



Engineering Standard

SAES-L-105

7 July 2013

Piping Line Classes

Document Responsibility: Piping Standards Committee

Saudi Aramco DeskTop Standards

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Previous Issue: 22 December 2012 Next Planned Update: 7 July 2018

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1 Scope

- 1.1 This standard covers the minimum mandatory requirements for piping line classes data sheets for piping, valves, and fittings for new piping for use in oil and gas processing, refining, distribution, and utility services, whose design is in accordance with either ASME B31.1, ASME B31.3, ASME B31.4, or ASME B31.8 Codes.
- 1.2 This standard provides the basic Piping Line Classes. Unlisted line classes (e.g., for unlisted material, higher corrosion allowance, or with modification suffix to a base line class) to meet projects' specific requirements shall be developed based on this standard and shall be approved by the Piping Standards Committee Chairman. The preamble section of this standard shall be attached to the relevant selected piping class(es) for the specific project.

2 Conflicts and Deviations

- 2.1 Any conflicts between this standard and other applicable Saudi Aramco Engineering Standards (SAESs), Materials System Specifications (SAMSSs), Standard Drawings (SASDs), or industry standards, codes, and forms shall be resolved in writing by the Company or Buyer Representative through the Manager, Consulting Services Department of Saudi Aramco, Dhahran.
- 2.2 Direct all requests to deviate from this standard in writing to the Company or Buyer Representative, who shall follow internal company procedure [SAEP-302](#) and forward such requests to the Manager, Consulting Services Department of Saudi Aramco, Dhahran.

3 References

The selection of material and equipment, and the design, construction, maintenance, and repair of equipment and facilities covered by this standard shall comply with the latest edition of Saudi Aramco Mandatory Standards and the references listed below, unless otherwise noted.

3.1 Saudi Aramco References

Saudi Aramco Engineering Procedure

[SAEP-302](#)

Instructions for Obtaining a Waiver of a Mandatory Saudi Aramco Engineering Requirement

Saudi Aramco Engineering Standards

[SAES-B-017](#)

Fire Water System Design

<u>SAES-L-100</u>	<i>Applicable Codes and Standards for Pressure Piping</i>
<u>SAES-L-101</u>	<i>Regulated Vendor List for Pipes, Fittings, Flanges and Tubes</i>
<u>SAES-L-102</u>	<i>Regulated Vendor List for Valves</i>
<u>SAES-L-108</u>	<i>Selection of Valves</i>
<u>SAES-L-109</u>	<i>Selection of Flanges, Stud Bolts and Gaskets</i>
<u>SAES-L-110</u>	<i>Limitations on Piping Joints and Components</i>
<u>SAES-L-132</u>	<i>Material Selection for Piping Systems</i>
<u>SAES-L-133</u>	<i>Corrosion Protection Requirements for Pipelines, Piping, and Process Equipment</i>
<u>SAES-L-136</u>	<i>Pipe, Flange, and Fitting Material Requirements</i>
<u>SAES-L-310</u>	<i>Design of Plant Piping</i>
<u>SAES-L-410</u>	<i>Design of Pipelines</i>
<u>SAES-L-610</u>	<i>Nonmetallic Piping in Oily Water Services</i>
<u>SAES-L-620</u>	<i>Design of Nonmetallic Piping in Hydrocarbon and Water Injection Systems</i>
<u>SAES-L-810</u>	<i>Design of Piping on Offshore Structures</i>
<u>SAES-M-100</u>	<i>Saudi Aramco Building Code</i>
<u>SAES-S-010</u>	<i>Sanitary Sewers</i>
<u>SAES-S-020</u>	<i>Oily Water Drainage Systems</i>
<u>SAES-S-030</u>	<i>Storm Water Drainage Systems</i>
<u>SAES-S-050</u>	<i>Sprinkler and Standpipe System in Buildings</i>
<u>SAES-S-060</u>	<i>Saudi Aramco Plumbing Code</i>
<u>SAES-W-011</u>	<i>Welding Requirements for On-Plot Piping</i>
<u>SAES-W-012</u>	<i>Welding Requirements for Pipelines</i>

Saudi Aramco Material System Specifications

<u>01-SAMSS-005</u>	<i>Shop Applied, Internal Cement Mortar Lining of Steel Pipe</i>
<u>01-SAMSS-025</u>	<i>Specification for Heavy Duty Polytetrafluoroethylene (PTFE) and Perfluoroalkoxy (PFA) Lined Carbon Steel Pipe and Fittings</i>

<u>01-SAMSS-029</u>	<i>RTR (Fiberglass) Sewer Pipe and Fittings for Gravity Flow</i>
<u>01-SAMSS-034</u>	<i>RTR (Fiberglass) Pressure Pipe and Fittings</i>
<u>01-SAMSS-035</u>	<i>API Line Pipe</i>
<u>01-SAMSS-042</u>	<i>Reinforced Thermoset Resin (RTR) Pipe and Fittings in Water and Hydrocarbon Services</i>
<u>01-SAMSS-046</u>	<i>Stainless Steel Pipe</i>
<u>01-SAMSS-048</u>	<i>CRA Clad or Lined Steel Pipe</i>
<u>01-SAMSS-333</u>	<i>High Frequency Welded Line Pipe</i>
<u>02-SAMSS-005</u>	<i>Butt Welding Pipe Fittings</i>
<u>02-SAMSS-011</u>	<i>Forged Steel and Alloy Flanges</i>
<u>04-SAMSS-001</u>	<i>Gate Valves</i>
<u>04-SAMSS-002</u>	<i>Globe Valves</i>
<u>04-SAMSS-003</u>	<i>Additional Requirements for Low Temp. Valves</i>
<u>04-SAMSS-005</u>	<i>Check Valves, Swing Type</i>
<u>04-SAMSS-035</u>	<i>General Requirements for Valves</i>
<u>04-SAMSS-041</u>	<i>Expanding Plug Valves</i>
<u>04-SAMSS-050</u>	<i>Gate Valves, Through Conduit Type, API 6D</i>
<u>04-SAMSS-051</u>	<i>Ball Valves, API 6D</i>
<u>09-SAMSS-107</u>	<i>Qualification Requirements and Application of Composite Fluoropolymer/Ceramic Coatings to Fasteners</i>

Saudi Aramco Standard Drawings

<u>AB-036865</u>	<i>Cathodic Protection, Electrical Insulating/Isolating Assemblies</i>
<u>AD-036204</u>	<i>Letter Designation for Line Numbers</i>
<u>AE-036768</u>	<i>External Welding Sleeve for Cement Lined Pipe</i>

3.2 Industry Codes and Standards

American Petroleum Institute

<i>API SPEC 5L</i>	<i>Specification for Line Pipe</i>
<i>API SPEC 6D</i>	<i>Specification for Pipeline Valves</i>

<i>API STD 599</i>	<i>Metal Plug Valves-Flanged, Threaded and Welding Ends</i>
<i>API STD 600</i>	<i>Steel Gate Valves-Flanged and Butt-Welding Ends</i>
<i>API STD 602</i>	<i>Steel Gate, Globe, and Check Valves for Sizes NPS 4 and Smaller for the Petroleum and Natural Gas Industries</i>
<i>API STD 607</i>	<i>Fire Test for Quarter-Turn Valves and Valves Equipped with Nonmetallic Seats</i>
<i>API RP 941</i>	<i>Steels for Hydrogen Service at Elevated Temperatures and Pressures in Petroleum Refineries and Petrochemical Plants</i>

American Society of Mechanical Engineers

<i>ASME B31.1</i>	<i>Power Piping</i>
<i>ASME B31.3</i>	<i>Process Piping</i>
<i>ASME B31.4</i>	<i>Pipeline Transportation Systems for Liquid Hydrocarbons and other Liquids</i>
<i>ASME B31.8</i>	<i>Gas Transmission and Distribution Piping Systems</i>
<i>ASME B16.1</i>	<i>Cast Iron Pipe Flanges and Flanged Fittings</i>
<i>ASME B16.3</i>	<i>Malleable Iron Threaded Fittings</i>
<i>ASME B16.5</i>	<i>Pipe Flanges and Flanged Fittings</i>
<i>ASME B16.9</i>	<i>Factory-Made Wrought Butt welding Fittings</i>
<i>ASME B16.11</i>	<i>Forged Steel Fittings, Socket-Welding and Threaded</i>
<i>ASME B16.12</i>	<i>Cast Iron Threaded Drainage Fittings</i>
<i>ASME B16.20</i>	<i>Metallic Gaskets for Pipe Flanges</i>
<i>ASME B16.21</i>	<i>Nonmetallic Gaskets for Pipe Flanges</i>
<i>ASME B16.22</i>	<i>Wrought Copper and Copper Alloy Solder Joint Pressure Fittings</i>
<i>ASME B16.28</i>	<i>Wrought Steel Butt welding Short Radius Elbows and Returns</i>
<i>ASME B16.34</i>	<i>Valves Flanged, Threaded and Welding End</i>
<i>ASME B16.39</i>	<i>Malleable Iron Threaded Pipe Unions</i>
<i>ASME B16.42</i>	<i>Ductile Iron Pipe Flanges and Flanged Fittings</i>
<i>ASME B16.47</i>	<i>Large Diameter Flanges</i>

ASME B16.48

Line Blanks

American Society for Testing and Materials

<i>ASTM A36</i>	<i>Structural Steel</i>
<i>ASTM A53</i>	<i>Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless</i>
<i>ASTM A74</i>	<i>Cast Iron Soil Pipe and Fittings</i>
<i>ASTM A105</i>	<i>Forgings, Carbon Steel, for Piping Components</i>
<i>ASTM A106</i>	<i>Seamless Carbon Steel Pipe for High Temperature Service</i>
<i>ASTM A126</i>	<i>Gray Iron Castings for Valves, Flanges, and Pipe Fittings</i>
<i>ASTM A182</i>	<i>Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves, and Parts for High Temperature Service</i>
<i>ASTM A193</i>	<i>Alloy-Steel and Stainless Steel Bolting Materials for High Temperature Service</i>
<i>ASTM A194</i>	<i>Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High Temperature Service</i>
<i>ASTM A216</i>	<i>Steel Casting, Carbon, Suitable for Fusion Welding for High Temperature Service</i>
<i>ASTM A217</i>	<i>Steel Casting, Martensitic Stainless and Alloy, for Pressure-Containing Parts Suitable for High Temperature Service</i>
<i>ASTM A234</i>	<i>Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service</i>
<i>ASTM A240</i>	<i>Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and General Applications</i>
<i>ASTM A269</i>	<i>Seamless and Welded Austenitic Stainless Steel Tubing for General Service</i>
<i>ASTM A307</i>	<i>Carbon Steel Bolts and Studs, 60,000 psi Tensile</i>
<i>ASTM A312</i>	<i>Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipe</i>
<i>ASTM A335</i>	<i>Seamless Ferritic Alloy Steel for High-Temperature Service</i>

<i>ASTM A350</i>	<i>Forgings, Carbon and Low-Alloy Steel Requiring Notch Toughness Testing for Piping Components</i>
<i>ASTM A351</i>	<i>Steel Castings, Austenitic, for High-Temperature Service</i>
<i>ASTM A395</i>	<i>Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures</i>
<i>ASTM A403</i>	<i>Wrought Austenitic Stainless Steel Piping Fittings</i>
<i>ASTM A494</i>	<i>Castings, Nickel and Nickel Alloy</i>
<i>ASTM A563</i>	<i>Carbon and Alloy Steel Nuts</i>
<i>ASTM A789/A789M</i>	<i>Seamless and Welded Ferritic/Austenitic Stainless Steel Tubing for General Service</i>
<i>ASTM A790/A790M</i>	<i>Seamless and Welded Ferritic/Austenitic Stainless Steel Pipe</i>
<i>ASTM B61</i>	<i>Steam or Valve Bronze Castings</i>
<i>ASTM B62</i>	<i>Composition Bronze or Ounce Metal Castings</i>
<i>ASTM B88</i>	<i>Seamless Copper Water Tube</i>
<i>ASTM B165</i>	<i>Nickel-Copper Alloy (UNS N04400) Seamless Pipe and Tube</i>
<i>ASTM B169</i>	<i>Aluminum-Bronze Plate, Sheet, Strip, and Rolled Bar (UNS C61400)</i>
<i>ASTM B366</i>	<i>Factory-Made Wrought Nickel-Alloy Welding Fittings</i>
<i>ASTM B407</i>	<i>Nickel-Iron-Chromium Alloy Seamless Pipe and Tube</i>
<i>ASTM B409</i>	<i>Nickel-Iron-Chromium Alloy Plate, Sheet, and Strip</i>
<i>ASTM B462</i>	<i>Forged or Rolled UNS N08020, UNS N08024, UNS N08026, and UNS N08367 Alloy Pipe Fittings, and Valves and Parts for Corrosive High-Temperature Service</i>
<i>ASTM B463</i>	<i>Forged or Rolled UNS N08020, UNS N08024, UNS N08026 Alloy Plate, Sheet, and Strip</i>
<i>ASTM B464</i>	<i>Welded Chromium-Nickel-Iron-Molybdenum-Copper-Columbium Stabilized Alloy (UNS N08020) Pipe</i>
<i>ASTM B466</i>	<i>Seamless Copper-Nickel Pipe and Tube (UNS C70610)</i>
<i>ASTM B467</i>	<i>Welded Copper-Nickel Pipe (UNS C71500)</i>

<i>ASTM B474</i>	<i>Electric Fusion Welded UNS N08020, UNS N08024, and UNS N08026 Nickel Alloy Pipe</i>
<i>ASTM B530</i>	<i>Method for Measurement of Coating Thicknesses by Magnetic Method, Electrodeposited Nickel Coatings on Magnetic and Non-Magnetic Substrates</i>
<i>ASTM B564</i>	<i>Nickel Alloy Forgings</i>
<i>ASTM D1784</i>	<i>Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds</i>
<i>ASTM D1785</i>	<i>Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120</i>
<i>ASTM D2467</i>	<i>Socket-Type Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80</i>
<i>ASTM D2564</i>	<i>Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings</i>
<i>ASTM D2665</i>	<i>Practice for Operating Xenon Arc-Type Light Exposure Apparatus With and Without Water for Exposure of Plastics</i>
<i>ASTM D3034</i>	<i>Type PSM Poly(Vinyl Chloride)(PVC) Sewer Pipe and Fittings</i>
<i>ASTM D3311</i>	<i>Drain, Waste, and Vent (DWV) Plastic Fittings Patterns</i>
<i>ASTM F437</i>	<i>Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80</i>
<i>ASTM F439</i>	<i>Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings</i>
<i>ASTM F441</i>	<i>Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80</i>
<i>ASTM F493</i>	<i>Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings</i>

Chlorine Institute

Chlorine Institute Pamphlet 6

Manufacturers Standardization Society

MSS SP-44 Steel Pipe Line Flanges

MSS SP-75 Specification for High-Test, Wrought, Butt-Welding

Fittings

<i>MSS SP-83</i>	<i>Steel Pipe Unions, Socket-Welding and Threaded</i>
<i>MSS SP-95</i>	<i>Swaged Nipples and Bull Plugs</i>
<i>MSS SP-97</i>	<i>Integrally Reinforced Forged Branch Outlet Fittings - Socket Welding, Threaded, and Buttwelding Ends</i>

National Association of Corrosion Engineers / International Standardization Organization

<u>NACE MR0175/ ISO 15156</u>	<i>Petroleum and Natural Gas Industries-Materials for use in H₂S-Containing Environments in Oil and Gas Production</i>
<i>NACE MR-0103</i>	<i>Materials Resistant to Sulfide Stress Cracking in Corrosive Petroleum Refining Environments</i>

4 Definitions and Abbreviations

4.1 Definitions

Amine Services: All amine solutions including: MEA, DGA and ADIP.

Caustic Services: All sodium hydroxide solutions.

Hydrocarbon Services: Process streams of liquid or gaseous hydrocarbon materials, including two and three phase hydrocarbon materials.

Hydrogen Services: Process streams containing relatively pure hydrogen and component streams containing hydrogen with a partial pressure of 350 Kpa (abs) and higher.

NPS: Nominal Pipe Size.

Sour Services: For definition, refer to [SAES-L-133](#).

4.2 Abbreviations

The following abbreviations are used in this standard for valve descriptions;-

BB	Bolted Bonnet
BC	Bolted Cover
CS	Carbon Steel
ISNRS	Inside Screw Non-Rising Stem
ISRS	Inside Screw Rising Stem

- OS&Y** Outside Screw and Yoke
- PSB** Pressure Seal Bonnet
- WB** Welded Bonnet
- TRIM** Stem, body seating surface, disc and gate seating surface, Backseat, ball, plug, etc., and all other parts in contact with line fluid. Refer to [Table 4.2](#) for trim designation numbers. Whenever “full” is used, it means that all parts shall be made from the material specified and not just the surface mating material
- HF** Hard Faced (Stellite No.6)

Table 4.2 – Simplified Trim Number Designations

Trim No.	Body Seat Surface Material	Closure Member Surface Material
1	13 CR	13 CR
2	SS 304	SS 304
3	SS 310	SS 310
4	13 CR Hardened	13 CR Hardened
5	Co-Cr Hardfacing	Co-Cr Hardfacing
5A	Ni-Cr hardfacing	Ni-Cr hardfacing
6	13 CR	CU-NI
7	13 CR hardened	13 CR
8	Co-Cr Hardfacing	13 CR
8A	Ni-Cr hardfacing	13 CR
9	Monel	Monel
10	SS 316	SS 316
11	Monel	Ni-Cr or Co-Cr Hardfacing
12	SS 316	Ni-Cr or Co-Cr Hardfacing
13	Alloy 20	Alloy 20
14	Alloy 20	Ni-Cr or Co-Cr Hardfacing

Notes:

- This table is a simplified version of trim number table in API 600. Its only purpose is to aid in understanding the trim number designations listed in the Piping Material Classes.
- Trim selection and acceptable alternatives are governed by [SAES-L-108](#) and the applicable SAMSS.
- When a combination trim is shown (Trim No.'s 6, 7, 8, 8A, 11, 12, or 14), the seating surface materials of the seat and closure member may be interchanged.

5 General Requirements

5.1 The standard consists of three parts:

Part I, supplements ASME B31.4/8 design Code and covers the applicable piping defined in [SAES-L-100](#) for non-process facilities such as pump stations, terminals, water treatment and water injection plants, bulk plants, air fueling terminals, tank farms, and wellhead piping. Flowlines, trunklines, transmission lines, cross-country pipelines, and sub-sea pipelines are excluded.

Part II, supplements ASME B31.1/3 design Code and covers the applicable piping defined in [SAES-L-100](#) for process facilities such as steam generation plants, GOSPs, gas plants, NGL plants, off-shore platforms, refineries and petrochemical plants.

Part III covers utility and non-metallic piping for process and non-process facilities.

5.2 The latest revision of this standard shall be used to develop “Piping Line Classes” for grass root plants or new facilities within an existing plant. The plant original specifications based on previous revisions of this standard or specific project’s “Piping Line Classes” should be used for maintaining or tie-ins to existing piping facilities provided the original specifications meet applicable code requirements and do not pose a safety hazard.

6 Design

6.1 General

6.1.1 All piping designed per the applicable ASME B31 Code as specified in the individual line classes shall meet the requirements of: [SAES-L-100](#), [SAES-L-108](#), [SAES-L-109](#), [SAES-L-110](#), [SAES-L-310](#), [SAES-L-410](#), [SAES-L-610](#), [SAES-L-620](#), and [SAES-L-810](#).

6.1.2 All sanitary and drainage piping shall meet the applicable requirements of: [SAES-S-010](#), [SAES-S-020](#), [SAES-S-030](#), and [SAES-S-060](#).

6.1.3 All piping for fire water systems shall meet the applicable requirements of [SAES-B-017](#) and [SAES-S-050](#).

6.2 Corrosion Allowance

Corrosion allowance shall be determined based on the criteria specified in [SAES-L-133](#) and shall meet the allowance specified in the facility material selection diagram(s).

Commentary Notes:

The corrosion allowance given in the listed line classes in this standard is based on typical values from previous projects. However, it is the responsibility of the material/corrosion engineer to specify the appropriate corrosion allowance for the service conditions and intended service life. If the required corrosion allowance is not covered in the listed line classes in this standard, a line class with the required corrosion allowance shall be developed for the specific project's "Piping Line Classes". The wall thickness and schedules of the pipe and fitting shall be calculated to meet the Code requirements including the required corrosion allowance.

6.3 Pipe

Limitations on pipe sizes per the applicable [SAES-L-310](#) or [SAES-L-410](#) shall apply.

6.4 Pipe Joints and Components

6.4.1 Limitation on pipe joints and components per [SAES-L-110](#) shall apply.

6.4.2 Selection of flanges, gaskets, bolts and nuts shall be in accordance with [SAES-L-109](#).

6.5 Valves

The types of valves and valve trims to be used are to be in accordance with the individual line classes based on the service conditions and the limitations detailed in [SAES-L-108](#).

6.6 Branch Connection

Branch connections for new construction of metallic piping shall be made in accordance with [SAES-L-110](#).

7 Materials

7.1 General

7.1.1 The piping material specifications (line classes) listed in Tables [8.1](#), [9.1](#), and [10.1](#) are the basic material descriptions for: pipe, valves and fittings which are typically suitable for the listed fluid service(s) under the given conditions.

7.1.2 The fluid services and selection of material listed in Tables [8.1](#), [9.1](#) and [10.1](#) are not inclusive or restrictive. New services and alternative materials are acceptable provided they meet the requirements of [SAES-L-132](#) and the material selection diagram(s)/specifications of the project.

- 7.1.3 Restrictions on the use of line pipe material per [SAES-L-136](#) shall apply.
 - 7.1.4 The pipe material specifications (line classes) shall only be used within the specified pressure and temperature range.
 - 7.1.5 The line class notes listed in referenced within the individual line classes and listed in Appendix are mandatory requirements.
 - 7.1.6 Alternative material specifications (ASTM, API, ISO, MSS) to those listed in the detailed line classes sections 8.3, 9.3, and 10.2 may be used subject to the approval of CSD.
- 7.2 Impact Testing (Pipe and Fittings)
- Impact test is required for carbon steel material ASTM A106 and API SPEC 5L when the design temperature is below the minimum temperature of ASME B31.3 Figure 323.2.2.
- 7.3 Postweld Heat Treatment (Pipe and Fittings)
- Postweld heat treatment (PWHT) shall be specified when required by the applicable Code or for service conditions listed in [SAES-W-011](#).
- 7.4 Material Specifications and Procurement
- 7.4.1 The material of pipe, fittings, and valves shall conform to the applicable code, industry specification, and SAMSS referenced in [Section 3](#) of this standard.
 - 7.4.2 Limitation on procurement of pipes, flanges, pipe fittings and gaskets per [SAES-L-101](#) shall apply.
 - 7.4.3 Limitation on procurement of valves per [SAES-L-102](#) shall apply.

8 Line Class Designator System

The system is based on Process Industry Practices (PIP) to provide a uniform standard consistent with industry practices, but modified to meet specific Saudi Aramco requirements.

8.1 Field Definitions and Examples

The base piping line class designator system consists of five alpha-numeric fields containing one or two characters each. Each field describes various features of the piping line class as shown in [Table 8.1](#).

Table 8.1 - Line Class Field Definition

	Field Location				
	First	Second	Third	Forth	Fifth (optional)
Field Type	Numeric	Alphabetic	Numeric	Alphabetic	Numeric
Number of Characters	Single/double	Double	Single	Single	Double
Representation	Flange Rating	Basic Material	Corrosion Allowance	Main Service Type	Modification Suffix
Example	3	CS	2	P	02
Explanation	1: 300# rating	Carbon steel	3 mm corrosion allowance	General Hydrocarbon	Sour Service

- 8.2 Exceptions, modification, or additions may be made to the base piping line class to meet specific requirements through the use of the fifth field location, i.e., modification suffix. Line classes with listed fields shall be approved the Chairman of the Piping Standards Committee.
- 8.3 Line classes for materials not listed in 8.5.2 may be added per the Process Industry Practices (PIP).
- 8.4 Projects may develop their specific “Piping Line Classes” to meet the project’s specific requirements.
- 8.4.1 The project’s “Piping Line Classes” may contain listed line classes in this standard as well as unlisted line classes (e.g., for unlisted material, higher corrosion allowance, or with modification suffix to a base line class).

8.4.2 The project's "Piping Line Classes" shall be developed based on this standard and shall be approved by the Piping Standards Committee Chairman.

8.5 Field Definition Tables

8.5.1 First Field (Pressure Rating)

Symbol	Pressure Rating or Class (ASME B16.5/B16.47 Flange Class)	Symbol	(Pressure Rating)
1	150		
3	300		
		80	Non-pressure
6	600		
9	900	90	Class 3000, API 6A
15	1500	95	Class 10000, API 6A
25	2500	99	Design pressure

8.5.2 Second Field (Line Material)

Symbol	Material	Symbol	Material
BC	Copper Tubing	LP	Polypropylene-lined Carbon Steel
BD	90-10 Cu-Ni	LT	PTFE Lined Carbon Steel
CA	Impact Tested Carbon Steel	NC	Hastelloy C276
CS	Carbon Steel	NM	Monel 400
CG	Galvanized Carbon Steel	NR	Incoloy 800
CH	Carbon Steel, PWHT for Process	NT	Carpenter 20 (Alloy 20)
CT	HIC Tested Carbon Steel	PU	CPVC(Chlorinated PVC)
CJ	1-1/4 Cr-1/2 Mo Alloy Steel	PV	PVC(PolyVinyl Chloride)
CK	2-1/4 Cr-1 Mo Alloy Steel	SA	304/304L Stainless Steel
CL	5 Cr-1/2 Mo Alloy Steel	SC	304H Stainless Steel
CM	9 Cr-1 Mo Alloy Steel	SD	Type 316/316L Stainless Steel
CX	Carbon Steel, Jacketed	SL	347 Stainless Steel

Symbol	Material	Symbol	Material
DC	Cast Iron, Grey	SP	Duplex Stainless Steel UNS S32205/S31803
FE	Glass Fiber Reinforced Epoxy	SJ	321 Stainless Steel
LC	Cement-lined Carbon Steel	SY	Super Duplex Stainless Steel UNS S32750
LE	Epoxy-lined Carbon Steel	SV	254 SMO UNS S31254
LH	HDPE-lined Carbon Steel	WA	Reinforced Thermoplastic Pipe
LL	Cladded Carbon Steel		

8.5.3 Third Field (Corrosion Allowance)

Symbol	Corrosion Allowance	Symbol	Corrosion Allowance
0	Zero	3	4.8 mm (3/16")
1	1.6 mm (1/16")	4	6.4 mm (1/4")
2	3.2 mm (1/8")	9	Corrosion allowance as noted.

Commentary Note:

Using corrosion allowance of 1.5, 3.0, 4.5, and 6.0 mm for symbols 1, 2, 3, and 4 respectively is acceptable if the wall thickness calculations is based on metric units.

8.5.4 Forth Field (Service)

Symbol	Service
A	Acid
C	Caustic
D	Drain/Sewer
H	Hydrogen
P	Process (General Hydrocarbon)
T	Wellhead Piping (Owner designator)
U	Utility
W	Water (Owner designator)
Y	Chlorine Gas (Owner designator)

8.5.5 Fifth Field (Modification Suffix)

Symbol	Service
01	Base line class (optional)
02	Sour service, NACE MR-0175/ISO 15156 or NACE MR-0103 as applicable
03	Different valve trim or different flange face
04	Design code per ASME B31.4 (optional)
05	Buried
06	HIC Resistance, Sour service, NACE MR-0175/ISO 15156 or NACE MR-0103 as applicable
07	Reserved
08	Design code per ASME B31.8 (optional)
09-10	Reserved
11-20	Project specific requirements

8.2.6 Saudi Aramco Service Codes

Saudi Aramco service codes listed in Saudi Aramco Standard Drawing [AD-036204-001](#) shall be included in conjunction with the line class designators on P&ID's and other drawings.

Example: 6"-FG-123-1CS1P is a 6-inch fuel gas line number 123 and material specification 1CS1P.

9 Line Class Index - Part I (Non-process Facilities)

9.1 [Table 9.1](#) provides the line class index which summarizes: the service applications, primary materials, design pressure/code, temperature range, and valve trim for Part I (Non Process Facilities).

Table 9.1 - Piping Line Classes Index for Part I (Non-process Facilities)

LINE CLASS	SERVICE	MATERIAL	DESIGN PRESSURE/CODE	TEMP RANGE	VALVE TRIM	NOTES
CARBON STEEL PIPING – NON SOUR SERVICES						
1CA1P	General hydrocarbon (low temp)	Impact tested Carbon steel	ASME B16.5 Flange rating/ ASME B31.4/31.8	-46°C to 121°C	Trim 12	
3CA1P						
6CA1P						
1CS1P	General hydrocarbon	Carbon steel ERW and X65 are permitted	ASME B16.5 Flange rating/ ASME B31.4/31.8	-18°C to 121°C	Trim 8	
3CS1P						
6CS1P						
9CS1P						
15CS1P						
25CS1P						
90CS1T	Wellhead Piping	Carbon steel	API 6A 3000 RJ/ ASME B31.4/31.8	-18°C to 121°C	Trim 8	
95CS1T	Khuff Gas Wellhead Piping	Carbon steel	API 6A 1000RJ/ ASME 31.8	-18°C to 121°C	Trim 8	
CARBON STEEL PIPING –SOUR SERVICES						
1CS1P02	Sour services SSC environments per SAES-L-133	Carbon steel ISO 15156 ERW and X65 are permitted	ASME B16.5 Flange rating/ ASME B31.4/31.8	-18°C to 121°C	Trim 12	(1)
3CS1P02						
6CS1P02						
9CS1P02						
15CS1P02						
1CS1P06	Sour services HIC environments per SAES-L-133	Carbon steel HIC Resistant ISO 15156 ERW and X65 are permitted	ASME B16.5 Flange rating/ ASME B31.4/31.8	-18°C to 121°C	Trim 12	(1)
3CS1P06						
6CS1P06						
STAINLESS STEELS						
1SA1P	- Corrosive services - Lube oil	304/304L SS	ASME B16.5 Flange rating/ ASME B31.4/31.8	-29°C to 121°C	Trim 12	
3SA1P						
1SD0P	- Corrosive Services	316/316L SS	ASME B16.5 Flange rating/ ASME B31.4/31.8	-29°C to 121°C	Trim 12	
3SD0P						
1SY0W	Corrosive process, Sea Water, Wasea Water, Formation Water	Super Duplex	ASME B16.5 Flange rating/ ASME B31.4/31.8	0°C to 121°C	Trim 5	

- 9.2 The below notes are applicable for line classes of Part I (Non Process Facilities) as referenced in the index ([Section 9.1](#)) or the detailed line classes ([Section 9.3](#)):
- 1- Note restrictions of use of SS 316 in ISO 15156/NACE MR0175. Use trim 8 (SS 410) in sour services when general corrosion potential is low.
 - 2- The wall thickness calculation is based on the line class corrosion allowance and 0.72 design factor. The corrosion allowance is included in the pipe and fitting wall thicknesses. For service conditions that require different corrosion allowances or different design factor, the wall thicknesses are to be calculated accordingly.
 - 3- Schedule of fittings and flanges to be same as pipe. If high strength pipe is used, high strength fitting per MSS SP-75 and high strength flanges shall be used.
 - 4- Equivalent ASTM specifications for the valve body manufactured from plates, bars, or tubular per Table 1 of ASME B16.34 may be used.
 - 5- ASTM A193 Gr. B7 bolts with ASTM A194 Gr. 2H heavy hex nuts may be used if the bolts will not be subject to low temperature conditions (e.g., auto-refrigeration due to flange leakage). Refer to [SAES-L-109](#) for bolt material selection.
 - 6- Where non-metallic seats, seals, liners, etc., are used, the manufacturer's pressure/temperature ratings shall limit the service of this class. If seal welding is required, threaded end valves shall have extended bodies or "swing-out" bodies to prevent damage due to welding heat.
 - 7- Use flanges instead of unions.
 - 8- Fittings and flanges with yield strength of 60 ksi or higher should be used if API 5L Gr. X60 is used. This would allow selecting fittings and flanges of the same thickness.
 - 9- If the bolts have potential for exposure to the sour service, A193 B7M stud bolts, with A194 2HM heavy hex nuts shall be used.
 - 10- API 6A nominal sizes are between parentheses.
 - 11- The pipe wall thickness shall be calculated in accordance with Appendix K (high pressure piping) of ASME B31.3 code.
 - 12- Socket weld joints shall not be used.
-

9.3 Detailed Line Classes of Part I (Non Process Facilities)

Line Class: 1CA1P Service: Refer to Table 9.1 Rating Class: 150 RF Temperature Limit: -45°C to 121°C Corrosion Allowance: 1.6 mm (2)			Basic Material: Impact Tested C.S. Code: B31.4/31.8 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" -2"	XS	Seamless	A333 Gr. 6	(2)
	3" to 24"	STD	Seamless or welded	A333 Gr. 6 or A671, Class 22, Grade CC60 or CC65, S2	
	26" and above	Calculate			
FITTINGS					
El's, tees, reducers, coupling, caps, plugs, etc.	½" - 1½"	Class 3000	Socketweld/Threaded	A350-LF2 Class 1, B16.11	(3)
	2" -24"		Buttweld, Seamless	A420-Gr. WPL6, B16.9	
	26" and above		Buttweld, Welded	A420-Gr. WPL6, B16.9	
NIPPLES	½" - 1½"	XS	Socketweld/Threaded	A333 Gr. 6	
SWAGES	½" - 1½"	XS	Socketweld/Threaded	A420-WPL6, MSS SP-95	
Unions	½" - 1½"	Class 3000	Socketweld/Threaded	A350-LF2 Class 1, MSS SP-83	
Sockolets/Threadolets	½" - 1½"	Class 3000	Socketweld/Threaded	A350-LF2 Class 1, MSS SP-97	
Weldolets	2" and above	Class 3000	Buttweld	A350-LF2 Class 1, MSS SP-97	
FLANGES	½" - 1½"	Class 150	Socketweld/Threaded RF	A350-LF2 Class 1, B16.5	(3)
	2" to 24"	Class 150	Weldneck RF		
	24" and above	Class 150	Weldneck RF	A350-LF2 Class 1, B16.47 series A	
BOLTING	A320 Gr. L7 stud bolts, A194 G's 4 or 7 heavy hex nuts.				(5)
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
VALVES					
Gate Valves	1½" and under	Class 800	Socketweld/Threaded	A350-LF2 Class 1 body, BB, OS&Y, graphite packing, API 602, Trim No.12	(4)
	2" and above	Class 150	RF Flanged	Body A352-LCB or A350-LF2 Class 1 Wedge type: BB, OS&Y, graphite packing, API 600, Trim No. 12 Thru-Conduit type: API 6D, Trim No.12	

Continuation of Line Class 1CA1P					
Item	NPS	Rating Schedule	Type	Specification	Notes
Globe Valves	1½" and under	Class 800	Socketweld/ Threaded	A350-LF2 Class 1 body, BB, OS&Y, graphite packing API 602, Trim No. 12	
	2" and above	Class 150	RF Flanged	Body A352-LCB or A350-LF2 Class 1, BB, OS&Y, graphite packing, Trim No. 12	(4)
Check Valves	1½" and under	Class 800	Socketweld/ Threaded	A350-LF2 Class 1 body, API 602, Trim No. 10	
	2" and above	Class 150	RF Flanged	A352-LCB body, BC, Trim No. 10	(4)
Ball Valves	1½" and under	Class 300	Socketweld/ Threaded	A350-LF2 Class 1 body, floating ball, RTFE seats, Trim SS 316	(6)
	2" to 4"	Class 150	RF Flanged	Body A352-LCB or A350-LF2 Class 1, floating ball, RTFE seats, fire safe, API 6D, Trim SS 316	(4), (6)
	6" and above	Class 150	RF Flanged	Body A352-LCB or A350-LF2 Class 1, trunnion mounted, fire safe, API 6D, Trim SS 316	(4), (6)
Plug Valves	1½" and under	Class 600	Socketweld/ Threaded	A350-LF2 Class 1 body, lubricated, inverted pressure balanced, API 599, Trim SS 316	
	2" and above	Class 150	RF Flanged	Body A352-LCB or A350-LF2 Class 1, API 599, inverted pressure balanced, Trim SS 316	(4)
Butterfly Valves	3" and above	Class 150	Lugged or RF Flanged	Body A352-LCB or A350-LF2 Class 1, high performance, fire-safe, API 609 Cat. B, Trim SS 316	(4)

Line Class: 3CA1P Service: Refer to Table 9.1 Rating Class: 300 RF Temperature Limit: -45°C to 121°C Corrosion Allowance: 1.6 mm (2)			Basic Material: Impact Tested C.S. Code: B31.4/31.8 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" -2"	XS	Seamless	A333 Gr. 6	(2)
	3" to 16"	Sch 40	Seamless or Welded	A333 Gr. 6 or	
	18" and above	Calculate		A671, Class 22, Grade CC60 or CC65, S2	
FITTINGS El's, tees, reducers, coupling, caps, plugs, etc.	½" - 1½"	Class 3000	Socketweld/ Threaded	A350-LF2 Class 1, B16.11	(3)
	2" -24"		Buttweld, Seamless	A420-Gr. WPL6, B16.9	
	26" and above		Buttweld, Welded	A420-Gr. WPL6, B16.9	
NIPPLES	½" - 1½"	XS	Socketweld/ Threaded	A333 Gr. 6	
SWAGES	½" - 1½"	XS	Socketweld/ Threaded	A420-WPL6, MSS SP-95	
Unions	½" - 1½"	Class 3000	Socketweld/ Threaded	A350-LF2 Class 1, MSS SP-83	
Sockolets/ Threadolets	½" - 1½"	Class 3000	Socketweld/ Threaded	A350-LF2 Class 1, MSS SP-97	
Weldolets	2" and above	Class 3000	Buttweld	A350-LF2 Class 1, MSS SP-97	
FLANGES	½" - 1½"	Class 300	Socketweld/ Threaded RF	A350-LF2 Class 1, B16.5	(3)
	2" to 24"	Class 300	Weldneck RF		
	24" and above	Class 300	Weldneck RF	A350-LF2 Class 1, B16.47, series A	
BOLTING	A320 Gr. L7 stud bolts, A194 G's 4 or 7 heavy hex nuts.				(5)
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20.			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20.			
VALVES					
Gate Valves	1½" and under	Class 800	Socketweld/ Threaded	A350-LF2 Class 1 body, BB, OS&Y, graphite packing, API 602, Trim No.12	(4)
	2" and above	Class 300	RF Flanged	Body A352-LCB or A350-LF2 Class 1 <u>Wedge type:</u> BB, OS&Y, graphite packing, API 600, Trim No. 12 <u>Thru-Conduit type:</u> API 6D, Trim No.12	

Continuation of Line Class 3CA1P					
Item	NPS	Rating Schedule	Type	Specification	Notes
Globe Valves	1½" and under	Class 800	Socketweld/ Threaded	A350-LF2 Class 1 body, BB, OS&Y, graphite packing API 602, Trim No. 12	
	2" and above	Class 300	RF Flanged	Body A352-LCB or A350-LF2 Class 1, BB, OS&Y, graphite packing, Trim No. 12	(4)
Check Valves	1½" and under	Class 800	Socketweld/ Threaded	A350-LF2 Class 1 body, API 602, Trim No. 10	
	2" and above	Class 300	RF Flanged	Body A352-LCB or A350-LF2 Class 1, BC, Trim No. 10	(4)
Ball Valves	1½" and under	Class 300	Socketweld/ Threaded	A350-LF2 Class 1 body, floating ball, RTFE seats, Trim SS 316	(6)
	2" to 4"	Class 300	RF Flanged	Body A352-LCB or A350-LF2 Class 1, floating ball, RTFE seats, fire safe, API 6D, Trim SS 316	(4), (6)
	6" and above	Class 300	RF Flanged	Body A352-LCB or A350-LF2 Class 1, trunnion mounted, fire safe, API 6D, Trim SS 316	(4), (6)
Plug Valves	1½" and under	Class 600	Socketweld/ Threaded	A350-LF2 Class 1 body, lubricated, inverted pressure balanced, API 599, Trim SS 316	
	2" and above	Class 300	RF Flanged	Body A352-LCB or A350-LF2 Class 1, API 599, inverted pressure balanced, Trim SS 316	(4)
Butterfly Valves	3" and above	Class 300	Lugged or RF Flanged	Body A352-LCB or A350-LF2 Class 1, high performance, fire-safe, API 609 Cat. B, Trim No. SS 316	(4)

Line Class: 6CA1P Service: Refer to Table 9.1 Rating Class: 600 RF Temperature Limit: -45°C to 121°C Corrosion Allowance: 1.6 mm (2)			Basic Material: Impact Tested C.S. Code: B31.4/31.8 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" - 1½" 8"	XS	Seamless	A333 Gr. 6	(2)
	2" to 8"	XS	Seamless	A333 Gr. 6	
	10" and above	Calculate	Seamless or Welded	A333 Gr. 6 or A671, Class 22, Grade CC60 or CC65, S2	
FITTINGS El's, tees, reducers, coupling, caps, plugs, etc.	½" - 1½"	Class 3000	Socketweld/ Threaded	A350-LF2 Class 1, B16.11	(3)
	2" - 24"		Buttweld, Seamless	A420-Gr. WPL6, B16.9	
	26" and above		Buttweld, Welded	A420-Gr. WPL6, B16.9	
NIPPLES	½" - 1½"	XS	Socketweld/ Threaded	A333 Gr. 6	
SWAGES	½" - 1½"	XS	Socketweld/ Threaded	A420-WPL6, MSS SP-95	
Unions	-	-	-	-	(7)
Socketlets / Threadoletts	½" - 1½"	Class 3000	Socketweld/ Threaded	A350-LF2 Class 1, MSS SP-97	
Weldolets	2" and above	Class 3000	Buttweld	A350-LF2 Class 1, MSS SP-97	
FLANGES	½" - 1½"	Class 600	Socketweld/ Threaded RF	A350-LF2 Class 1, B16.5	(3)
	2" to 24"	Class 600	Weldneck RF		
	24" and above	Class 600	Weldneck RF	A350-LF2 Class 1, B16.47, series A	
BOLTING	A320 Gr. L7 stud bolts, A194 G's 4 or 7 heavy hex nuts.				(5)
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20.			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20.			
VALVES					
Gate Valves	1½" and under	Class 800	Socketweld/ Threaded	A350-LF2 Class 1 body, BB, OS&Y, graphite packing, API 602, Trim No.12	(4)
	2" and above	Class 600	RF Flanged	Body A352-LCB or A350-LF2 Class 1 Wedge type: BB, OS&Y, graphite packing, API 600, Trim No. 12 Thru-Conduit type: API 6D, Trim No.12	

Continuation of Line Class 6CA1P					
Item	NPS	Rating Schedule	Type	Specification	Notes
Globe Valves	1½" and under	Class 800	Socketweld/ Threaded	A350-LF2 Class 1 body, BB, OS&Y, graphite packing API 602, Trim No. 12	
	2" and above	Class 600	RF Flanged	Body A352-LCB or A350-LF2 Class 1, BB, OS&Y, graphite packing, Trim No. 12	(4)
Check Valves	1½" and under	Class 800	Socketweld/ Threaded	A350-LF2 Class 1 body, API 602, Trim No. 10	
	2" and above	Class 600	RF Flanged	Body A352-LCB or A350-LF2 Class 1, BC, Trim No. 10	(4)
Ball Valves	1½" and under	Class 600	Socketweld/ Threaded	A350-LF2 Class 1 body, floating ball, RTFE seats, Trim SS 316	(6)
	2" and above	Class 600	RF Flanged	Body A352-LCB or A350-LF2 Class 1, trunnion mounted, fire safe, API 6D, Trim SS 316	(4), (6)
Plug Valves	1½" and under	Class 600	Socketweld/ Threaded	A350-LF2 Class 1 body, lubricated, inverted pressure balanced, API 599, Trim SS 316	
	2" and above	Class 600	RF Flanged	Body A352-LCB or A350-LF2 Class 1, API 599, inverted pressure balanced, Trim SS 316	(4)
Butterfly Valves	3" and above	Class 600	Lugged or RF Flanged	Body A352-LCB or A350-LF2 Class 1, high performance, fire-safe, API 609 Cat. B, Trim SS 316	(4)

Line Class: 1CS1P Service: Refer to Table 9.1 Rating Class: 150 RF Temperature Limit: -18 to 121°C Corrosion Allowance: 1.6 mm (2)			Basic Material: Carbon Steel Code: B31.4/31.8 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½-1½	XS	Seamless	A106 Gr. B or API 5L, Gr. B or Gr. X60	(2)
	2"	XS	Seamless		
	3" to 24"	STD	Seamless or Welded (SAW, ERW)		
	26" and larger	Calculate			
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½-1½	Class 3000	Socketweld/ Threaded	A105N, B16.11	
	2 and above		Buttweld	A234-WPB, B16.9	(3), (8)
Nipples	½-1½	XS	Socketweld/ Threaded	A106 Gr. B	
Swages	½-1½	XS	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-83	
Sockolets/ Threadolets	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-97	
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	
FLANGES	1½ and under	Class 150	Socketweld/ Threaded RF	A105N, B16.5	(3)
	2 -24	Class 150	Weldneck RF	A105N, B16.5	(3), (8)
	26 and above	Class 150	Weldneck RF	A350 LF2 Cl 2 B16.47 Series A	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
VALVES					
Gate Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	(4)
	2 and above	Class 150	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, API 600, Trim No. 8	
Globe Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	(4)
	2 and above	Class 150	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, Trim No. 8	

Continuation of Line Class 1CS1P					
Item	NPS	Rating Schedule	Type	Specification	Notes
Check Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, Trim No.1	
	2 and above	Class 150	RF Flanged	Body A216-WCB or A105, Trim No.1	(4)
Ball Valves	1½ and under	Class 300	Socketweld/ Threaded	A105N body, floating ball, RTFE seats, Trim SS 316	(6)
	2 to 4	Class 150	RF Flanged	Body A216-WCB or A105, floating ball, RTFE seats, fire safe, API 6D, Trim ENP or SS410	(4), (6)
	6 and above	Class 150	RF Flanged	Body A216-WCB or A105, trunnion mounted, fire safe, API 608 or 6D, Trim ENP or SS410	(4)
Plug Valves	1½ and under	Class 600	Socketweld/ Threaded	A105N body, lubricated, inverted pressure balanced, BC, Trim 316 SS	
	2 and above	Class 150	RF Flanged	Body A216-WCB or A105, lubricated, inverted pressure balanced, BC, API 599, Trim ENP or SS 410	(4)
Butterfly Valves	4 and above	Class 150	Lugged or RF Flanged	Body A216-WCB or A105, high performance, double or triple eccentric, fire safe, API 609 Cat.B, Trim ENP or SS316	(4)

Line Class: 3CS1P Service: Refer to Table 9.1 Rating Class: 300 RF Temperature Limit: -18 to 121°C Corrosion Allowance: 1.6 mm (2)			Basic Material: Carbon Steel Code: B31.4/31.8 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½-1½	XS	Seamless	A106 Gr. B or	(2)
	2"	XS	Seamless	API 5L, Gr. B or Gr. X60	
	3" to 16"	Sch 40	Seamless or Welded		
	18" and larger	Calculate	(SAW, ERW)		
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½-1½	Class 3000	Socketweld/ Threaded	A105N, B16.11	
	2 and above		Buttweld	A234-WPB, B16.9	(3), (8)
Nipples	½-1½	XS	Socketweld/ Threaded	A106 Gr. B	
Swages	½-1½	XS	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-83	
Sockolets/ Threadolets	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-97	
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	
FLANGES	1½ and under	Class 300	Socketweld RF	A105N, B16.5	(3)
	2 -24	Class 300	Weldneck RF	A105N, B16.5	(3), (8)
	26 and above	Class 300	Weldneck RF	A350 LF2 Cl 2 B16.47 Series A	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts.				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20.			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20.			
VALVES					
Gate Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	(4)
	2 and above	Class 300	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, API 600, Trim No. 8	
Globe Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	(4)
	2 and above	Class 300	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, Trim No. 8	

Continuation of Line Class 3CS1P					
Item	NPS	Rating Schedule	Type	Specification	Notes
Check Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, Trim No.1	
	2 and above	Class 300	RF Flanged	Body A216-WCB or A105, Trim No.1	(4)
Ball Valves	1½ and under	Class 300	Socketweld/ Threaded	A105N body, floating ball, RTFE seats, Trim SS 316	(6)
	2 to 4	Class 300	RF Flanged	Body A216-WCB or A105, floating ball, RTFE seats, fire safe, API 6D, Trim ENP or SS410	(4), (6)
	6 and above	Class 300	RF Flanged	Body A216-WCB or A105, trunnion mounted, fire safe, API 608 or 6D, Trim ENP or SS 410	(4)
Plug Valves	1½ and under	Class 300	Socketweld/ Threaded	A105N body, lubricated, inverted pressure balanced, BC, Trim 316 SS	
	2 and above	Class 300	RF Flanged	Body A216-WCB or A105, lubricated, inverted pressure balanced, BC, API 599, Trim ENP or SS 410	(4)
Butterfly Valves	4 and above	Class 300	Lugged or RF Flanged	Body A216-WCB or A105, high performance, double or triple eccentric, fire safe, API 609 Cat.B, Trim ENP or SS316	(4)

Line Class: 6CS1P Service: Refer to Table 9.1 Rating Class: 600 RF Temperature Limit: -18 to 121°C Corrosion Allowance: 1.6 mm (2)			Basic Material: Carbon Steel Code: B31.4/31.8 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½"-1½"	XS	Seamless	A106 Gr. B, or	(2)
	2" to 8"	XS	Seamless or Welded (SAW, ERW)	API 5L, Gr. B or Gr. X60	
	10" and larger	Calculate			
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½-1½	Class 3000	Socketweld/ Threaded	A105N, B16.11	(3), (8)
	2 and above		Buttweld	A234-WPB, B16.9	
Nipples	½-1½	XS	Socketweld/ Threaded	A106 Gr. B	
Swages	½-1½	XS	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	-	-	-	-	(7)
Sockolets/ Threadolets	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-97	
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	(3)
FLANGES	1½ and under	Class 600	Socketweld/ Threaded RF	A105N, B16.5	(3), (8)
	2" to 12"	Class 600	Weldneck RF	A105N, B16.5	
	14" to 24"	Class 600	Weldneck RF	A350-LF2 Class 2, B16.5	
	26 and above	Class 600	Weldneck RF	A350 LF2 CI 2 B16.47 Series A	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
VALVES					
Gate Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	(4)
	2 and above	Class 600	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, API 600, Trim No. 8	
Globe Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	(4)
	2 and above	Class 600	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, Trim No. 8	

Continuation of Line Class 6CS1P					
Item	NPS	Rating Schedule	Type	Specification	Notes
Check Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, Trim No.1	
	2 and above	Class 600	RF Flanged	Body A216-WCB or A105, Trim No.1	(4)
Ball Valves	1½ and under	Class 600	Socketweld/ Threaded	A105N body, floating ball, RTFE seats, Trim SS 316	(6)
	2" and above	Class 600	RF Flanged	Body A216-WCB or A105, trunnion mounted, fire safe, API 608 or 6D, Trim ENP or SS410	(4)
Plug Valves	1½ and under	Class 600	Socketweld/ Threaded	A105N body, lubricated, inverted pressure balanced, BC, Trim 316 SS	
	2 and above	Class 600	RF Flanged	Body A216-WCB or A105, lubricated, inverted pressure balanced, BC, API 599, Trim ENP or SS 410	(4)
Butterfly Valves	4 and above	Class 600	Lugged or RF Flanged	Body A216-WCB or A105, high performance, double or triple eccentric, fire safe, API 609 Cat.B, Trim ENP or SS316	(4)

Line Class: 9CS1P Service: Refer to Table 9.1 Rating Class: 900 RJ Temperature Limit: -18 to 121°C Corrosion Allowance: 1.6 mm (2)			Basic Material: Carbon Steel Code: B31.4/31.8 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½"-1½"	XS	Seamless	A106 Gr. B, or API 5L, Gr. B or Gr. X60	(2)
	2" to 3"	XS	Seamless		
	4" and larger	Calculate	Seamless or Welded (SAW, ERW)		
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½-1½	Class 3000	Socketweld/ Threaded	A105N, B16.11	
	2 and above		Buttweld	A234-WPB, B16.9	(3), (8)
Nipples	½-1½	XS	Socketweld/ Threaded	A106 Gr. B	
Swages	½-1½	XS	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	-	-	-	-	(7)
Socklets/ Threadolets	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-97	
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	
FLANGES	½-1½	Class 900	Socketweld/ Threaded RJ	A105N, B16.5	(3)
	2 -24	Class 900	Weldneck RJ	A350 LF2 Cl 2, B16.5	(3), (8)
	26- 48	Class 900	Weldneck RJ	A350 LF2 Cl 2 B16.47 Series A	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	Soft-Iron octagonal ring, per B16.20				
VALVES					
Gate Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	
	2 and above	Class 900	RJ Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, API 600, Trim No. 8	(4)
Globe Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	
	2 and above	Class 900	RJ Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, Trim No. 8	(4)

Continuation of Line Class 9CS1P					
Item	NPS	Rating Schedule	Type	Specification	Notes
Check Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, Trim No.1	
	2 and above	Class 900	RJ Flanged	Body A216-WCB or A105, Trim No.1	(4)
Ball Valves	2 and above	Class 900	RJ Flanged	Body A216-WCB or A105, trunnion mounted, fire safe, API 608 or 6D, Trim ENP or SS410	(4)
Plug Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, lubricated, inverted pressure balanced, BC, Trim 316 SS	
	2 and above	Class 900	RJ Flanged	Body A216-WCB or A105, lubricated, inverted pressure balanced, BC, API 599, Trim ENP or SS 410	(4)

Line Class: 15CS1P Service: Refer to Table 9.1 Rating Class: 1500 RJ Temperature Limit: -18 to 121°C Corrosion Allowance: 1.6 mm (2)			Basic Material: Carbon Steel Code: B31.4/31.8 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½"-1½"	Sch 160	Seamless	A106 Gr. B or	(2)
	2 and larger	Calculate	Seamless or Welded (SAW, ERW)	API 5L, Gr. B or Gr. X60	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½-1½	Class 6000	Socketweld/ Threaded	A105N, B16.11	
	2 and above		Buttweld	A234-WPB, B16.9	(3), (8)
Nipples	½-1½	Sch 160	Socketweld/ Threaded	A106 Gr. B	
Swages	½-1½	Sch 160	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	-	-	-	-	(7)
Socketlets/ Threadolets	½-1½	Class 6000	Socketweld/ Threaded	A105N, MSS SP-97	
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	
FLANGES	½-1½	Class 1500	Socketweld/ Threaded RJ	A105N, B16.5	(3), (8)
	2-24	Class 1500	Weldneck RJ	A350 LF2 Cl 2, ASME B16.5	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	Soft-Iron octagonal ring, per B16.20				
VALVES					
Gate Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	
	2 and above	Class 1500	RJ Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, API 600, Trim No. 8	
Globe Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	(4)
	2 and above	Class 1500	RJ Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, Trim No. 8	(4)

Continuation of Line Class 15CS1P					
Item	NPS	Rating Schedule	Type	Specification	Notes
Check Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, Trim No.1	
	2 and above	Class 1500	RJ Flanged	Body A216-WCB or A105, Trim No.1	(4)
Ball Valves	2 and above	Class 1500	RJ Flanged	Body A216-WCB or A105, trunnion mounted, fire safe, API 608 or 6D, Trim ENP or SS410	(4)
Plug Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, lubricated, inverted pressure balanced, BC, Trim 316 SS	
	2 and above	Class 1500	RJ Flanged	Body A216-WCB or A105, lubricated, inverted pressure balanced, BC, API 599, Trim ENP or SS 410	(4)

Line Class: 25CS1P Service: Refer to Table 9.1 Rating Class: 2500 RJ Temperature Limit: -18 to 121°C Corrosion Allowance: 1.6 mm (2)			Basic Material: Carbon Steel Code: B31.4/31.8 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½"-1½"	XXS	Seamless	A106 Gr. B or	(2)
	2 and larger	Calculate	Seamless or Welded (SAW, ERW)	API 5L, Gr. B or Gr. X60	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½-1½	Class 9000	Socketweld/ Threaded	A105N, B16.11	(3), (8)
	2 and above		Buttweld	A234-WPB, B16.9	
Nipples	½-1½	XXS	Socketweld/ Threaded	A106 Gr. B	
Swages	½-1½	XXS	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	-	-	-	-	(7)
Sockolets/ Threadolets	½-1½	Class 9000	Socketweld/ Threaded	A105N, MSS SP-97	
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	
FLANGES	½-1½	Class 2500	Socketweld/ Threaded RJ	A105N, B16.5	(3), (8)
	2-24	Class 2500	Weldneck RJ	A350 LF2 Cl 2, B16.5	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts.				
GASKETS	Soft-Iron octanonal ring, per B16.20				
VALVES					
Gate Valves	½ and under	Class 2500	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, Trim No. 8	(4)
	2 and above	Class 2500	RJ Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, API 600, Trim No. 8	
Globe Valves	½ and under	Class 2500	Socketweld/ Threaded	A105N body, PSB or WB, OS&Y, Trim No.8	(4)
	2 and above	Class 2500	RJ Flanged	A216-WCB body or A105, PSB or WB, OS&Y, Trim No.8	
Check Valves	½ and under	Class 2500	Socketweld/ Threaded	A105N body, PSB or WB, Trim No.8	(4)
	2 and above	Class 2500	RJ Flanged	A216-WCB body or A105, PSB or WB, Trim No. 8	

Line Class: 90CS1T Service: Refer to Table 9.1 Rating Class: API 6A, Class 3000 RJ Temperature Limit: -18 to 343°C Corrosion Allowance: 1.6 mm (2)			Basic Material: Carbon Steel Code: B31.4/B31.8 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	1½" and under	Sch 160	Seamless or Welded	API 5L Gr. B, EWR, SAW or seamless	(10)
	2" to 10" (2-1/16" to 11")	Calculate		API 5L Gr. B, or X60	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	1½" and under	Class 6000	Socketweld/ Threaded	A105N, B16.11	(3)
	2" and above		Buttweld	A234 Gr. WPB, B16.9	
Nipples and Swages	2" and under		Seamless	A106 Gr. B or API 5L Gr. B	
Unions	-	-	-	-	(7)
Sockolets/ Threadolets	1½" and under	Class 6000	Socketweld/ Threaded	A105N, B16.11	
Weldolets	2" and above		Buttweld	A105N, B16.9	
FLANGES	2" and above	API 3000	Weldneck, RJ	API 3000 Type 6B	(3)
BOLTING	A193 B7 stud bolts, semi-finished, heavy pattern with A194 Gr. 2H heavy hex nuts.				
GASKETS	Soft-Iron octagonal ring, per B16.20.				
GATE VALVES	1½" and under	Class 1500	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	(4), (6)
	2" and above	API 3000	RJ Flanged	Thru-conduit, A216-WCB body, BB, ISNRS, graphite packing, API 6A, Trim ENP or SS 410	
GLOBE VALVES	1½" and under	Class 1500	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, Trim No. 8	
	2" and above	API 3000	RJ Flanged	A216-WCB body, BB, OS&Y, graphite packing, Trim No. 8	
CHECK VALVES	1½" and under	Class 1500	Socketweld/ Threaded	A105 body, BC, Trim No. 1	
	2" and above	API 3000	RJ Flanged	A216-WCB body, BC, Trim 1	
BALL VALVES	2" and above	API 3000	RJ Flanged	A216-WCB body, trunnion mounted, fire safe, API 6A, Trim ENP or SS 410	(4), (6)
PLUG VALVES	1½" and under	Class 1500	Socketweld/ Threaded	A105 body, lubricated, inverted pressure balanced, API 599, Trim SS 316	(4)
	2" and above	API 3000	RJ Flanged	A216-WCB body, lubricated, inverted pressure balanced, API 599, Trim ENP or SS 410	

Line Class: 95CS1T Service: Khuff Gas Wellhead Piping Rating Class: API 6A, Class 10000 RJ Temperature Limit: -18 to 343°C Corrosion Allowance: Note (2)			Basic Material: Carbon Steel Code: ASME B31.8 (11) Stress Relief: Per ASME B31.8 Examination: Per ASME B31.8 Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	¾" thru 1"	Sch.160	Seamless	API 5L, B	(10)
	1½" thru 2" (1-13/16" - 2-1/16")	XXS		API 5L, X60	
	3" thru 4" (3-1/8" - 4-1/16")	XXS			
	6" (7-1/16")	1" (min. wall)	Seamless or ERW		
	8" (9")	1.344" (min. wall)			
	10" (11")	1.658" (min. wall)			
FITTINGS El's, Tees, Reducers, Cross	¾" thru 10"	API 10000	Carbon Steel	Equivalent wall thickness to provide same strength as pipe	(12)
FLANGES Weld Neck	2" thru 10"	API 10000, RJ		API 6A Bore to match pipe ID	
Connectors	Sizes to suit pipe and valve			API 6A, Class 10000, Clamp connector	
Blind	2" thru 10"	API 10000, RJ		API 6A	
Spec. Blind	2" thru 10"	API 10000, RJ		Special design consult CSD	
BOLTS	All sizes	ASTM A193 B7 stud bolts, with semi-finished, heavy pattern, ASTM A194 Gr. 2H hex nuts			
GASKETS	2" thru 10"	Octagonal ring per SAES-L-009			
VALVES Check, ball	9/16"	API 10000	Special		(6)
Globe, needle	9/16"	API 10000	Special		
Gate	1-13/16" and above	API 10000	RJ Flanged or clamp connector	Alloy steel body, SS 410 Trim with TC hard facing, Inconel 718 stem, Amine resistant, ISNRS, API 6A, PSL 3+	

Line Class: 1CS1P02 Service: Refer to Table 9.1 Rating Class: 150 RF Temperature Limit: -18 to 121°C Corrosion Allowance: 1.6 mm (2)			Basic Material: Carbon Steel, Sour Service, ISO 15156 (1) Code: B31.4/31.8 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½-1½	XS	Seamless	A106 Gr. B or	(2)
	2"	XS	Seamless	API 5L, Gr. B or Gr. X60,	
	3" to 24"	STD	Seamless or	Sour Service, ISO 15156	
	26" and larger	Calculate	Welded (SAW, ERW)		
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½-1½	Class 3000	Socketweld/ Threaded	A105N, B16.11	(3), (8)
	2 and above		Buttweld	A234-WPB, B16.9	
Nipples	½-1½	XS	Socketweld/ Threaded	A106 Gr. B	
Swages	½-1½	XS	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-83	
Sockolets/ Threadolets	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-97	
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	
FLANGES	1½ and under	Class 150	Socketweld/ Threaded RF	A105N, B16.5	(3)
	2 -24	Class 150	Weldneck RF	A105N, B16.5	(3), (8)
	26 and above	Class 150	Weldneck RF	A350 LF2 CI 2 B16.47 Series A	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
VALVES					
Gate Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 12	(4)
	2 and above	Class 150	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, API 600, Trim No. 12	
Globe Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 12	(4)
	2 and above	Class 150	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, Trim No. 12	

Continuation of Line Class 1CS1P02					
Item	NPS	Rating Schedule	Type	Specification	Notes
Check Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, Trim No.10	
	2 and above	Class 150	RF Flanged	Body A216-WCB or A105, Trim No.10	(4)
Ball Valves	1½ and under	Class 300	Socketweld/ Threaded	A105N body, floating ball, RTFE seats, Trim SS 316	(6)
	2 to 4	Class 150	RF Flanged	Body A216-WCB or A105, floating ball, RTFE seats, fire safe, API 6D, Trim ENP or SS316	(4), (6)
	6 and above	Class 150	RF Flanged	Body A216-WCB or A105, trunnion mounted, fire safe, API 608 or 6D, Trim ENP or SS316	(4)
Plug Valves	1½ and under	Class 600	Socketweld/ Threaded	A105N body, lubricated, inverted pressure balanced, BC, Trim 316 SS	
	2 and above	Class 150	RF Flanged	Body A216-WCB or A105, lubricated, inverted pressure balanced, BC, API 599, Trim ENP or SS 316	(4)
Butterfly Valves	4 and above	Class 150	Lugged or RF Flanged	Body A216-WCB or A105, high performance, double or triple eccentric, fire safe, API 609 Cat.B, Trim ENP or SS316	(4)

Line Class: 3CS1P02 Service: Refer to Table 9.1 Rating Class: 300 RF Temperature Limit: -18 to 121°C Corrosion Allowance: 1.6 mm (2)			Basic Material: Carbon Steel, Sour Service, ISO 15156 (1) Code: B31.4/31.8 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½-1½	XS	Seamless	A106 Gr. B or	(2)
	2"	XS	Seamless	API 5L, Gr. B or Gr. X60,	
	3" to 16"	Sch 40	Seamless or	Sour Service, ISO 15156	
	18" and larger	Calculate	Welded (SAW, ERW)		
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½-1½	Class 3000	Socketweld/ Threaded	A105N, B16.11	
	2 and above		Buttweld	A234-WPB, B16.9	(3), (8)
Nipples	½-1½	XS	Socketweld/ Threaded	A106 Gr. B	
Swages	½-1½	XS	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-83	
Sockolets/ Threadolets	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-97	
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	
FLANGES	1½ and under	Class 300	Socketweld RF	A105N, B16.5	(3)
	2 -24	Class 300	Weldneck RF	A105N, B16.5	(3), (8)
	26 and above	Class 300	Weldneck RF	A350 LF2 CI 2 B16.47 Series A	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
VALVES					
Gate Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 12	
	2 and above	Class 300	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, API 600, Trim No. 12	(4)
Globe Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 12	
	2 and above	Class 300	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, Trim No. 12	(4)

Continuation of Line Class 3CS1P02					
Item	NPS	Rating Schedule	Type	Specification	Notes
Check Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, Trim No.10	
	2 and above	Class 300	RF Flanged	Body A216-WCB or A105, Trim No.10	(4)
Ball Valves	1½ and under	Class 300	Socketweld/ Threaded	A105N body, floating ball, RTFE seats, Trim SS 316	(6)
	2 to 4	Class 300	RF Flanged	Body A216-WCB or A105, floating ball, RTFE seats, fire safe, API 6D, Trim ENP or SS 316	(4), (6)
	6 and above	Class 300	RF Flanged	Body A216-WCB or A105, trunnion mounted, fire safe, API 608 or 6D, Trim ENP or SS 316	(4)
Plug Valves	1½ and under	Class 300	Socketweld/ Threaded	A105N body, lubricated, inverted pressure balanced, BC, Trim 316 SS	
	2 and above	Class 300	RF Flanged	Body A216-WCB or A105, lubricated, inverted pressure balanced, BC, API 599, Trim ENP or SS 316	(4)
Butterfly Valves	4 and above	Class 300	Lugged or RF Flanged	Body A216-WCB or A105, high performance, double or triple eccentric, fire safe, API 609 Cat.B, Trim ENP or SS 316	(4)

Line Class: 6CS1P02 Service: Refer to Table 9.1 Rating Class: 600 RF Temperature Limit: -18 to 121°C Corrosion Allowance: 1.6 mm (2)			Basic Material: Carbon Steel, Sour Service, ISO 15156 (1) Code: B31.4/31.8 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½"-1½"	XS	Seamless	A106 Gr. B or	(2)
	2" to 8"	XS	Seamless or Welded (SAW, ERW)	API 5L, Gr. B or Gr. X60, Sour Service, ISO 15156	
	10" and larger	Calculate			
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½-1½	Class 3000	Socketweld/ Threaded	A105N, B16.11	(3), (8)
	2 and above		Buttweld	A234-WPB, B16.9	
Nipples	½-1½	XS	Socketweld/ Threaded	A106 Gr. B	
Swages	½-1½	XS	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	-	-	-	-	(7)
Sockolets/ Threadolets	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-97	
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	(3)
FLANGES	1½ and under	Class 600	Socketweld/ Threaded RF	A105N, B16.5	(3), (8)
	2" to 12"	Class 600	Weldneck RF	A105N, B16.5	
	14" to 24"	Class 600	Weldneck RF	A350-LF2 Class 2, B16.5	
	26 and above	Class 600	Weldneck RF	A350 LF2 Cl 2 B16.47 Series A	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
VALVES					
Gate Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 12	(4)
	2 and above	Class 600	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, API 600, Trim No. 12	
Globe Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 12	(4)
	2 and above	Class 600	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, Trim No. 12	

Continuation of Line Class 6CS1P02					
Item	NPS	Rating Schedule	Type	Specification	Notes
Check Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, Trim No.10	
	2 and above	Class 600	RF Flanged	Body A216-WCB or A105, Trim No.10	(4)
Ball Valves	1½ and under	Class 600	Socketweld/ Threaded	A105N body, floating ball, RTFE seats, Trim SS 316	(6)
	2" and above	Class 600	RF Flanged	Body A216-WCB or A105, trunnion mounted, fire safe, API 608 or 6D, Trim ENP or SS 316	(4)
Plug Valves	1½ and under	Class 600	Socketweld/ Threaded	A105N body, lubricated, inverted pressure balanced, BC, Trim 316 SS	
	2 and above	Class 600	RF Flanged	Body A216-WCB or A105, lubricated, inverted pressure balanced, BC, API 599, Trim ENP or SS 316	(4)
Butterfly Valves	4 and above	Class 600	Lugged or RF Flanged	Body A216-WCB or A105, high performance, double or triple eccentric, fire safe, API 609 Cat.B, Trim ENP or SS 316	(4)

Line Class: 9CS1P02 Service: Refer to Table 9.1 Rating Class: 900 RJ Temperature Limit: -18 to 121°C Corrosion Allowance: 1.6 mm (2)			Basic Material: Carbon Steel, Sour Service, ISO 15156 (1) Code: B31.4/31.8 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½"-1½"	XS	Seamless	A106 Gr. B or	(2)
	2" to 3"	XS	Seamless	API 5L, Gr. B or Gr. X60,	
	4" and larger	Calculate	Seamless or Welded (SAW, ERW)	Sour Service, ISO 15156	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½"-1½"	Class 3000	Socketweld/ Threaded	A105N, B16.11	(3), (8)
	2 and above		Buttweld	A234-WPB, B16.9	
Nipples	½"-1½"	XS	Socketweld/ Threaded	A106 Gr. B	
Swages	½"-1½"	XS	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	-	-	-	-	(7)
Sockolets/ Threadolets	½"-1½"	Class 3000	Socketweld/ Threaded	A105N, MSS SP-97	
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	
FLANGES	½"-1½"	Class 900	Socketweld/ Threaded RJ	A105N, B16.5	(3)
	2 -24	Class 900	Weldneck RJ	A350 LF2 Cl 2, B16.5	(3), (8)
	26- 48	Class 900	Weldneck RJ	A350 LF2 Cl 2 B16.47 Series A	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts.				
GASKETS	Soft-Iron octanonal ring, per B16.20				
VALVES					
Gate Valves	½" and under	Class 1500	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 12	(4)
	2 and above	Class 900	RJ Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, API 600, Trim No. 12	
Globe Valves	½" and under	Class 1500	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 12	(4)
	2 and above	Class 900	RJ Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, Trim No. 12	

Continuation of Line Class 9CS1P02					
Item	NPS	Rating Schedule	Type	Specification	Notes
Check Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, Trim No.10	
	2 and above	Class 900	RJ Flanged	Body A216-WCB or A105, Trim No.10	(4)
Ball Valves	2 and above	Class 900	RJ Flanged	Body A216-WCB or A105, trunnion mounted, fire safe, API 608 or 6D, Trim ENP or SS 316	(4)
Plug Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, lubricated, inverted pressure balanced, BC, Trim 316 SS	
	2 and above	Class 900	RJ Flanged	Body A216-WCB or A105, lubricated, inverted pressure balanced, BC, API 599, Trim ENP or SS 316	(4)

Line Class: 15CS1P02 Service: Refer to Table 9.1 Rating Class: 1500 RJ Temperature Limit: -18 to 121°C Corrosion Allowance: 1.6 mm (2)			Basic Material: Carbon Steel, Sour Service, ISO 15156 (1) Code: B31.4/31.8 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½"-1½"	Sch 160	Seamless	A106 Gr. B or	(2)
	2 and larger	Calculate	Seamless or Welded (SAW, ERW)	API 5L, Gr. B or Gr. X60, Sour Service, ISO 15156	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½"-1½"	Class 6000	Socketweld/ Threaded	A105N, B16.11	(3), (8)
	2 and above		Buttweld	A234-WPB, B16.9	
Nipples	½"-1½"	Sch 160	Socketweld/ Threaded	A106 Gr. B	
Swages	½"-1½"	Sch 160	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	-	-	-	-	(7)
Socketlets/ Threadlets	½"-1½"	Class 6000	Socketweld/ Threaded	A105N, MSS SP-97	
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	
FLANGES	½"-1½"	Class 1500	Socketweld/ Threaded RJ	A105N, B16.5	(3), (8)
	2 - 24	Class 1500	Weldneck RJ	A350 LF2 Cl 2, ASME B16.5	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	Soft-Iron octagonal ring, per B16.20				
VALVES					
Gate Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 12	
	2 and above	Class 1500	RJ Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, API 600, Trim No. 12	
Globe Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 12	(4)
	2 and above	Class 1500	RJ Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, Trim No. 12	(4)

Continuation of Line Class 15CS1P02					
Item	NPS	Rating Schedule	Type	Specification	Notes
Check Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, Trim No.10	
	2 and above	Class 1500	RJ Flanged	Body A216-WCB or A105, Trim No.10	(4)
Ball Valves	2 and above	Class 1500	RJ Flanged	Body A216-WCB or A105, trunnion mounted, fire safe, API 608 or 6D, Trim ENP or SS 316	(4)
Plug Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, lubricated, inverted pressure balanced, BC, Trim 316 SS	
	2 and above	Class 1500	RJ Flanged	Body A216-WCB or A105, lubricated, inverted pressure balanced, BC, API 599, Trim ENP or SS 316	(4)

Line Class: 1CS1P06 Service: Refer to Table 9.1 Rating Class: 150 RF Temperature Limit: -18 to 121°C Corrosion Allowance: 1.6 mm (2)			Basic Material: Carbon Steel, HIC resistance, ISO 15156 (1) Code: B31.4/31.8 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½-1½	XS	Seamless	A106 Gr. B or	(2)
	2"	XS	Seamless	API 5L, Gr. B or Gr. X60,	
	3" to 24"	STD	Seamless or Welded	Sour Service, ISO 15156,	
	26" and larger	Calculate	(SAW, ERW)	Annex H	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½-1½	Class 3000	Socketweld/ Threaded	A105N, B16.11	(3), (8)
	2 and above		Buttweld	A234-WPB, B16.9	
Nipples	½-1½	XS	Socketweld/ Threaded	A106 Gr. B	
Swages	½-1½	XS	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-83	
Sockolets/ Threadolets	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-97	
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	
FLANGES	1½ and under	Class 150	Socketweld/ Threaded RF	A105N, B16.5	(3)
	2 -24	Class 150	Weldneck RF	A105N, B16.5	(3), (8)
	26 and above	Class 150	Weldneck RF	A350 LF2 Cl 2 B16.47 Series A	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
VALVES					
	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 12	(4)
	2 and above	Class 150	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, API 600, Trim No. 12	
Globe Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 12	(4)
	2 and above	Class 150	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, Trim No. 12	

Continuation of Line Class 1CT1P02					
Item	NPS	Rating Schedule	Type	Specification	Notes
Check Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, Trim No.10	
	2 and above	Class 150	RF Flanged	Body A216-WCB or A105, Trim No.10	(4)
Ball Valves	1½ and under	Class 300	Socketweld/ Threaded	A105N body, floating ball, RTFE seats, Trim SS 316	(6)
	2 to 4	Class 150	RF Flanged	Body A216-WCB or A105, floating ball, RTFE seats, fire safe, API 6D, Trim ENP or SS 316	(4), (6)
	6 and above	Class 150	RF Flanged	Body A216-WCB or A105, trunnion mounted, fire safe, API 608 or 6D, Trim ENP or SS 316	(4)
Plug Valves	1½ and under	Class 600	Socketweld/ Threaded	A105N body, lubricated, inverted pressure balanced, BC, Trim 316 SS	
	2 and above	Class 150	RF Flanged	Body A216-WCB or A105, lubricated, inverted pressure balanced, BC, API 599, Trim ENP or SS 316	(4)
Butterfly Valves	4 and above	Class 150	Lugged or RF Flanged	Body A216-WCB or A105, high performance, double or triple eccentric, fire safe, API 609 Cat.B, Trim ENP or SS 316	(4)

Line Class: 3CS1P06 Service: Refer to Table 9.1 Rating Class: 300 RF Temperature Limit: -18 to 121°C Corrosion Allowance: 1.6 mm (2)			Basic Material: Carbon Steel, HIC Resistance, ISO 15156 (1) Code: B31.4/31.8 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½-1½	XS	Seamless	A106 Gr. B or API 5L, Gr. B or Gr. X60, Sour Service, ISO 15156, Annex H	(2)
	2"	XS	Seamless		
	3" to 16"	Sch 40	Seamless or Welded		
	18" and larger	Calculate	(SAW, ERW)		
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½-1½	Class 3000	Socketweld/ Threaded	A105N, B16.11	
	2 and above		Buttweld	A234-WPB, B16.9	(3), (8)
Nipples	½-1½	XS	Socketweld/ Threaded	A106 Gr. B	
Swages	½-1½	XS	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-83	
Sockolets/ Threadolets	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-97	
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	
FLANGES	1½ and under	Class 300	Socketweld RF	A105N, B16.5	(3)
	2 -24	Class 300	Weldneck RF	A105N, B16.5	(3), (8)
	26 and above	Class 300	Weldneck RF	A350 LF2 Cl 2 B16.47 Series A	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
VALVES					
	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 12	(4)
	2 and above	Class 300	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, API 600, Trim No. 12	
Globe Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 12	(4)
	2 and above	Class 300	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, Trim No. 12	

Continuation of Line Class 3CSTP02					
Item	NPS	Rating Schedule	Type	Specification	Notes
Check Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, Trim No.10	
	2 and above	Class 300	RF Flanged	Body A216-WCB or A105, Trim No.10	(4)
Ball Valves	1½ and under	Class 300	Socketweld/ Threaded	A105N body, floating ball, RTFE seats, Trim SS 316	(6)
	2 to 4	Class 300	RF Flanged	Body A216-WCB or A105, floating ball, RTFE seats, fire safe, API 6D, Trim ENP or SS 316	(4), (6)
	6 and above	Class 300	RF Flanged	Body A216-WCB or A105, trunnion mounted, fire safe, API 608 or 6D, Trim ENP or SS 316	(4)
Plug Valves	1½ and under	Class 300	Socketweld/ Threaded	A105N body, lubricated, inverted pressure balanced, BC, Trim SS 316	
	2 and above	Class 300	RF Flanged	Body A216-WCB or A105, lubricated, inverted pressure balanced, BC, API 599, Trim ENP or SS 316	(4)
Butterfly Valves	4 and above	Class 300	Lugged or RF Flanged	Body A216-WCB or A105, high performance, double or triple eccentric, fire safe, API 609 Cat.B, Trim ENP or SS 316	(4)

Line Class: 6CS1P06 Service: Refer to Table 9.1 Rating Class: 600 RF Temperature Limit: -18 to 121°C Corrosion Allowance: 1.6 mm (2)			Basic Material: Carbon Steel, HIC Resistance, ISO 15156 (1) Code: B31.4/31.8 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½"-1½"	XS	Seamless	A106 Gr. B or API 5L, Gr. B or Gr. X60, Sour Service, ISO 15156, Annex H	(2)
	2" to 8"	XS	Seamless or Welded		
	10" and larger	Calculate	(SAW, ERW)		
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½-1½	Class 3000	Socketweld/ Threaded	A105N, B16.11	
	2 and above		Buttweld	A234-WPB, B16.9	(3), (8)
Nipples	½-1½	XS	Socketweld/ Threaded	A106 Gr. B	
Swages	½-1½	XS	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	-	-	-	-	(7)
Sockolets/ Threadolets	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-97	
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	(3)
FLANGES	1½ and under	Class 600	Socketweld/ Threaded RF	A105N, B16.5	
	2" to 12"	Class 600	Weldneck RF	A105N, B16.5	(3)
	14" to 24"	Class 600	Weldneck RF	A350-LF2 Class 2, B16.5	(3), (8)
	26 and above	Class 600	Weldneck RF	A350 LF2 Cl 2 B16.47 Series A	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
VALVES					
	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 12	
	2 and above	Class 600	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, API 600, Trim No. 12	(4)
Globe Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 12	
	2 and above	Class 600	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, Trim No. 12	(4)

Continuation of Line Class 6CT1P02					
Item	NPS	Rating Schedule	Type	Specification	Notes
Check Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, Trim No.10	
	2 and above	Class 600	RF Flanged	Body A216-WCB or A105, Trim No.10	(4)
Ball Valves	1½ and under	Class 600	Socketweld/ Threaded	A105N body, floating ball, RTFE seats, Trim SS 316	(6)
	2" and above	Class 600	RF Flanged	Body A216-WCB or A105, trunnion mounted, fire safe, API 608 or 6D, Trim ENP or SS 316	(4)
Plug Valves	1½ and under	Class 600	Socketweld/ Threaded	A105N body, lubricated, inverted pressure balanced, BC, Trim 316 SS	
	2 and above	Class 600	RF Flanged	Body A216-WCB or A105, lubricated, inverted pressure balanced, BC, API 599, Trim ENP or SS 316	(4)
Butterfly Valves	4 and above	Class 600	Lugged or RF Flanged	Body A216-WCB or A105, high performance, double or triple eccentric, fire safe, API 609 Cat.B, Trim ENP or SS 316	(4)

Line Class: 1SA1P Service: Refer to Table 9.1 Rating Class: 150 RF B16.5 Temperature Limit: -29 to 121°C Corrosion Allowance: 1.6 mm (2)			Basic Material: 304/304L SS Code: B31.4/31.8 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	A312 Type 304/304L	
	3" to 14"	Sch 10S	Seamless or	A312 Type 304/304L or	
	16" to 24"	Calculate Min Sch 10S	Welded	A358 Gr 304/304L Class 1	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld	A182-F304/304L, B16.11	3
	2" – 24"		Buttweld	A403 WP304/304L, Seamless, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	A403 WP304/304L, Seamless, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	A312 Type 304/304L Seamless	
Unions					7
Sockolets/ Thredolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-F304/304L, MSS-SP-97	
Weldolets	2" and above		Buttweld	A182-F304/304L MSS-SP-97	3
FLANGES	1½" and under	Class 150	Socketweld RF	A182-F304/304L, B16.5	3
	2" – 24"	Class 150	Weldneck RF		
BOLTING	A193 Gr. B7 stud bolts, semi-finished heavy pattern, A194 Gr 2H heavy hex nuts				
GASKETS	Spiral-wound, 316 SS windings, flexible graphite filled with 304 SS steel outer ring, per B16.20				
GATE VALVES	1½" and under	Class 800	Socketweld	A182-F316/316L body, BB, OS&Y, graphite packing, API 602, Trim No. 12	4
	2" and above	Class 150	RF Flanged	A351-CF3 body, BB, OS&Y, graphite packing, Trim No. 12	
GLOBE VALVES	1½" and under	Class 800	Socketweld	A182-F316/316L body, BB, OS&Y, graphite packing, API 602, Trim No. 12	4
	2" and above	Class 150	RF Flanged	A351-CF3 body, BB, OS&Y, graphite packing, Trim No. 12	
CHECK VALVES	1½" and under	Class 800	Socketweld	A182-F316/316L body, BC, API 602, Trim No. 12	4
	2" and above	Class 150	RF Flanged	A351-CF3 body, BC, Trim No. 12	

Line Class: 3SA1P Service: Refer to Table 9.1 Rating Class: 300 RF B16.5 Temperature Limit: -29 to 121°C Corrosion Allowance: 1.6 mm (2)			Basic Material: 304/304L SS Code: B31.4/31.8 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	A312 Type 304/304L	
	3" to 6"	Sch 10S	Seamless or	A312 Type 304/304L or	
	8" to 24"	Calculate Min Sch 10S	Welded	A358 Gr 304/304L Class 1	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld	A182-F304/304L, B16.11	3
	2" – 24"		Buttweld	A403 WP304/304L, Seamless, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	A403 WP304/304L, Seamless, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	A312 Type 304/304L Seamless	
Unions					7
Sockolets/ Threadolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-F304/304L, MSS-SP-97	
Weldolets	2" and above		Buttweld	A182-F304/304L MSS-SP-97	3
FLANGES	1½" and under	Class 300	Socketweld RF	A182-F304/304L, B16.5	
	2" – 24"	Class 300	Weldneck RF		3
BOLTING	A193 Gr. B7 stud bolts, semi-finished heavy pattern, A194 Gr 2H heavy hex nuts				
GASKETS	Spiral-wound, 316 SS windings, flexible graphite filled with 304 SS steel outer ring, per B16.20				
GATE VALVES	1½" and under	Class 800	Socketweld	A182-F316/316L body, BB, OS&Y, graphite packing, API 602, Trim No. 12	4
	2" and above	Class 300	RF Flanged	A351-CF3 body, BB, OS&Y, graphite packing, Trim No. 12	
GLOBE VALVES	1½" and under	Class 800	Socketweld	A182-F316/316L body, BB, OS&Y, graphite packing, API 602, Trim No. 12	4
	2" and above	Class 300	RF Flanged	A351-CF3 body, BB, OS&Y, graphite packing, Trim No. 12	
CHECK VALVES	1½" and under	Class 800	Socketweld	A182-F316/316L body, BC, API 602, Trim No. 12	4
	2" and above	Class 300	RF Flanged	A351-CF3 body, BC, Trim No. 12	

Line Class: 1SD0P Service: Refer to Table 9.1 Rating Class: 150 RF B16.5 Temperature Limit: -29 to 121°C Corrosion Allowance: 0.0 mm (2)			Basic Material: 316/316L SS Code: B31.4/31.8 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	A312 Type 316/316L	
	3" to 24"	Sch 10S	Seamless or Welded	A312 Type 316/316L or A358 Gr 316/316L Class 1	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld	A182-F316/316L, B16.11	3
	2" – 24"		Buttweld	A403 WP316/316L, Seamless, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	A403 WP316/316L, Seamless, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	A312 Type 316/316L Seamless	
Unions					7
Sockolets/ Threadolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-F316/316L, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-F316/316L, MSS SP-97	3
FLANGES	1½" and under	Class 150	Socketweld RF	A182-F316/316L, B16.5	3
	2" and above	Class 150	Weldneck RF		
BOLTING	A193 Gr. B7 stud bolts, semi-finished heavy pattern, A194 Gr 2H heavy hex nuts				
GASKETS	Spiral-wound, 316 SS windings, flexible graphite filled with 316 SS steel outer ring, per B16.20				
GATE VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F316/316L body, BB, OS&Y, graphite packing, API 602, Trim No. 12	4
	2" and above	Class 150	RF Flanged	A351-CF8M body, BB, OS&Y, graphite packing, Trim No. 12	
GLOBE VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F316/316L body, BB, OS&Y, graphite packing, API 602, Trim No. 12	4
	2" and above	Class 150	RF Flanged	A351-CF8M body, BB, OS&Y, graphite packing, Trim No. 12	
CHECK VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F316/316L body, BC, API 602, Trim No. 12	4
	2" and above	Class 150	RF Flanged	A351-CF8M body, BC, Trim No. 12	

Line Class: 3SD0P Service: Refer to Table 9.1 Rating Class: 300 RF B16.5 Temperature Limit: -29 to 121°C Corrosion Allowance: 0.0 mm (2)			Basic Material: 316/316L SS Code: B31.4/31.8 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	A312 Type 316/316L	
	3" to 24"	Calculate Sch 10S min.	Seamless or Welded	A312 Type 316/316L or A358 Gr 316/316L Class 1	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld	A182-F316/316L, B16.11	3
	2" – 24"		Buttweld	A403 WP316/316L, Seamless, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	A403 WP316/316L, Seamless, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	A312 Type 316/316L Seamless	
Unions					7
Sockolets/ Threadolets	½" to 1½"	Class 6000	Socketweld/ Threaded	A182-F316/316L, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-F316/316L, MSS SP-97	3
FLANGES	1½" and under	Class 300	Socketweld RF	A182-F316/316L, B16.5	
	2" and above	Class 300	Weldneck RF		3
BOLTING	A193 Gr. B7 stud bolts, semi-finished heavy pattern, A194 Gr 2H heavy hex nuts				
GASKETS	Spiral-wound, 316 SS windings, flexible graphite filled with 316 SS steel outer ring, per B16.20.				
GATE VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F316/316L body, BB, OS&Y, graphite packing, API 602, Trim No. 12	4
	2" and above	Class 300	RF Flanged	A351-CF8M body, BB, OS&Y, graphite packing, Trim No. 12	
GLOBE VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F316/316L body, BB, OS&Y, graphite packing, API 602, Trim No. 12	4
	2" and above	Class 300	RF Flanged	A351-CF8M body, BB, OS&Y, graphite packing, Trim No. 12	
CHECK VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F316/316L body, BC, API 602, Trim No. 12	4
	2" and above	Class 300	RF Flanged	A351-CF8M body, BC, Trim No. 12	

Line Class: 1SY0W Service: Refer to Table 9.1 Rating Class: 150 RF B16.5 Temperature Limit: -29°C to 121°C Corrosion Allowance: 0.0 mm (2)			Basic Material: Super Duplex SS UNS N032750 (Uranus 47 N™) Code: B31.4/31.8 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	A790 S32750	
	3" to 24"	Calculate Sch 10S Min.			
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld	A182-F53, B16.11	3
	2" and above		Buttweld	A815- WPS32750, Seamless, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	A815- WPS32750, Seamless, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	A790 S32750 Seamless	
Unions					7
Sockolets/ Threadolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-F53, MSS-SP-97	
Weldolets	2" and above		Buttweld	A182-F53, MSS-SP-97	3
FLANGES	1½" and under	Class 150	Socketweld RF	A182-F53, B16.5	3
	2" and above	Class 150	Weldneck RF		
BOLTING	A193 Gr. B7 stud bolts, semi-finished heavy pattern, A194 Gr 2H heavy hex nuts				
GASKETS	Spiral-wound, DUPLEX SS S32750 windings, flexible graphite filled with DUPLEX SS S32750 outer ring, per B16.20				
GATE VALVES	1½" and under	Class 600/800	Socketweld	A182-F53 body and trim, BB, OS&Y, graphite packing, API 602	4
	2" and above	Class 150	RF Flanged	A890 GR 5A CE3MN body, BB, OS&Y, graphite packing, API 600, A182-F53 trim	
GLOBE VALVES	1½" and under	Class 600/800	Socketweld	A182-F53 body and trim, BB, OS&Y, graphite packing, API 602	4
	2" and above	Class 150	RF Flanged	A890 GR 5A CE3MN body, BB, OS&Y, graphite packing, A182-F53 trim	
CHECK VALVES	1½" and under	Class 600/800	Socketweld	A182-F53 body and trim, BC	4
	2" and above	Class 150	RF Flanged	A890 GR 5A CE3MN body, BC, A182-F53 trim	

10 Line Class Index - Part II (Process Facilities)

10.1 [Table 10.1](#) provides the line class index which summarizes: the service applications, primary materials, design pressure/code, temperature range, and valve trim for Part II (Process Facilities).

Table 10.1 - Piping Line Classes Index for Part II (Process Facilities)

LINE CLASS	SERVICE	MATERIAL	DESIGN PRESSURE/CODE	TEMP RANGE	VALVE TRIM	NOTES
CARBON STEEL PIPING – NON SOUR SERVICES						
1CA1P	General hydrocarbon (low temp)	Impact tested Carbon steel	ASME B16.5	-46°C to 343°C	Trim 12	
3CA1P			Flange rating/			
6CA1P			ASME B31.3			
1CH2C	Caustic Spent caustic	Carbon steel	ASME B16.5	0°C to 80°C	Trim 9	1,2
3CH2C			Flange rating/			
6CH2C			ASME B31.3			
1CS2H	Hydrogen	Carbon steel	ASME B16.5	Max 400°C	Trim 8	3
3CS2H			Flange rating/			
6CS2H			ASME B31.3			
1CS1P	General process Hydrocarbon with H ₂ Steam and BFW Condensate Fuel gas Nitrogen	Carbon steel	ASME B16.5	-18°C to 400°C	Trim 8	3
3CS1P			Flange rating/			
6CS1P			ASME B31.3			
9CS1P						
15CS1P						
25CS1P						
1CX2P	Paving asphalt W/ steam jacket	Carbon steel	ASME B16.5	-18°C to 195°C	Trim 8	
3CX4P			Flange rating/ ASME B31.3			
1CX4P	Sulfur jacketed	Carbon steel	ASME B16.5 Flange rating/ ASME B31.3	-18°C to 195°C	Trim 8	
1CS1U	Steam generation	Carbon steel	ASME B16.5	-18°C to 400°C	Trim 8	
3CS1U			Flange rating/			
6CS1U			ASME B31.1			
3CS2Y	Dry chlorine gas or liquid	Carbon steel	300 psig ASME B31.3	-18° to 149°C	Trim 9	4
CARBON STEEL PIPING –SOUR SERVICES						
1CH2P02	Lean and rich DGA	Carbon steel NACE MR-0175/NACE MR-0103 as applicable	ASME B16.5	0° to 190°C	Trim 12	1, 5, 6
3CH2P02			Flange rating/			
6CH2P02			ASME B31.3			
1CS2P02	Sour services Sulfide Stress Cracking (SSC) environments per SAES-L-133	Carbon steel NACE MR-0175/NACE MR-0103 as applicable	ASME B16.5	-18°C to 400°C	Trim 12	5, 6
3CS2P02			Flange rating/			
6CS2P02			ASME B31.3			
9CS2P02						
15CS2P02						

LINE CLASS	SERVICE	MATERIAL	DESIGN PRESSURE/CODE	TEMP RANGE	VALVE TRIM	NOTES
1CS2P06 3CS2P06 6CS2P06	Sour services HIC environments per SAES-L-133	Carbon steel HIC Resistant NACE MR-0175/NACE MR-0103 as applicable	ASME B16.5 Flange rating/ ASME B31.3	-18°C to 150°C	Trim 12	5, 6
LOW AND MEDIUM ALLOY STEELS						
1CJ2H 3CJ2H 6CJ2H	Hydrogen	1-1/4 Cr-1/2Mo	ASME B16.5 Flange rating/ ASME B31.3	Max 595°C	Trim 8	3
1CJ1P 3CJ1P 6CJ1P 9CJ1P 15CJ1P 25CJ1P	Hydrocarbon w/H ₂ Superheated steam Reformer-Feed	1-1/4 Cr-1/2Mo	ASME B16.5 Flange rating/ ASME B31.3	-29°C to 595°C	Trim 8	3
6CK2H 9CK2H 15CK2H 25CK2H	Hydrogen	2-1/4Cr-1Mo	ASME B16.5 Flange rating/ ASME B31.3	Max 595°C	Trim 8	3
1CK1P 3CK1P 6CK1P 9CK1P 15CK1P 25CK1P	General hydrocarbon	2-1/4Cr-1Mo	ASME B16.5 Flange rating/ ASME B31.3	-29°C to 595°C	Trim 8	3
1CL1P 3CL1P 6CL1P 9CL1P	General hydrocarbons	5Cr-1/2Mo	ASME B16.5 Flange rating/ ASME B31.3	-29°C to 595°C	Trim 8	
1CM1P 3CM1P 6CM1P	General hydrocarbons	9Cr-1Mo	ASME B16.5 Flange rating/ ASME B31.3	-29°C to 595°C	Trim 8	
1CM2P03 3CM2P03	Erosive services: High velocity steam decoking Vacuum transfer	9Cr-1Mo	ASME B16.5 Flange rating/ ASME B31.3	-29°C to 455°C	Trim 5	
STAINLESS STEELS						
1SA1P 3SA1P	- General process - Lube oil	304/304L SS	ASME B16.5 Flange rating/ ASME B31.3	-29° C to 400°C	Trim 12	
1SC1P 3SC1P	Flue gas	304 H SS	ASME B16.5 Flange rating/ ASME B31.3	0°C to 677°C	304H SS	

LINE CLASS	SERVICE	MATERIAL	DESIGN PRESSURE/CODE	TEMP RANGE	VALVE TRIM	NOTES
1SD0P	- General process - low temperature application (NGL) - Corrosive process - Rich DGA, (high ve/ Flashing), Note (2) - Phosphate injection Note (2) - Concentrated H ₂ SO ₄ (≥ 93%) > 50°C Note (2) - Lube and seal oil - Nitric acid - Wet carbon dioxide	316/316L SS	ASME B16.5 Flange rating/ ASME B31.3	-200°C to 400°C	Trim 12	
3SD0P						
6SD0P						
9SD0P						
15SD0P						
1SJ1P	Corrosive process	321 SS	ASME B16.5 Flange rating/ ASME B31.3	-29°C to 510°C	347 SS	
3SJ1P						
6SJ1P						
9SJ1P						
15SJ1P						
1SLOP	Corrosive process	347 SS	ASME B16.5 Flange rating/ ASME B31.3	-29°C to 540°C	Trim 5	
1SPOP	Corrosive process	Duplex SS	ASME B16.5 Flange rating/ ASME B31.3	-29°C to 315°C	Duplex SS	
1SY0P	Corrosive process	Super Duplex	ASME B16.5 Flange rating/ ASME B31.3	-29°C to 315°C	Super Duplex	
1SV0P	Corrosive process	Super austenitic SS (254 SMO)	ASME B16.5 Flange rating/ ASME B31.3	-29°C to 315°C	Super austenitic SS (254 SMO)	
HIGH ALLOYS						
1NM1C	Caustic injection	Monel	ASME B16.5 Flange rating/ ASME B31.3	0°C to 400°C	Trim 9	
1NR0P	Corrosive process/ Chemical injection	Alloy 800	ASME B16.5 Flange rating/ ASME B31.3	0°C to 510°C	Trim 5	
1NS0P	Corrosive process/ Chemical injection	Alloy 825	ASME B16.5 Flange rating/ ASME B31.3	0°C to 538°C	Trim 5	
1NT1A	Concentrated H ₂ SO ₄ ≥93%	Alloy 20	ASME B16.5 Flange rating/ ASME B31.3	-18°C to 66°C	Trim 13	8
3NT1A	Concentrated H ₂ SO ₄ ≥93%	Alloy 20	ASME B16.5 Flange rating/ ASME B31.3	-18°C to 82°C	Trim 13	

- 10.2 The below notes are applicable for line classes of Part II (Process Facilities) as referenced in the index ([Section 10.1](#)) or the detailed line classes ([Section 10.3](#)):
- 1- PWHT is required.
 - 2- No copper or copper alloys are permitted.
 - 3- For hydrogen or hydrocarbons with hydrogen, refer to Nelson chart in API RP 941 to determine the maximum allowable temperature as a function of hydrogen partial pressure such that.
 - A value of 350 kPa (50 psi) or 10% whichever is greater shall be added to the maximum hydrogen partial pressure.
 - A value of 28°C (50°F) shall be subtracted from the selected material curve readings.
 - 4- Dry chlorine is when water content is less than 2000 ppm. Design shall follow Chlorine Institute Pamphlet 6.
 - 5- Note requirements of use of SS 316 in ISO 15156/NACE MR0175. Use trim 8 (SS 410) in sour services when general corrosion potential is low.
 - 6- Note requirements of use of SS 316 in NACE MR0103. Use trim 8 (SS 410) in sour services when general corrosion potential is low.
 - 7- Wet chlorine contains more than 2000 ppm water.
 - 8- Safety shields are required for flanged connections.
 - 9- The corrosion allowance is included in the pipe and fitting wall thicknesses. For service conditions that require higher corrosion allowances, the wall thicknesses are to be increased accordingly.
 - 10- Schedule of fittings and flanges to be same as pipe. If high strength pipe is used, high strength fitting per MSS SP-75 and high strength flanges shall be used.
 - 11- Equivalent ASTM specifications for the valve body manufactured from plates, bars, or tubular per Table 1 of ASME B16.34 may be used.
 - 12- Use flanges instead of unions.
 - 13- ASTM A193 Gr. B7 bolts with ASTM A194 Gr. 2H heavy hex nuts may be used if the bolts will not be subject to low temperature conditions (e.g., auto-refrigeration due to flange leakage). Refer to [SAES-L-109](#) for bolt material selection.
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- 14- Where non-metallic seats, seals, liners, etc., are used, the manufacturer's pressure/temperature ratings shall limit the service of this class. If seal welding is required, threaded end valves shall have extended bodies or "swing-out" bodies to prevent damage due to welding heat.
- 15- Threaded connections shall not be used in hydrogen services.
- 16- In oxidizing environments, the maximum temperature for graphite filler material is limited to 425°C. Spiral-wound gaskets for vacuum and catalyst services require 316 SS inner rings.
- 17- Fittings and flanges with yield strength of 60 ksi or higher should be used if API 5L Gr. X60 is used. This would allow selecting fittings and flanges of the same thickness.
- 18- A corrosion allowance is used for the inner pipe to reflect corrosion on the inner and outer surfaces.
- 19- Steam jacket to be sized one NPS larger than the inner pipe.
- 20- Jacket pipe is designed for low pressure steam (maximum 150 psig) with 0.063 in corrosion allowance.
- 21- Swages, nipples, threadlets and socklets are rated for jacket pipe.
- 22- Valves connected to inner pipe must be steam traced.
- 23- A corrosion allowance of only 3.2 mm may be used for pipe sizes 6" and smaller.
- 24- Threaded and socketwelded connections are not permitted in dry chlorine service, use flanges including connections for: vents, drains, hydrotest, and thermowells.

If the bolts have potential for exposure to the sour service, A193 B7M stud bolts, with A194 2HM heavy hex nuts shall be used.
- 25- High corrosion allowance of 3.2 mm is specified for this line class as it is intended for erosive services.

10.3 Detailed line classes of Part II (Process Facilities)

Line Class: 1CA1P Service: Refer to Table 10.1 Rating Class: 150 RF Temperature Limit: -45°C to 343°C Corrosion Allowance: 1.6 mm (9)			Basic Material: Impact Tested C.S. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" -2"	XS	Seamless	A333 Gr. 6	(9)
	3" to 24"	STD	Seamless or welded	A333 Gr. 6	
	26" and above	Calculate		A671, Grades CC60, Class 22, S-2	
FITTINGS El's, tees, reducers, coupling, caps, plugs, etc.	½" - 1½"	Class 3000	Socketweld/ Threaded	A350-LF2 Class 1, B16.11	(10)
	2" -24"		Buttweld, Seamless	A420-Gr. WPL6, B16.9	
	26" and above		Buttweld, Welded	A420-Gr. WPL6, B16.9	
NIPPLES	½" - 1½"	XS	Socketweld/ Threaded	A333 Gr. 6	
SWAGES	½" - 1½"	XS	Socketweld/ Threaded	A420-WPL6, MSS SP-95	
Unions	½" - 1½"	Class 3000	Socketweld/ Threaded	A350-LF2 Class 1, MSS SP-83	
Sockolets/ Threadolets	½" - 1½"	Class 3000	Socketweld/ Threaded	A350-LF2 Class 1, MSS SP-97	
Weldolets	2" and above	Class 3000	Buttweld	A350-LF2 Class 1, MSS SP-97	
FLANGES	½" - 1½"	Class 150	Socketweld/ Threaded RF	A350-LF2 Class 1, B16.5	(10)
	2" to 24"	Class 150	Weldneck RF		
	24" and above	Class 150	Weldneck RF	A350-LF2 Class 1, B16.47 series A	
BOLTING	A320 Gr. L7 stud bolts, A194 G's 4 or 7 heavy hex nuts				(13)
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
VALVES					
Gate Valves	1½" and under	Class 800	Socketweld/ Threaded	A350-LF2 Class 1 body, BB, OS&Y, graphite packing, API 602, Trim No.12	(11)
	2" and above	Class 150	RF Flanged	Body A352-LCB or A350-LF2 Class 1 <u>Wedge type:</u> BB, OS&Y, graphite packing, API 600, Trim No. 12 <u>Thru-Conduit type:</u> API 6D, Trim No.12	

Continuation of Line Class 1CA1P					
Item	NPS	Rating Schedule	Type	Specification	Notes
Globe Valves	1½" and under	Class 800	Socketweld/ Threaded	A350-LF2 Class 1 body, BB, OS&Y, graphite packing API 602, Trim No. 12	
	2" and above	Class 150	RF Flanged	Body A352-LCB or A350-LF2 Class 1, BB, OS&Y, graphite packing, Trim No. 12	(11)
Check Valves	1½" and under	Class 800	Socketweld/ Threaded	A350-LF2 Class 1 body, API 602, Trim No. 10	
	2" and above	Class 150	RF Flanged	A352-LCB body, BC, Trim No. 10	(11)
Ball Valves	1½" and under	Class 300	Socketweld/ Threaded	A350-LF2 Class 1 body, floating ball, RTFE seats, Trim SS 316	(14)
	2" to 4"	Class 150	RF Flanged	Body A352-LCB or A350-LF2 Class 1, floating ball, RTFE seats, fire safe, API 6D, Trim SS 316	(11), (14)
	6" and above	Class 150	RF Flanged	Body A352-LCB or A350-LF2 Class 1, trunnion mounted, fire safe, API 6D, Trim SS 316	(11), (14)
Plug Valves	1½" and under	Class 600	Socketweld/ Threaded	A350-LF2 Class 1 body, lubricated, inverted pressure balanced, API 599, Trim SS 316	
	2" and above	Class 150	RF Flanged	Body A352-LCB or A350-LF2 Class 1, API 599, inverted pressure balanced, Trim SS 316	(11)
Butterfly Valves	3" and above	Class 150	Lugged or RF Flanged	Body A352-LCB or A350-LF2 Class 1, high performance, fire-safe, API 609 Cat. B, Trim SS 316	(11)

Line Class: 3CA1P Service: Refer to Table 10.1 Rating Class: 300 RF Temperature Limit: -45°C to 343°C Corrosion Allowance: 1.6 mm (9)			Basic Material: Impact Tested C.S. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" -2"	XS	Seamless	A333 Gr. 6	
	3" to 16"	Sch 40	Seamless or Welded	A333 Gr. 6	
	18" and above	Calculate		A671, Grades CC60, Class 22, S-2	
FITTINGS El's, tees, reducers, coupling, caps, plugs, etc.	½" - 1½"	Class 3000	Socketweld/ Threaded	A350-LF2 Class 1, B16.11	(10)
	2" -24"		Buttweld, Seamless	A420-Gr. WPL6, B16.9	
	26" and above		Buttweld, Welded	A420-Gr. WPL6, B16.9	
NIPPLES	½" - 1½"	XS	Socketweld/ Threaded	A333 Gr. 6	
SWAGES	½" - 1½"	XS	Socketweld/ Threaded	A420-WPL6, MSS SP-95	
Unions	½" - 1½"	Class 3000	Socketweld/ Threaded	A350-LF2 Class 1, MSS SP-83	
Sockolets/ Threadolets	½" - 1½"	Class 3000	Socketweld/ Threaded	A350-LF2 Class 1, MSS SP-97	
Weldolets	2" and above	Class 3000	Buttweld	A350-LF2 Class 1, MSS SP-97	
FLANGES	½" - 1½"	Class 300	Socketweld/ Threaded RF	A350-LF2 Class 1, B16.5	(10)
	2" to 24"	Class 300	Weldneck RF		
	24" and above	Class 300	Weldneck RF	A350-LF2 Class 1, B16.47, series A	
BOLTING	A320 Gr. L7 stud bolts, A194 G's 4 or 7 heavy hex nuts				(13)
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
VALVES					
Gate Valves	1½" and under	Class 800	Socketweld/ Threaded	A350-LF2 Class 1 body, BB, OS&Y, graphite packing, API 602, Trim No.12	(11)
	2" and above	Class 300	RF Flanged	Body A352-LCB or A350- LF2 Class 1 <u>Wedge type:</u> BB, OS&Y, graphite packing, API 600, Trim No. 12 <u>Thru-Conduit type:</u> API 6D, Trim No.12	

Continuation of Line Class 3CA1P					
Item	NPS	Rating Schedule	Type	Specification	Notes
Globe Valves	1½" and under	Class 800	Socketweld/ Threaded	A350-LF2 Class 1 body, BB, OS&Y, graphite packing API 602, Trim No. 12	
	2" and above	Class 300	RF Flanged	Body A352-LCB or A350-LF2 Class 1, BB, OS&Y, graphite packing, Trim No. 12	(11)
Check Valves	1½" and under	Class 800	Socketweld/ Threaded	A350-LF2 Class 1 body, API 602, Trim No. 10	
	2" and above	Class 300	RF Flanged	Body A352-LCB or A350-LF2 Class 1, BC, Trim No. 10	(11)
Ball Valves	1½" and under	Class 300	Socketweld/ Threaded	A350-LF2 Class 1 body, floating ball, RTFE seats, Trim SS 316	(14)
	2" to 4"	Class 300	RF Flanged	Body A352-LCB or A350-LF2 Class 1, floating ball, RTFE seats, fire safe, API 6D, Trim SS 316	(11), (14)
	6" and above	Class 300	RF Flanged	Body A352-LCB or A350-LF2 Class 1, trunnion mounted, fire safe, API 6D, Trim SS 316	(11), (14)
Plug Valves	1½" and under	Class 600	Socketweld/ Threaded	A350-LF2 Class 1 body, lubricated, inverted pressure balanced, API 599, Trim SS 316	
	2" and above	Class 300	RF Flanged	Body A352-LCB or A350-LF2 Class 1, API 599, inverted pressure balanced, Trim SS 316	(11)
Butterfly Valves	3" and above	Class 300	Lugged or RF Flanged	Body A352-LCB or A350-LF2 Class 1, high performance, fire-safe, API 609 Cat. B, Trim No. SS 316	(11)

Line Class: 6CA1P Service: Refer to Table 10.1 Rating Class: 600 RF Temperature Limit: -45°C to 343°C Corrosion Allowance: 1.6 mm (9)			Basic Material: Impact Tested C.S. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" - 1½"8"	XS	Seamless	A333 Gr. 6	
	2" to 8"	XS	Seamless	A333 Gr. 6	
	10" and above	Calculate	Seamless or Welded	A333 Gr. 6 or A671, Grades CC60, Class 22, S-2	
FITTINGS El's, tees, reducers, coupling, caps, plugs, etc.	½" - 1½"	Class 3000	Socketweld/ Threaded	A350-LF2 Class 1, B16.11	(10)
	2" -24"		Buttweld, Seamless	A420-Gr. WPL6, B16.9	
	26" and above		Buttweld, Welded	A420-Gr. WPL6, B16.9	
NIPPLES	½" - 1½"	XS	Socketweld/ Threaded	A333 Gr. 6	
SWAGES	½" - 1½"	XS	Socketweld/ Threaded	A420-WPL6, MSS SP-95	
Unions	-	-	-	-	(12)
Sockolets/ Threadolets	½" - 1½"	Class 3000	Socketweld/ Threaded	A350-LF2 Class 1, MSS SP-97	
Weldolets	2" and above	Class 3000	Buttweld	A350-LF2 Class 1, MSS SP-97	
FLANGES	½" - 1½"	Class 600	Socketweld/ Threaded RF	A350-LF2 Class 1, B16.5	(10)
	2" to 24"	Class 600	Weldneck RF		
	24" and above	Class 600	Weldneck RF	A350-LF2 Class 1, B16.47, series A	
BOLTING	A320 Gr. L7 stud bolts, A194 G's 4 or 7 heavy hex nuts				(13)
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
VALVES					
Gate Valves	1½" and under	Class 800	Socketweld/ Threaded	A350-LF2 Class 1 body, BB, OS&Y, graphite packing, API 602, Trim No.12	(11)
	2" and above	Class 600	RF Flanged	Body A352-LCB or A350-LF2 Class 1 <u>Wedge type:</u> BB, OS&Y, graphite packing, API 600, Trim No. 12 <u>Thru-Conduit type:</u> API 6D, Trim No.12	

Continuation of Line Class 6CA1P					
Item	NPS	Rating Schedule	Type	Specification	Notes
Globe Valves	1½" and under	Class 800	Socketweld/ Threaded	A350-LF2 Class 1 body, BB, OS&Y, graphite packing API 602, Trim No. 12	
	2" and above	Class 600	RF Flanged	Body A352-LCB or A350-LF2 Class 1, BB, OS&Y, graphite packing, Trim No. 12	(11)
Check Valves	1½" and under	Class 800	Socketweld/ Threaded	A350-LF2 Class 1 body, API 602, Trim No. 10	
	2" and above	Class 600	RF Flanged	Body A352-LCB or A350-LF2 Class 1, BC, Trim No. 10	(11)
Ball Valves	1½" and under	Class 600	Socketweld/ Threaded	A350-LF2 Class 1 body, floating ball, RTFE seats, Trim SS 316	(14)
	2" and above	Class 600	RF Flanged	Body A352-LCB or A350-LF2 Class 1, trunnion mounted, fire safe, API 6D, Trim SS 316	(11), (14)
Plug Valves	1½" and under	Class 600	Socketweld/ Threaded	A350-LF2 Class 1 body, lubricated, inverted pressure balanced, API 599, Trim SS 316	
	2" and above	Class 600	RF Flanged	Body A352-LCB or A350-LF2 Class 1, API 599, inverted pressure balanced, Trim SS 316	(11)
Butterfly Valves	3" and above	Class 600	Lugged or RF Flanged	Body A352-LCB or A350-LF2 Class 1, high performance, fire-safe, API 609 Cat. B, Trim SS 316	(11)

Line Class: 1CH2C Service: Refer to Table 10.1 Rating Class: 150 RF B16.5 Temperature Limit: 0 to 80°C Corrosion Allowance: 3.2 mm (9)			Basic Material: Carbon Steel Code: B31.3 Stress Relief: PWHT is required Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½"	Sch 160	Seamless	A106 Gr. B	
	¾" to 2"	XS	Seamless	A106 Gr. B	
	3" to 24"	Std	Seamless	A106 Gr. B or API 5L, Gr. B	
	26" and larger	Calculate	Welded	API 5L, Gr. B or A671-CC60 Class 32 (Supplement S-1).	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½"-1½"	Class 6000	Socketweld/ Threaded	A105N, B16.11	
	2" and above		Buttweld	A234-WPB, B16.9	(10)
Nipples	2" and under		Socketweld/ Threaded	A106 Gr. B	(10)
Swages	2" and under		Socketweld/ Threaded	A234-WPB, MSS SP-95	(10)
Unions	2" and under	Class 6000	Socketweld/ Threaded	A105N, MSS SP-83.	
Socketlets/ Threadoletts	1½" and under	Class 6000	Socketweld/ Threaded	A105N, B16.11	
Weldolets	2" and above		Buttweld	A105N, B16.9	(10)
FLANGES	1½" and under	Class 150	Socketweld/ Threaded RF	A105N, B16.5	(10)
	2" and above	Class 150	Weldneck RF	A105N, B16.5	(10)
	24" and above	Class 150	Weldneck RF	A350-LF2 Class 2, B16.47 series A	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
Gate Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N Body, BB, OS&Y, API 602, Trim No.9	
	2" and above	Class 150	RF Flanged	A216-WCB body, BB, OS&Y, API 600, Trim No.9	(11)
Globe Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N Body, BB, OS&Y, Trim No.9	
	2" and above	Class 150	RF Flanged	A216-WCB Body, BB, OS&Y, Trim No.9	(11)
Check Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N body, BC, Trim No.9	
	2" and above	Class 150	RF Flanged	A216-WCB body, BC, Trim No. 9	(11)

Line Class: 3CH2C Service: Refer to Table 10.1 Rating Class: 300 RF B16.5 Temperature Limit: 0 to 80°C Corrosion Allowance: 3.2 mm (9)			Basic Material: Carbon Steel Code: B31.3 Stress Relief: PWHT is required Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to ¾"	Sch 160	Seamless	A106 Gr. B	
	1" to 1 ½"	XS	Seamless	A106 Gr. B	
	2 to 16"	XS	Seamless	A106 Gr. B or API 5L, Gr. B	
	18" and larger	Calculate	Seamless or Welded	API 5L, Gr. B or A671-CC60 Class 32. (Supplement S-1).	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½"-1½"	Class 6000	Socketweld/ Threaded	A105N, B16.11	
	2" and above		Buttweld	A234-WPB, B16.9	(10)
Nipples	½"-1½"		Socketweld/ Threaded	A106 Gr. B	(10)
Swages	½"-1½"		Socketweld/ Threaded	A234-WPB, MSS SP-95	(10)
Unions	½"-1½"	Class 6000	Socketweld/ Threaded	A105N, MSS SP-83	
Sockolets/ Threadolets	1½" and under	Class 6000	Socketweld/ Threaded	A105N, B16.11	
Weldolets	2" and above		Buttweld	A105N, B16.9	(10)
FLANGES	1½" and under	Class 300	Socketweld/ Threaded RF	A105N, B16.5	(10)
	2" and above	Class 300	Weldneck RF	A105N, B16.5	(10)
	24" and above	Class 300	Weldneck RF	A350-LF2 Class 2, B16.47 series A	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
Gate Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N Body, BB, OS&Y, API 602, Trim No.9	
	2" and above	Class 300	RF Flanged	A216-WCB body, BB, OS&Y, API 600, Trim No.9	(11)
Globe Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N Body, BB, OS&Y, Trim No.9	
	2" and above	Class 150	RF Flanged	A216-WCB Body, BB, OS&Y, Trim No.9	(11)
Check Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N body, BC, Trim No.9	
	2" and above	Class 300	RF Flanged	A216-WCB body, BC, Trim No. 9	(11)

Line Class: 6CH2C Service: Refer to Table 10.1 Rating Class: 600 RF B16.5 Temperature Limit: 0 to 80°C Corrosion Allowance: 3.2 mm (9)			Basic Material: Carbon Steel Code: B31.3 Stress Relief: PWHT is required Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 1 ½"	Sch 160	Seamless	A106 Gr. B	
	2"	XS	Seamless	A106 Gr. B	
	3 to 6"	XS	Seamless	A106 Gr. B or API 5L, Gr. B	
	8 to 24"	Sch 80	Seamless	A106 Gr. B or API 5L, Gr. B	
	26" and larger	Calculate	Seamless or Welded	API 5L, Gr. B or A671-CC60 Class 32 (Supplement S-1).	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	1½" and under	Class 6000	Socketweld/ Threaded	A105N, B16.11	
	2" and above		Buttweld	A234 Gr. WPB, B16.9	(10)
Nipples	2" and under	Sch 160	Socketweld/ Threaded	A106 Gr. B	
Swages	2" and under	Sch 160	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	½"-1½"	Class 6000	Socketweld/ Threaded	A105N, MSS SP-83.	
Sockolets/ Threadolets	1½" and under	Class 6000	Socketweld/ Threaded	A105N, B16.11	
Weldolets	2" and above		Buttweld	A105N, B16.9	(10)
FLANGES	1½" and under	Class 600	Socketweld RF	A105N, B16.5	(10)
	2" to 12"	Class 600	Weldneck RF	A105N, B16.5	(10)
	14" to 24"	Class 600	Weldneck RF	A350-LF2 Class 2, B16.5	(10)
	24" and above	Class 600	Weldneck RF	A350-LF2 Class 2, B16.47 series A	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
Gate Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N Body, BB, OS&Y, API 602, Trim No.9	
	2" and above	Class 600	RF Flanged	A216-WCB body, BB, OS&Y, API 600, Trim No.9	(11)
Globe Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N Body, BB, OS&Y, Trim No.9	
	2" and above	Class 600	RF Flanged	A216-WCB Body, BB, OS&Y, Trim No.9	(11)
Check Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N body, BC, Trim No.9	
	2" and above	Class 600	RF Flanged	A216-WCB body, BC, Trim No. 9	(11)

Line Class: 1CS2H Service: Refer to Table 10.1 Rating Class: 150 RF B16.5 Temperature Limit: 400°C Max. (3) Corrosion Allowance: 3.2 mm (9)			Basic Material: Carbon Steel Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½"	Sch 160	Seamless	A106 Gr. B	
	¾" to 2"	XS	Seamless	A106 Gr. B	
	3" to 24"	Std	Seamless	A106 Gr. B or API 5L, Gr. B	
	26" and larger	Calculate	Welded	API 5L, Gr. B or A671-CC60 Class 32. (Supplement S-1).	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½"-1½"	Class 6000	Socketweld	A105N, B16.11	(15)
	2" and above		Buttweld	A234-WPB, B16.9	(10)
Nipples	2" and under		Socketweld	A106 Gr. B	(10), (15)
Swages	2" and under		Socketweld	A234-WPB, MSS SP-95	(10), (15)
Unions	-	-	-	-	(12)
Sockolets/ Threadolets	1½" and under	Class 6000	Socketweld	A105N, B16.11	(15)
Weldolets	2" and above		Buttweld	A105N, B16.9	(10)
FLANGES	1½" and under	Class 150	Socketweld RF	A105N, B16.5	(10), (15)
	2" to 24"	Class 150	Weldneck RF	A105N, B16.5	(10)
	24" and above	Class 150	Weldneck RF	A350-LF2 Class 2, B16.47 series A	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
Gate Valves	1½" and under	Class 800	Socketweld	A105N Body, BB, OS&Y, API 602, Trim No.8	(15)
	2" and above	Class 150	RF Flanged	A216-WCB body, BB, OS&Y, API 600, Trim No.8	(11)
Globe Valves	1½" and under	Class 800	Socketweld	A105N Body, BB, OS&Y, Trim No.8	(15)
	2" and above	Class 150	RF Flanged	A216-WCB Body, BB, OS&Y, Trim No.8	(11)
Check Valves	1½" and under	Class 800	Socketweld	A105N body, BC, Trim No.1	(15)
	2" and above	Class 150	RF Flanged	A216-WCB body, BC, Trim No. 1	(11)

Line Class: 3CS2H Service: Refer to Table 10.1 Rating Class: 300 RJ B16.5 Temperature Limit: 400°C Max. (3) Corrosion Allowance: 3.2 mm (9)			Basic Material: Carbon Steel Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½"-¾"	Sch 160	Seamless	A106 Gr. B	
	1" to 1½"	XS	Seamless	A106 Gr. B	
	2 to 16"	XS	Seamless	A106 Gr. B or API 5L, Gr. B	
	18" and larger	Calculate	Seamless or Welded	API 5L, Gr. B or A671-CC60 Class 32. (Supplement S-1).	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½"-1½"	Class 6000	Socketweld/ Threaded	A105N, B16.11	
	2" and above		Buttweld	A234-WPB, B16.9	(10)
Nipples	½"-1½"		Socketweld	A106 Gr. B	(10), (15)
Swages	½"-1½"		Socketweld	A234-WPB, MSS SP-95	(10), (15)
Unions	-	-	-	-	(12)
Sockolets/ Threadolets	1½" and under	Class 6000	Socketweld	A105N, B16.11	(15)
Weldolets	2" and above		Buttweld	A105N, B16.9	(10)
FLANGES	1½" and under	Class 300	Socketweld RJ	A105N, B16.5	(10), (15)
	2" to 24"	Class 300	Weldneck RJ	A105N, B16.5	(10)
	24" and above	Class 300	Weldneck RJ	A350-LF2 Class 2, B16.47 series A	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	Soft Iron Octagonal Ring, ASME B16.20				
Gate Valves	1½" and under	Class 800	Socketweld	A105N Body, BB, OS&Y, API 602, Trim No.8	(15)
	2" and above	Class 300	RF Flanged	A216-WCB body, BB, OS&Y, API 600, Trim No.8	(11)
Globe Valves	1½" and under	Class 800	Socketweld	A105N Body, BB, OS&Y, Trim No.8	(15)
	2" and above	Class 150	RF Flanged	A216-WCB Body, BB, OS&Y, Trim No.8	(11)
Check Valves	1½" and under	Class 800	Socketweld	A105N body, BC, Trim No.1	(15)
	2" and above	Class 300	RF Flanged	A216-WCB body, BC, Trim No. 1	(11)

Line Class: 6CS2H Service: Refer to Table 10.1 Rating Class: 600 RJ B16.5 Temperature Limit: 400°C Max. (3) Corrosion Allowance: 3.2 mm (9)			Basic Material: Carbon Steel Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 1½"	Sch 160	Seamless	A106 Gr. B	
	2"	XS	Seamless	A106 Gr. B	
	3 to 6"	XS	Seamless	A106 Gr. B or API 5L, Gr. B	
	8" to 24"	Sch 80	Seamless	A106 Gr. B or API 5L, Gr. B	
	26" and larger	Calculate	Seamless or Welded	API 5L, Gr. B or A671-CC60 Class 32. (Supplement S-1).	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	1½" and under	Class 6000	Socketweld	A105N, B16.11	(15)
	2" and above		Buttweld	A234 Gr. WPB, B16.9	(10)
Nipples	2" and under	Sch 160	Socketweld	A106 Gr. B	(15)
Swages	2" and under	Sch 160	Socketweld	A234-WPB, MSS SP-95	(15)
Unions	-	-	-	-	(12)
Sockolets/ Threadolets	1½" and under	Class 6000	Socketweld	A105N, B16.11	(15)
Weldolets	2" and above		Buttweld	A105N, B16.9	(10)
FLANGES	1½" and under	Class 600	Socketweld RF	A105N, B16.5	(10), (15)
	2" to 12"	Class 600	Weldneck RF	A105N, B16.5	(10)
	14" to 24"	Class 600	Weldneck RF	A350-LF2 Class 2, B16.5	(10)
	24" and above	Class 600	Weldneck RF	A350-LF2 Class 2, B16.47 series A	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	Soft Iron Octagonal Ring, ASME B16.20				
Gate Valves	1½" and under	Class 800	Socketweld	A105N Body, BB, OS&Y, API 602, Trim No.8	(15)
	2" and above	Class 600	RF Flanged	A216-WCB body, BB, OS&Y, API 600, Trim No.8	(11)
Globe Valves	1½" and under	Class 800	Socketweld	A105N Body, BB, OS&Y, Trim No.8	(15)
	2" and above	Class 600	RF Flanged	A216-WCB Body, BB, OS&Y, Trim No.8	(11)
Check Valves	1½" and under	Class 800	Socketweld	A105N body, BC, Trim No.1	(15)
	2" and above	Class 600	RF Flanged	A216-WCB body, BC, Trim No. 1	(11)

Line Class: 1CS1P Service: Refer to Table 10.1 Rating Class: 150 RF Temperature Limit: -18 to 400°C (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: Carbon Steel Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½-1½	XS	Seamless	A106 Gr. B	
	2"	XS	Seamless	A106 Gr. B, API 5L, Gr. B	
	3" to 24"	STD	Seamless	A106 Gr. B, API 5L, Gr. B	
	26" and larger	Calculate	Seamless or Welded	API 5L, Gr. B or Gr. X60, or A671-CC60 Class 32. (Supplement S-1).	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings etc.	½-1½	Class 3000	Socketweld/ Threaded	A105N, B16.11	
	2 and above		Buttweld	A234-WPB, B16.9	(10), (17)
Nipples	½-1½	XS	Socketweld/ Threaded	A106 Gr. B	
Swages	½-1½	XS	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-83	
Sockolets/ Threadolets	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-97	
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	
FLANGES	1½ and under	Class 150	Socketweld/ Threaded RF	A105N, B16.5	(10)
	2 -24	Class 150	Weldneck RF	A105N, B16.5	(10),
	26 and above	Class 150	Weldneck RF	A350 LF2 Cl 2 B16.47 Series A	(17)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			(16)
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
VALVES					
Gate Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	
	2 and above	Class 150	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, API 600, Trim No. 8	(11)
Globe Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	
	2 and above	Class 150	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, Trim No. 8	(11)

Continuation of Line Class 1CS1P					
Item	NPS	Rating Schedule	Type	Specification	Notes
Check Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, Trim No.1	
	2 and above	Class 150	RF Flanged	Body A216-WCB or A105, Trim No.1	(11)
Ball Valves	1½ and under	Class 300	Socketweld/ Threaded	A105N body, floating ball, RTFE seats, Trim SS 316	(14)
	2 to 4	Class 150	RF Flanged	Body A216-WCB or A105, floating ball, RTFE seats, fire safe, API 6D, Trim ENP or SS410	(11), (14)
	6 and above	Class 150	RF Flanged	Body A216-WCB or A105, trunnion mounted, fire safe, API 608 or 6D, Trim ENP or SS410	(11)
Plug Valves	1½ and under	Class 600	Socketweld/ Threaded	A105N body, lubricated, inverted pressure balanced, BC, Trim 316 SS	
	2 and above	Class 150	RF Flanged	Body A216-WCB or A105, lubricated, inverted pressure balanced, BC, API 599, Trim ENP or SS 410	(11)
Butterfly Valves	4 and above	Class 150	Lugged or RF Flanged	Body A216-WCB or A105, high performance, double or triple eccentric, fire safe, API 609 Cat.B, Trim ENP or SS316	(11)

Line Class: 3CS1P Service: Refer to Table 10.1 Rating Class: 300 RF Temperature Limit: -18 to 400°C (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: Carbon Steel Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½-1½	XS	Seamless	A106 Gr. B	
	2"	XS	Seamless	A106 Gr. B, API 5L, Gr. B	
	3" to 16"	Sch 40	Seamless	A106 Gr. B, API 5L, Gr. B	
	18" and larger	Calculate	Seamless or Welded	API 5L, Gr. B or Gr. X60, or A671-CC60 Class 32. (Supplement S-1).	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½-1½	Class 3000	Socketweld/ Threaded	A105N, B16.11	
	2 and above		Buttweld	A234-WPB, B16.9	(10), (17)
Nipples	½-1½	XS	Socketweld/ Threaded	A106 Gr. B	
Swages	½-1½	XS	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-83	
Sockolets/ Threadolets	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-97	
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	
FLANGES	1½ and under	Class 300	Socketweld RF	A105N, B16.5	(10)
	2 -24	Class 300	Weldneck RF	A105N, B16.5	(10), (17)
	26 and above	Class 300	Weldneck RF	A350 LF2 Cl 2 B16.47 Series A	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			(16)
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
VALVES					
Gate Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	(11)
	2 and above	Class 300	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, API 600, Trim No. 8	
Globe Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	(11)
	2 and above	Class 300	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, Trim No. 8	

Continuation of Line Class 3CS1P					
Item	NPS	Rating Schedule	Type	Specification	Notes
Check Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, Trim No.1	
	2 and above	Class 300	RF Flanged	Body A216-WCB or A105, Trim No.1	(11)
Ball Valves	1½ and under	Class 300	Socketweld/ Threaded	A105N body, floating ball, RTFE seats, Trim SS 316	(14)
	2 to 4	Class 300	RF Flanged	Body A216-WCB or A105, floating ball, RTFE seats, fire safe, API 6D, Trim ENP or SS410	(11), (14)
	6 and above	Class 300	RF Flanged	Body A216-WCB or A105, trunnion mounted, fire safe, API 608 or 6D, Trim ENP or SS410	(11)
Plug Valves	1½ and under	Class 300	Socketweld/ Threaded	A105N body, lubricated, inverted pressure balanced, BC, Trim 316 SS	
	2 and above	Class 300	RF Flanged	Body A216-WCB or A105, lubricated, inverted pressure balanced, BC, API 599, Trim ENP or SS 410	(11)
Butterfly Valves	4 and above	Class 300	Lugged or RF Flanged	Body A216-WCB or A105, high performance, double or triple eccentric, fire safe, API 609 Cat.B, Trim ENP or SS316	(11)

Line Class: 6CS1P Service: Refer to Table 10.1 Rating Class: 600 RF Temperature Limit: -18 to 400°C (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: Carbon Steel Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½"-1½"	XS	Seamless	A106 Gr. B	
	2" to 8"	XS	Seamless	A106 Gr. B, API 5L, Gr. B	
	10" and larger	Calculate	Seamless or Welded	API 5L, Gr. B or Gr. X60, or A671-CC60 Class 32. (Supplement S-1).	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½"-1½"	Class 3000	Socketweld/ Threaded	A105N, B16.11	
	2 and above		Buttweld	A234-WPB, B16.9	(10), (17)
Nipples	½"-1½"	XS	Socketweld/ Threaded	A106 Gr. B	
Swages	½"-1½"	XS	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	-	-	-	-	(12)
Sockolets/ Threadolets	½"-1½"	Class 3000	Socketweld/ Threaded	A105N, MSS SP-97	
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	(10)
FLANGES	1½ and under	Class 600	Socketweld/ Threaded RF	A105N, B16.5	
	2" to 12"	Class 600	Weldneck RF	A105N, B16.5	(10)
	14" to 24"	Class 600	Weldneck RF	A350-LF2 Class 2, B16.5	(10), (17)
	26 and above	Class 600	Weldneck RF	A350 LF2 Cl 2 B16.47 Series A	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			(16)
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
VALVES					
Gate Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	(11)
	2 and above	Class 600	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, API 600, Trim No. 8	
Globe Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	(11)
	2 and above	Class 600	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, Trim No. 8	

Continuation of Line Class 6CS1P					
Item	NPS	Rating Schedule	Type	Specification	Notes
Check Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, Trim No.1	
	2 and above	Class 600	RF Flanged	Body A216-WCB or A105, Trim No.1	(11)
Ball Valves	1½ and under	Class 600	Socketweld/ Threaded	A105N body, floating ball, RTFE seats, Trim SS 316	(14)
	2" and above	Class 600	RF Flanged	Body A216-WCB or A105, trunnion mounted, fire safe, API 608 or 6D, Trim ENP or SS410	(11)
Plug Valves	1½ and under	Class 600	Socketweld/ Threaded	A105N body, lubricated, inverted pressure balanced, BC, Trim 316 SS	
	2 and above	Class 600	RF Flanged	Body A216-WCB or A105, lubricated, inverted pressure balanced, BC, API 599, Trim ENP or SS 410	(11)
Butterfly Valves	4 and above	Class 600	Lugged or RF Flanged	Body A216-WCB or A105, high performance, double or triple eccentric, fire safe, API 609 Cat.B, Trim ENP or SS316	(11)

Line Class: 9CS1P Service: Refer to Table 10.1 Rating Class: 900 RJ Temperature Limit: -18 to 400°C (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: Carbon Steel Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½"-1½"	XS	Seamless	A106 Gr. B	
	2" to 3"	XS	Seamless	A106 Gr. B , API 5L, Gr. B	
	4" to 12"	Sch 120	Seamless	A106 Gr. B , API 5L, Gr. B	
	14" and larger	Calculate	Seamless or Welded	API 5L, Gr. B or Gr. X60, or A671-CC60 Class 32. (Supplement S-1).	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½-1½	Class 3000	Socketweld/ Threaded	A105N, B16.11	
	2 and above		Buttweld	A234-WPB, B16.9	(10), (17)
Nipples	½-1½	XS	Socketweld/ Threaded	A106 Gr. B	
Swages	½-1½	XS	Socketweld/ Threaded	A234-WPB , MSS SP-95	
Unions	-	-	-	-	(12)
Sockolets/ Threadolets	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-97	
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	
FLANGES	½-1½	Class 900	Socketweld/ Threaded RJ	A105N, B16.5	(10)
	2-24	Class 900	Weldneck RJ	A350 LF2 Cl 2, B16.5	(10),
	26- 48	Class 900	Weldneck RJ	A350 LF2 Cl 2 B16.47 Series A	(17)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	Soft-Iron octanonal ring, per B16.20				
VALVES					
Gate Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	
	2 and above	Class 900	RJ Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, API 600, Trim No. 8	(11)
Globe Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	
	2 and above	Class 900	RJ Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, Trim No. 8	(11)

Continuation of Line Class 9CS1P					
Item	NPS	Rating Schedule	Type	Specification	Notes
Check Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, Trim No.1	
	2 and above	Class 900	RJ Flanged	Body A216-WCB or A105, Trim No.1	(11)
Ball Valves	2 and above	Class 900	RJ Flanged	Body A216-WCB or A105, trunnion mounted, fire safe, API 608 or 6D, Trim ENP or SS410	(11)
Plug Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, lubricated, inverted pressure balanced, BC, Trim 316 SS	
	2 and above	Class 900	RJ Flanged	Body A216-WCB or A105, lubricated, inverted pressure balanced, BC, API 599, Trim ENP or SS 410	(11)

Line Class: 15CS1P Service: Refer to Table 10.1 Rating Class: 1500 RJ Temperature Limit: -18 to 400°C (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: Carbon Steel Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½"-1½"	Sch 160	Seamless	A106 Gr. B	
	2 and larger	Calculate	Seamless or Welded	API 5L, Gr. B or Gr. X60 or A671-CC60 Class 32. (Supplement S-1).	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½-1½	Class 6000	Socketweld/ Threaded	A105N, B16.11	
	2 and above		Buttweld	A234-WPB, B16.9	(10), (17)
Nipples	½-1½	Sch 160	Socketweld/ Threaded	A106 Gr. B	
Swages	½-1½	Sch 160	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	-	-	-	-	(12)
Sockolets/ Threadolets	½-1½	Class 6000	Socketweld/ Threaded	A105N, MSS SP-97	
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	
FLANGES	½-1½	Class 1500	Socketweld/ Threaded RJ	A105N, B16.5	(10), (17)
	2-24	Class 1500	Weldneck RJ	A350 LF2 Cl 2, ASME B16.5	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	Soft-Iron octagonal ring, per B16.20				
VALVES					
Gate Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	
	2 and above	Class 1500	RJ Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, API 600, Trim No. 8	
Globe Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	(11)
	2 and above	Class 1500	RJ Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, Trim No. 8	(11)

Continuation of Line Class 15CS1P					
Item	NPS	Rating Schedule	Type	Specification	Notes
Check Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, Trim No.1	
	2 and above	Class 1500	RJ Flanged	Body A216-WCB or A105, Trim No.1	(11)
Ball Valves	2 and above	Class 1500	RJ Flanged	Body A216-WCB or A105, trunnion mounted, fire safe, API 608 or 6D, Trim ENP or SS410	(11)
Plug Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, lubricated, inverted pressure balanced, BC, Trim 316 SS	
	2 and above	Class 1500	RJ Flanged	Body A216-WCB or A105, lubricated, inverted pressure balanced, BC, API 599, Trim ENP or SS 410	(11)

Line Class: 25CS1P Service: Refer to Table 10.1 Rating Class: 2500 RJ Temperature Limit: -18 to 400°C (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: Carbon Steel Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½"-1½"	XXS	Seamless	A106 Gr. B	
	2 and larger	Calculate	Seamless or Welded	API 5L, Gr. B or Gr. X60 or A671-CC60 Class 32. (Supplement S-1).	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½-1½	Class 9000	Socketweld/ Threaded	A105N, B16.11	
	2 and above		Buttweld	A234-WPB, B16.9	(10), (17)
Nipples	½-1½	XXS	Socketweld/ Threaded	A106 Gr. B	
Swages	½-1½	XXS	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	-	-	-	-	(12)
Socketlets/ Threadolets	½-1½	Class 9000	Socketweld/ Threaded	A105N, MSS SP-97	
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	
FLANGES	½-1½	Class 2500	Socketweld/ Threaded RJ	A105N, B16.5	(10), (17)
	2-24	Class 2500	Weldneck RJ	A350 LF2 Cl 2, B16.5	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts.				
GASKETS	Soft-Iron octagonal ring, per B16.20				
VALVES					
Gate Valves	1½ and under	Class 2500	Socketweld/ Threaded	A105N body, PSB or WB, OS&Y, graphite packing, Trim No. 8	(11)
	2 and above	Class 2500	RJ Flanged	Body A216-WCB or A105, PSB or WB, OS&Y, graphite packing, API 600, Trim No. 8	
Globe Valves	1½ and under	Class 2500	Socketweld/ Threaded	A105N body, PSB or WB, OS&Y, Trim No.8	(11)
	2 and above	Class 2500	RJ Flanged	A216-WCB body or A105, PSB or WB, OS&Y, Trim No.8	
Check Valves	1½ and under	Class 2500	Socketweld/ Threaded	A105N body, PSB or WB, Trim No.8	(11)
	2 and above	Class 2500	RJ Flanged	A216-WCB body or A105, PSB or WB, Trim No. 8	

Line Class: 1CX2P Service: Paving Asphalt with Steam Jacket Rating Class: 150 RF B16.5 Temperature Limit: -18 to 195°C Corrosion Allowance: 3.2 mm (9)			Basic Material: Double Pipe Carbon Steel Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: Special		
Item	NPS	Rating Schedule	Type	Specification	Notes
INNER PIPE	½"	Sch 160	Seamless	A106 Gr B or API 5L Gr. B	(18)
	¾" to 2"	XS			
	3" to 24"	STD			
JACKET PIPE	1" to 2"	XS	Seamless	A106 Gr B or API 5L Gr. B	(19), (20)
	3 to 24"	STD			
FITTINGS		Class 6000 for inner pipe Class 3000 for jacket pipe			
El's, Tees,	½" to 1½"		Socketweld/ Threaded	A105N, B16.11	
Reducers, Caps, Couplings, etc.	2" and above		Buttweld	A234-Gr. WPB, Seamless, B16.9	(10)
Swages	½" to 1½"	XS	Socketweld/ Threaded	A234-Gr. WPB, Seamless, MSS SP-95	(21)
Nipples	½" to 1½"	XS	Socketweld/ Threaded	A106 Gr. B Seamless	(21)
Unions	-	-	-	-	(12)
Sockolets/ Threadolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A105N, MSS SP-97	(21)
Weldolets	2" and above		Buttweld	A105N, MSS SP-97	(10)
FLANGES	1½" and under	Class 150	Socketweld/ Threaded RF	A105N, B16.5	(10)
	2" and above	Class 150	Weldneck RF	A105N, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts.				
GASKETS	Spiral-wound, 316 SS windings, flexible graphite filled with carbon steel outer ring and 316 SS inner ring, per B16.20				
GATE VALVES	1½" and under	Class 800	Socketweld/ Threaded	Jacketed, A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	(22)
	2" and above	Class 150	RF Flanged	Jacketed, A216-WCB body, BB, OS&Y, graphite packing, API 600, Trim No. 8	(11), (22)
PLUG VALVES	2" and above	Class 150	RF Flanged	Jacketed, A216-WCB body, non-lubricated, TFE Sleeve, API 599	(11), (14), (22)
CHECK VALVE	2" and above	Class 150	RF Flanged	Jacketed, Swing Check, A216-WCB body, BC, Trim No. 1	(11)

Line Class: 3CX2P Service: Paving Asphalt with Steam Jacket Rating Class: 300 RF B16.5 Temperature Limit: -18 to 195°C Corrosion Allowance: 3.2 mm (9)			Basic Material: Double Pipe Carbon Steel Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: Special		
Item	NPS	Rating Schedule	Type	Specification	Notes
INNER PIPE	½" to ¾"	Sch 160	Seamless	A106 Gr B or API 5L Gr. B	(18)
	1" to 16"	XS			
	18" to 24"	Calculate			
JACKET PIPE	1" to 2"	XS	Seamless	A106 Gr B or API 5L Gr. B	(19), (20)
	3 to 24"	STD			
FITTINGS		Class 6000 for inner pipe Class 3000 for jacket pipe			
El's, Tees,	½" to 1½"		Socketweld/ Threaded	A105N, B16.11	
Reducers, Caps, Couplings, etc.	2" and above		Buttweld	A234-Gr. WPB, Seamless, B16.9	(10)
Swages	½" to 1½"	XS	Socketweld/ Threaded	A234-Gr. WPB, Seamless, MSS SP-95	(21)
Nipples	½" to 1½"	XS	Socketweld/ Threaded	A106 Gr. B Seamless	(21)
Unions	-	-	-	-	(12)
Sockolets/ Threadolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A105N, MSS SP-97	(21)
Weldolets	2" and above		Buttweld	A105N, MSS SP-97	(10)
FLANGES	1½" and under	Class 300	Socketweld/ Threaded RF	A105N, B16.5	(10)
	2" and above	Class 300	Weldneck RF	A105N, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	Spiral-wound, 316 SS windings, flexible graphite filled with carbon steel outer ring and 316 SS inner ring, per B16.20				
GATE VALVES	1½" and under	Class 800	Socketweld/ Threaded	Jacketed, A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	(22)
	2" and above	Class 300	RF Flanged	Jacketed, A216-WCB body, BB, OS&Y, graphite packing, API 600, Trim No. 8	(11), (22)
PLUG VALVES	2" and above	Class 300	RF Flanged	Jacketed, A216-WCB body, non-lubricated, TFE Sleeve, API 599	(11), (14), (22)
CHECK VALVE	2" and above	Class 300	RF Flanged	Jacketed, Swing Check, A216-WCB body, BC, Trim No. 1	(11)

Line Class: 1CX4P Service: Sulfur with Steam Jacket Rating Class: 150 RF B16.5 Temperature Limit: -18 to 195°C Corrosion Allowance: 6.4 mm (9)			Basic Material: Double Pipe Carbon Steel Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: Special		
Item	NPS	Rating Schedule	Type	Specification	Notes
INNER PIPE	½"	Sch 160	Seamless	A106 Gr B or API 5L Gr. B	(18), (23)
	¾" to 6"	XS			
	8" to 18"	STD			
JACKET PIPE	1" to 2"	XS	Seamless	A106 Gr B or API 5L Gr. B	(19), (20)
	3 to 24"	STD			
FITTINGS					
El's, Tees,	½" to 1½"	Class 6000 for inner pipe Class 3000 for jacket pipe	Socketweld/ Threaded	A105N, B16.11	
Reducers, Caps, Couplings, etc.	2" and above		Buttweld		
Swages	½" to 1½"	XS	Socketweld/ Threaded	A234-Gr. WPB, Seamless, MSS SP-95	(21)
Nipples	½" to 1½"	XS	Socketweld/ Threaded	A106 Gr. B Seamless	(21)
Unions	-	-	-	-	(12)
Sockolets/ Threadolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A105N, MSS SP-97	(21)
Weldolets	2" and above		Buttweld	A105N, MSS SP-97	(10)
FLANGES	1½" and under	Class 150	Socketweld/ Threaded RF	A105N, B16.5	(10)
	2" and above	Class 150	Weldneck RF	A105N, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	Spiral-wound, 316 SS windings, flexible graphite filled with carbon steel outer ring and 316 SS inner ring, per B16.20				
GATE VALVES	1½" and under	Class 1500	Socketweld/ Threaded	Jacketed, A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	(22)
	2" and above	Class 150	RF Flanged	Jacketed, A216-WCB body, BB, OS&Y, graphite packing, API 600, Trim No. 8	(11), (22)
PLUG VALVES	2" and above	Class 150	RF Flanged	Jacketed, A216-WCB body, non-lubricated, TFE Sleeve, API 599	(11), (14), (22)
CHECK VALVE	2" and above	Class 150	RF Flanged	Jacketed, Swing Check, A216-WCB body, BC, Trim No. 1	(11)

Line Class: 1CS1U Service: Steam Generation Rating Class: 150 RF Temperature Limit: -18 to 400°C (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: Carbon Steel Code: B31.1 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½-1½	XS	Seamless	A106 Gr. B	
	2"	XS	Seamless	A106 Gr. B, API 5L, Gr. B	
	3" to 24"	STD	Seamless	A106 Gr. B, API 5L, Gr. B	
	26" and larger	Calculate	Seamless or Welded	API 5L, Gr. B or Gr. X60, or A671-CC60 Class 32. (Supplement S-1).	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings etc.	½-1½	Class 3000	Socketweld/ Threaded	A105N, B16.11	
	2 and above		Buttweld	A234-WPB, B16.9	(10), (17)
Nipples	½-1½	XS	Socketweld/ Threaded	A106 Gr. B	
Swages	½-1½	XS	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-83	
Socklets/ Threadolets	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-97	
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	
FLANGES	1½ and under	Class 150	Socketweld/ Threaded RF	A105N, B16.5	(10)
	2 -24	Class 150	Weldneck RF	A105N, B16.5	(10), (17)
	26 and above	Class 150	Weldneck RF	A350 LF2 Cl 2 B16.47 Series A	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			(16)
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
VALVES					
	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	
	2 and above	Class 150	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, API 600, Trim No. 8	(11)
Globe Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	
	2 and above	Class 150	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, Trim No. 8	(11)
Check Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, Trim No.1	
	2 and above	Class 150	RF Flanged	Body A216-WCB or A105, Trim No.1	(11)

Line Class: 3CS1U Service: Steam Generation Rating Class: 300 RF Temperature Limit: -18 to 400°C (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: Carbon Steel Code: B31.1 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½-1½	XS	Seamless	A106 Gr. B	
	2"	XS	Seamless	A106 Gr. B, API 5L, Gr. B	
	3" to 10"	Sch 40	Seamless	A106 Gr. B, API 5L, Gr. B	
	12" and larger	Calculate	Seamless or Welded	API 5L, Gr. B or Gr. X60, or A671-CC60 Class 32. (Supplement S-1).	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½-1½	Class 3000	Socketweld/ Threaded	A105N, B16.11	
	2 and above		Buttweld	A234-WPB, B16.9	(10), (17)
Nipples	½-1½	XS	Socketweld/ Threaded	A106 Gr. B	
Swages	½-1½	XS	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-83	
Sockolets/ Threadolets	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-97	
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	
FLANGES	1½ and under	Class 300	Socketweld RF	A105N, B16.5	(10)
	2 -24	Class 300	Weldneck RF	A105N, B16.5	(10), (17)
	26 and above	Class 300	Weldneck RF	A350 LF2 Cl 2 B16.47 Series A	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			(16)
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
VALVES					
	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	
	2 and above	Class 300	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, API 600, Trim No. 8	(11)
Globe Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 8	
	2 and above	Class 300	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, Trim No. 8	(11)
Check Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, Trim No.1	
	2 and above	Class 300	RF Flanged	Body A216-WCB or A105, Trim No.1	(11)

Line Class: 6CS1U Service: Steam generation Rating Class: 600 RF Temperature Limit: -18 to 400°C (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: Carbon Steel Code: B31.1 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25			
Item	NPS	Rating Schedule	Type	Specification	Notes	
PIPE	½"-1½"	XS	Seamless	A106 Gr. B		
	2" to 6"	XS	Seamless	A106 Gr. B, API 5L, Gr. B		
	8" and larger	Calculate	Seamless or Welded	API 5L, Gr. B or Gr. X60, or A671-CC60 Class 32. (Supplement S-1).		
FITTINGS						
El's, Tees, Reducers, Caps, Couplings etc.	½-1½	Class 3000	Socketweld/ Threaded	A105N, B16.11		
	2 and above		Buttweld	A234-WPB, B16.9	(10), (17)	
Nipples	½-1½	XS	Socketweld/ Threaded	A106 Gr. B		
Swages	½-1½	XS	Socketweld/ Threaded	A234-WPB, MSS SP-95		
Unions	-	-	-	-	(12)	
Sockolets/ Threadolets	½-1½	Class 3000	Socketweld/ Threaded	A105N, MSS SP-97		
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	(10)	
FLANGES	1½ and under	Class 600	Socketweld/ Threaded RF	A105N, B16.5		
	2" to 12"	Class 600	Weldneck RF	A105N, B16.5	(10)	
	14" to 24"	Class 600	Weldneck RF	A350-LF2 Class 2, B16.5	(10), (17)	
	26 and above	Class 600	Weldneck RF	A350 LF2 Cl 2 B16.47 Series A		
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts					
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20				(16)
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20				
VALVES						
	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 5	(11)	
	2 and above	Class 600	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, API 600, Trim No. 5		
Globe Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 5	(11)	
	2 and above	Class 600	RF Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, Trim No. 5		
Check Valves	1½ and under	Class 800	Socketweld/ Threaded	A105N body, Trim No.5	(11)	
	2 and above	Class 600	RF Flanged	Body A216-WCB or A105, Trim No.5		

Line Class: 3CS2Y Service: Dry Chlorine Gas or Liquid (4) Rating Class: 300 RF B16.5 Temperature Limit: -18 to 149°C Corrosion Allowance: 3.2 mm			Basic Material: Carbon Steel Code: B31.3, Chlorine Institute Pamphlet 6 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	2" and under	Sch 160	Seamless	A106 Gr. B.	
	3" to 8"	XS	Seamless	A106 Gr. B or API 5L Gr. B	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	All		Buttweld	A105N or A350-LF2, B16.11	(10) (24)
Nipples and Swages	-	-	-	-	(24)
Unions	-	-	-	-	(12)
Sockolets/ Threadolets	-	-	-	-	(24)
Weldolets	2" and above		Buttweld	A105N, B16.9	
FLANGES	All	Class 300	Weldneck, RF	A105N or A350-LF2, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20				
Ball Valves	4" and under	Class 300	RF Flanged	A216-WCB body, floating ball, TFE seats and seals, Monel trim, Chlorine Inst. #6.	(14)
Plug Valves	6" and 8"	Class 300	RF Flanged	A216-WCB body, TFE sleeved non-lubricated, BC, Monel trim, Chlorine Inst. #6.	(14)

Line Class: 1CH2P02 Service: Refer to Table 10.1 Rating Class: 150 RF B16.5 Temperature Limit: 0 to 190°C Corrosion Allowance: 3.2 mm (9)			Basic Material: Carbon Steel NACE (5, 6) Code: B31.3 Stress Relief: PWHT is required Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½"	Sch 160	Seamless	A106 Gr. B	
	¾" to 2"	XS	Seamless	A106 Gr. B	
	3" to 24"	Std	Seamless	A106 Gr. B or API 5L, Gr. B	
	26" and larger	Calculate	Welded	API 5L, Gr. B or A671-CC60 Class 32. (Supplement S-1).	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½"-1½"	Class 6000	Socketweld/ Threaded	A105N, B16.11	
	2" and above		Buttweld	A234-WPB, B16.9	(10)
Nipples	2" and under		Socketweld/ Threaded	A106 Gr. B	(10)
Swages	2" and under		Socketweld/ Threaded	A234-WPB, MSS SP-95	(10)
Unions	2" and under	Class 6000	Socketweld/ Threaded	A105N, MSS SP-83	
Sockolets/ Threadolets	1½" and under	Class 6000	Socketweld/ Threaded	A105N, B16.11	
Weldolets	2" and above		Buttweld	A105N, B16.9	(10)
FLANGES	1½" and under	Class 150	Socketweld/ Threaded RF	A105N, B16.5	(10)
	2" and above	Class 150	Weldneck RF	A105N, B16.5	(10)
	24" and above	Class 150	Weldneck RF	A350-LF2 Class 2, B16.47 series A	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
Gate Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N Body, BB, OS&Y, API 602, Trim No.12	
	2" and above	Class 150	RF Flanged	A216-WCB body, BB, OS&Y, API 600, Trim No.12	(11)
Globe Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N Body, BB, OS&Y, Trim No.12	
	2" and above	Class 150	RF Flanged	A216-WCB Body, BB, OS&Y, Trim No.12	(11)
Check Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N body, BC, Trim No.10	
	2" and above	Class 150	RF Flanged	A216-WCB body, BC, Trim No. 10	(11)

Line Class: 3CH2P02 Service: Refer to Table 10.1 Rating Class: 300 RF B16.5 Temperature Limit: 0 to 190°C Corrosion Allowance: 3.2 mm (9)			Basic Material: Carbon Steel, NACE (5, 6) Code: B31.3 Stress Relief: PWHT is required Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to ¾"	Sch 160	Seamless	A106 Gr. B	
	1" to 1 ½"	XS	Seamless	A106 Gr. B	
	2 to 16"	XS	Seamless	A106 Gr. B or API 5L, Gr. B	
	18" and larger	Calculate	Seamless or Welded	API 5L, Gr. B or A671-CC60 Class 32. (Supplement S-1).	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½"-1½"	Class 6000	Socketweld/ Threaded	A105N, B16.11	
	2" and above		Buttweld	A234-WPB, B16.9	(10)
Nipples	½"-1½"		Socketweld/ Threaded	A106 Gr. B	(10)
Swages	½"-1½"		Socketweld/ Threaded	A234-WPB, MSS SP-95	(10)
Unions	½"-1½"	Class 6000	Socketweld/ Threaded	A105N, MSS SP-83	
Sockolets/ Threadolets	1½" and under	Class 6000	Socketweld/ Threaded	A105N, B16.11	
Weldolets	2" and above		Buttweld	A105N, B16.9	(10)
FLANGES	1½" and under	Class 300	Socketweld/ Threaded RF	A105N, B16.5	(10)
	2" and above	Class 300	Weldneck RF	A105N, B16.5	(10)
	24" and above	Class 300	Weldneck RF	A350-LF2 Class 2, B16.47 series A	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
Gate Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N Body, BB, OS&Y, API 602, Trim No.12	
	2" and above	Class 300	RF Flanged	A216-WCB body, BB, OS&Y, API 600, Trim No.12	(11)
Globe Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N Body, BB, OS&Y, Trim No.12	
	2" and above	Class 150	RF Flanged	A216-WCB Body, BB, OS&Y, Trim No.12	(11)
Check Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N body, BC, Trim No.10	
	2" and above	Class 300	RF Flanged	A216-WCB body, BC, Trim No. 10	(11)

Line Class: 6CH2P02 Service: Refer to Table 10.1 Rating Class: 600 RF B16.5 Temperature Limit: 0 to 190°C Corrosion Allowance: 3.2 mm (9)			Basic Material: Carbon Steel, NACE (5, 6) Code: B31.3 Stress Relief: PWHT is required Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 1 ½"	Sch 160	Seamless	A106 Gr. B	
	2"	XS	Seamless	A106 Gr. B	
	3 to 6"	XS	Seamless	A106 Gr. B or API 5L, Gr. B	
	8 to 24"	Sch 80	Seamless	A106 Gr. B or API 5L, Gr. B	
	26" and larger	Calculate	Seamless or Welded	API 5L, Gr. B or A671-CC60 Class 32. (Supplement S-1).	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	1½" and under	Class 6000	Socketweld/ Threaded	A105N, B16.11	
	2" and above		Buttweld	A234 Gr. WPB, B16.9	(10)
Nipples	2" and under	Sch 160	Socketweld/ Threaded	A106 Gr. B	
Swages	2" and under	Sch 160	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	½"-1½"	Class 6000	Socketweld/ Threaded	A105N, MSS SP-83.	
Sockolets/ Threadolets	1½" and under	Class 6000	Socketweld/ Threaded	A105N, B16.11	
Weldolets	2" and above		Buttweld	A105N, B16.9	(10)
FLANGES	1½" and under	Class 600	Socketweld RF	A105N, B16.5	(10)
	2" to 12"	Class 600	Weldneck RF	A105N, B16.5	(10)
	14" to 24"	Class 600	Weldneck RF	A350-LF2 Class 2, B16.5	(10)
	24" and above	Class 600	Weldneck RF	A350-LF2 Class 2, B16.47 series A	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
Gate Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N Body, BB, OS&Y, API 602, Trim No.12	
	2" and above	Class 600	RF Flanged	A216-WCB body, BB, OS&Y, API 600, Trim No.12	(11)
Globe Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N Body, BB, OS&Y, Trim No.12	
	2" and above	Class 600	RF Flanged	A216-WCB Body, BB, OS&Y, Trim No.12	(11)
Check Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N body, BC, Trim No.10	
	2" and above	Class 600	RF Flanged	A216-WCB body, BC, Trim No. 10	(11)

Line Class: 1CS2P02 Service: Refer to Table 10.1 Rating Class: 150 RF B16.5 Temperature Limit: -18 to 400°C Corrosion Allowance: 3.2 mm (9)			Basic Material: Carbon Steel, NACE (5, 6) Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½"	Sch 160	Seamless	A106 Gr. B	
	¾" to 2"	XS	Seamless	A106 Gr. B	
	3" to 24"	Std	Seamless	A106 Gr. B or API 5L, Gr. B	
	26" and larger	Calculate	Welded	API 5L, Gr. B or Gr. X60, or A671-CC60 Class 32. (Supplement S-1).	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½"-1½"	Class 6000	Socketweld/ Threaded	A105N, B16.11	
	2" and above		Buttweld	A234-WPB, B16.9	(10), (17)
Nipples	2" and under		Socketweld/ Threaded	A106 Gr. B	(10)
Swages	2" and under		Socketweld/ Threaded	A234-WPB, MSS SP-95	(10)
Unions	2" and under	Class 6000	Socketweld/ Threaded	A105N, MSS SP-83	
Sockolets/ Threadolets	1½" and under	Class 6000	Socketweld/ Threaded	A105N, B16.11	
Weldolets	2" and above		Buttweld	A105N, B16.9	(10)
FLANGES	1½" and under	Class 150	Socketweld/ Threaded RF	A105N, B16.5	(10)
	2" and above	Class 150	Weldneck RF	A105N, B16.5	(10), (17)
	24" and above	Class 150	Weldneck RF	A350-LF2 Class 2, B16.47 series A	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				(25)
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
Gate Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N Body, BB, OS&Y, API 602, Trim No.12	(11)
	2" and above	Class 150	RF Flanged	A216-WCB body, BB, OS&Y, API 600, Trim No.12	
Globe Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N Body, BB, OS&Y, Trim No.12	(11)
	2" and above	Class 150	RF Flanged	A216-WCB Body, BB, OS&Y, Trim No.12	
Check Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N body, BC, Trim No.10	(11)
	2" and above	Class 150	RF Flanged	A216-WCB body, BC, Trim No. 10	

Line Class: 3CS2P02 Service: Refer to Table 10.1 Rating Class: 300 RF B16.5 Temperature Limit: -18 to 400°C Corrosion Allowance: 3.2 mm (9)			Basic Material: Carbon Steel, NACE (5, 6) Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to ¾"	Sch 160	Seamless	A106 Gr. B	
	1" to 1 ½"	XS	Seamless	A106 Gr. B	
	2 to 16"	XS	Seamless	A106 Gr. B or API 5L, Gr. B	
	18" and larger	Calculate	Seamless or Welded	API 5L, Gr. B or Gr. X60, or A671-CC60 Class 32. (Supplement S-1).	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½"-1½"	Class 6000	Socketweld/ Threaded	A105N, B16.11	
	2" and above		Buttweld	A234-WPB, B16.9	(10), (17)
Nipples	½"-1½"		Socketweld/ Threaded	A106 Gr. B	(10)
Swages	½"-1½"		Socketweld/ Threaded	A234-WPB, MSS SP-95	(10)
Unions	½"-1½"	Class 6000	Socketweld/ Threaded	A105N, MSS SP-83.	
Sockolets/ Threadolets	1½" and under	Class 6000	Socketweld/ Threaded	A105N, B16.11	
Weldolets	2" and above		Buttweld	A105N, B16.9	(10)
FLANGES	1½" and under	Class 300	Socketweld/ Threaded RF	A105N, B16.5	(10)
	2" and above	Class 300	Weldneck RF	A105N, B16.5	(10), (17)
	24" and above	Class 300	Weldneck RF	A350-LF2 Class 2, B16.47 series A	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				(25)
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
Gate Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N Body, BB, OS&Y, API 602, Trim No.12	(11)
	2" and above	Class 300	RF Flanged	A216-WCB body, BB, OS&Y, API 600, Trim No.12	
Globe Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N Body, BB, OS&Y, Trim No.12	(11)
	2" and above	Class 150	RF Flanged	A216-WCB Body, BB, OS&Y, Trim No.12	
Check Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N body, BC, Trim No.10	(11)
	2" and above	Class 300	RF Flanged	A216-WCB body, BC, Trim No. 10	

Line Class: 6CS2P02 Service: Refer to Table 10.1 Rating Class: 600 RF B16.5 Temperature Limit: -18 to 400°C Corrosion Allowance: 3.2 mm (9)			Basic Material: Carbon Steel, NACE (5, 6) Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 1 ½"	Sch 160	Seamless	A106 Gr. B	
	2"	XS	Seamless	A106 Gr. B	
	3 to 6"	XS	Seamless	A106 Gr. B or API 5L, Gr. B	
	8 to 24"	Sch 80	Seamless	A106 Gr. B or API 5L, Gr. B	
	26" and larger	Calculate	Seamless or Welded	API 5L, Gr. B or Gr. X60, or A671-CC60 Class 32. (Supplement S-1).	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	1½" and under	Class 6000	Socketweld/ Threaded	A105N, B16.11	
	2" and above		Buttweld	A234 Gr. WPB, B16.9	(10), (17)
Nipples	2" and under	Sch 160	Socketweld/ Threaded	A106 Gr. B	
Swages	2" and under	Sch 160	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	½"-1½"	Class 6000	Socketweld/ Threaded	A105N, MSS SP-83.	
Sockolets/ Threadolets	1½" and under	Class 6000	Socketweld/ Threaded	A105N, B16.11	
Weldolets	2" and above		Buttweld	A105N, B16.9	(10)
FLANGES	1½" and under	Class 600	Socketweld RF	A105N, B16.5	(10)
	2" to 12"	Class 600	Weldneck RF	A105N, B16.5	(10)
	14" to 24"	Class 600	Weldneck RF	A350-LF2 Class 2, B16.5	(10), (17)
	24" and above	Class 600	Weldneck RF	A350-LF2 Class 2, B16.47 series A	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				(25)
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
Gate Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N Body, BB, OS&Y, API 602, Trim No.12	(11)
	2" and above	Class 600	RF Flanged	A216-WCB body, BB, OS&Y, API 600, Trim No.12	
Globe Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N Body, BB, OS&Y, Trim No.12	(11)
	2" and above	Class 600	RF Flanged	A216-WCB Body, BB, OS&Y, Trim No.12	
Check Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N body, BC, Trim No.10	(11)
	2" and above	Class 600	RF Flanged	A216-WCB body, BC, Trim No. 10	

Line Class: 9CS2P02 Service: Refer to Table 10.1 Rating Class: 900 RJ Temperature Limit: -18 to 400°C (3) Corrosion Allowance: 3.2 mm (9)			Basic Material: Carbon Steel, NACE (5, 6) Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½"	XXS	Seamless	A106 Gr. B	
	¾" to 1 ½"	Sch 160	Seamless	A106 Gr. B	
	2" to 3"	Sch 160	Seamless	A106 Gr. B , API 5L, Gr. B	
	4"	Sch 120	Seamless	A106 Gr. B , API 5L, Gr. B	
	6" and larger	Calculate	Seamless or Welded	API 5L, Gr. B or Gr. X60, or A671-CC60 Class 32. (Supplement S-1).	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½-1½		Socketweld/ Threaded	A105N, B16.11	(10)
	2 and above		Buttweld	A234-WPB, B16.9	(10), (17)
Nipples	½-1½		Socketweld/ Threaded	A106 Gr. B	(10)
Swages	½-1½		Socketweld/ Threaded	A234-WPB , MSS SP-95	(10)
Unions	-	-	-	-	(12)
Sockolets/ Threadolets	½-1½		Socketweld/ Threaded	A105N, MSS SP-97	(10)
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	
FLANGES	½-1½	Class 900	Socketweld/ Threaded RJ	A105N, B16.5	(10)
	2 -24	Class 900	Weldneck RJ	A350 LF2 CI 2, B16.5	(10), (17)
	26- 48	Class 900	Weldneck RJ	A350 LF2 CI 2 B16.47 Series A	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				(25)
GASKETS	Soft-Iron octanonal ring, per B16.20				
VALVES					
Gate Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 12	(11)
	2 and above	Class 900	RJ Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, API 600, Trim No. 12	
Globe Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 12	(11)
	2 and above	Class 900	RJ Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, Trim No. 12	
Check Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, Trim No.10	(11)
	2 and above	Class 900	RJ Flanged	Body A216-WCB or A105, Trim No.10	

Line Class: 15CS2P02 Service: Refer to Table 10.1 Rating Class: 1500 RJ Temperature Limit: -18 to 400°C (3) Corrosion Allowance: 3.2 mm (9)			Basic Material: Carbon Steel, NACE (5, 6) Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½"-1½"	XXS	Seamless	A106 Gr. B	
	2 and larger	Calculate	Seamless or Welded	API 5L, Gr. B or Gr. X60, or A671-CC60 Class 32. (Supplement S-1).	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½-1½	Class 9000	Socketweld/ Threaded	A105N, B16.11	
	2 and above		Buttweld	A234-WPB, B16.9	(10), (17)
Nipples	½-1½	Sch XXS	Socketweld/ Threaded	A106 Gr. B	
Swages	½-1½	Sch XXS	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	-	-	-	-	(12)
Socketlets/ Threadolets	½-1½	Class 9000	Socketweld/ Threaded	A105N, MSS SP-97	
Weldolets	2 and above		Buttweld	A105N, MSS SP-97	
FLANGES	½-1½	Class 1500	Socketweld/ Threaded RJ	A105N, B16.5	(10), (17)
	2-24	Class 1500	Weldneck RJ	A350 LF2 Cl 2, ASME B16.5	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				(25)
GASKETS	Soft-Iron octagonal ring, per B16.20				
VALVES					
Gate Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 12	
	2 and above	Class 1500	RJ Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, API 600, Trim No. 12	
Globe Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, BB, OS&Y, graphite packing, API 602, Trim No. 12	(11)
	2 and above	Class 1500	RJ Flanged	Body A216-WCB or A105, BB, OS&Y, graphite packing, Trim No. 12	(11)
Check Valves	1½ and under	Class 1500	Socketweld/ Threaded	A105N body, Trim No.10	
	2 and above	Class 1500	RJ Flanged	Body A216-WCB or A105, Trim No.10	(11)

Line Class: 1CS2P06 Service: Refer to Table 10.1 Rating Class: 150 RF B16.5 Temperature Limit: -18 to 150°C Corrosion Allowance: 3.2 mm (9)			Basic Material: Carbon Steel, HIC Resistance (5, 6) Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½"	Sch 160	Seamless	A106 Gr. B	
	¾" to 2"	XS	Seamless	A106 Gr. B	
	3" to 24"	Std	Seamless	A106 Gr. B or API 5L, Gr. B Annex H	
	26" and larger	Calculate	Welded	API 5L, Gr. B or Gr. X60 Annex H	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½"-1½"	Class 6000	Socketweld/ Threaded	A105N, B16.11	
	2" and above		Buttweld	A234-WPB, B16.9	(10), (17)
Nipples	2" and under		Socketweld/ Threaded	A106 Gr. B	(10)
Swages	2" and under		Socketweld/ Threaded	A234-WPB, MSS SP-95	(10)
Unions	2" and under	Class 6000	Socketweld/ Threaded	A105N, MSS SP-83	
Sockolets/ Threadolets	1½" and under	Class 6000	Socketweld/ Threaded	A105N, B16.11	
Weldolets	2" and above		Buttweld	A105N, B16.9	(10)
FLANGES	1½" and under	Class 150	Socketweld/ Threaded RF	A105N, B16.5	(10)
	2" and above	Class 150	Weldneck RF	A105N, B16.5	(10), (17)
	24" and above	Class 150	Weldneck RF	A350-LF2 Class 2, B16.47 series A	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				(25)
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
Gate Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N Body, BB, OS&Y, API 602, Trim No.12	(11)
	2" and above	Class 150	RF Flanged	A216-WCB body, BB, OS&Y, API 600, Trim No.12	
Globe Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N Body, BB, OS&Y, Trim No.12	(11)
	2" and above	Class 150	RF Flanged	A216-WCB Body, BB, OS&Y, Trim No.12	
Check Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N body, BC, Trim No.10	(11)
	2" and above	Class 150	RF Flanged	A216-WCB body, BC, Trim No. 10	

Line Class: 3CS2P06 Service: Refer to Table 10.1 Rating Class: 300 RF B16.5 Temperature Limit: -18 to 150°C Corrosion Allowance: 3.2 mm (9)			Basic Material: Carbon Steel, HIC Resistance (5, 6) Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to ¾"	Sch 160	Seamless	A106 Gr. B	
	1" to 1 ½"	XS	Seamless	A106 Gr. B	
	2 to 16"	XS	Seamless	A106 Gr. B or API 5L, Gr. B Annex H	
	18" and larger	Calculate	Seamless or Welded	API 5L, Gr. B or Gr. X60 Annex H	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½"-1½"	Class 6000	Socketweld/ Threaded	A105N, B16.11	
	2" and above		Buttweld	A234-WPB, B16.9	(10), (17)
Nipples	½"-1½"		Socketweld/ Threaded	A106 Gr. B	(10)
Swages	½"-1½"		Socketweld/ Threaded	A234-WPB, MSS SP-95	(10)
Unions	½"-1½"	Class 6000	Socketweld/ Threaded	A105N, MSS SP-83	
Socketlets/ Threadolets	1½" and under	Class 6000	Socketweld/ Threaded	A105N, B16.11	
Weldolets	2" and above		Buttweld	A105N, B16.9	(10)
FLANGES	1½" and under	Class 300	Socketweld/ Threaded RF	A105N, B16.5	(10)
	2" and above	Class 300	Weldneck RF	A105N, B16.5	(10), (17)
	24" and above	Class 300	Weldneck RF	A350-LF2 Class 2, B16.47 series A	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				(25)
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
Gate Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N Body, BB, OS&Y, API 602, Trim No.12	(11)
	2" and above	Class 300	RF Flanged	A216-WCB body, BB, OS&Y, API 600, Trim No.12	
Globe Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N Body, BB, OS&Y, Trim No.12	(11)
	2" and above	Class 150	RF Flanged	A216-WCB Body, BB, OS&Y, Trim No.12	
Check Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N body, BC, Trim No.10	(11)
	2" and above	Class 300	RF Flanged	A216-WCB body, BC, Trim No. 10	

Line Class: 6CS2P06 Service: Refer to Table 10.1 Rating Class: 600 RF B16.5 Temperature Limit: -18 to 150°C Corrosion Allowance: 3.2 mm (9)			Basic Material: Carbon Steel, HIC Resistance (5, 6) Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 1 ½"	Sch 160	Seamless	A106 Gr. B	
	2"	XS	Seamless	A106 Gr. B	
	3 to 6"	XS	Seamless	A106 Gr. B or API 5L, Gr. B	
	8 to 24"	Sch 80	Seamless	A106 Gr. B or API 5L, Gr. B Annex H	
	26" and larger	Calculate	Seamless or Welded	API 5L, Gr. B or Gr. X60 Annex H	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	1½" and under	Class 6000	Socketweld/ Threaded	A105N, B16.11	
	2" and above		Buttweld	A234 Gr. WPB, B16.9	(10), (17)
Nipples	2" and under	Sch 160	Socketweld/ Threaded	A106 Gr. B	
Swages	2" and under	Sch 160	Socketweld/ Threaded	A234-WPB, MSS SP-95	
Unions	½"-1½"	Class 6000	Socketweld/ Threaded	A105N, MSS SP-83	
Sockolets/ Threadolets	1½" and under	Class 6000	Socketweld/ Threaded	A105N, B16.11	
Weldolets	2" and above		Buttweld	A105N, B16.9	(10)
FLANGES	1½" and under	Class 600	Socketweld RF	A105N, B16.5	(10)
	2" to 12"	Class 600	Weldneck RF	A105N, B16.5	(10)
	14" to 24"	Class 600	Weldneck RF	A350-LF2 Class 2, B16.5	(10), (17)
	24" and above	Class 600	Weldneck RF	A350-LF2 Class 2, B16.47 series A	
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts				(25)
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer and inner rings, B16.20			
Gate Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N Body, BB, OS&Y, API 602, Trim No.12	(11)
	2" and above	Class 600	RF Flanged	A216-WCB body, BB, OS&Y, API 600, Trim No.12	
Globe Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N Body, BB, OS&Y, Trim No.12	(11)
	2" and above	Class 600	RF Flanged	A216-WCB Body, BB, OS&Y, Trim No.12	
Check Valves	1½" and under	Class 800	Socketweld/ Threaded	A105N body, BC, Trim No.10	(11)
	2" and above	Class 600	RF Flanged	A216-WCB body, BC, Trim No. 10	

Line Class: 1CJ2H Service: Refer to Table 10.1 Rating Class: 150 RF B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 3.2 mm (9)			Basic Material: 1¼ Cr. 1/2 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to ¾"	Sch 160	Seamless	A335-Gr. P11	
	¾" to 2"	XS	Seamless	A335-Gr. P11	
	3" to 24"	Std	Seamless	A335-Gr. P11	
	26" and above	Calculate	Seamless or EFW	A335-Gr. P11 or A-691 Gr. 1¼ Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 6000	Socketweld	A182 Gr.F11, B16.11	(15)
	2" and above		Buttweld, seamless/welded	A234 Gr. WP11 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"		Socketweld	A335-Gr. P11	(10),(15)
Swages	½" to 1½"		Socketweld	A234 Gr. WP11, MSS SP-95	(10),(15)
Unions	-	-	-	-	(12)
Sockolets	½" to 1½"	Class 6000	Socketweld	A182-Gr. F11, MSS SP-97	(15)
Weldolets	2" and above		Buttweld	A182-Gr. F11, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 150	Socketweld RF	A182-Gr. F11, B16.5	(10), (15)
	2" to 24"	Class 150	Weldneck RF	A182-Gr. F11, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring and 316 SS inner ring, B16.20			
Gate Valves	½" to 1½"	Class 800	Socketweld	A182-F11 Cl. 2 body, BB, OS&Y, API 602, Trim No. 8	(15)
	2" and above	Class 150	RF Flanged	Body A217-WC6 or A182-F11 Cl. 2, BB, OS&Y, API 600, Trim No. 8	(11)
Globe Valves	½" to 1½"	Class 800	Socketweld	A182-F11 Cl. 2 body, BB, OS&Y, Trim No. 8	(15)
	2" and above	Class 150	RF Flanged	Body A217-WC6 or A182-F11 Cl. 2, BB, OS&Y, Trim No. 8	(11)
Check Valves	½" to 1½"	Class 800	Socketweld	A182-F11 Cl. 2 body, BC, Trim No. 1	(15)
	2" and above	Class 150	RF Flanged	Body A217-WC6 or A182-F11 Cl. 2, BC, Trim No. 1	(11)

Line Class: 3CJ2H Service: Refer to Table 10.1 Rating Class: 300 RJ B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 3.2 mm (9)			Basic Material: 1¼ Cr. 1/2 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to ¾"	Sch 160	Seamless	A335-Gr. P11	
	1" to 16"	XS	Seamless	A335-Gr. P11	
	18" and above	Calculate	Seamless or EFW	A335-Gr. P11 or A-691 Gr. 1¼ Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 6000	Socketweld	A182 Gr.F11, B16.11	(15)
	2" and above		Buttweld, seamless/welded	A234 Gr. WP11 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"		Socketweld	A335-Gr. P11	(10), (15)
Swages	½" to 1½"		Socketweld	A234 Gr. WP11, MSS SP-95	(10), (15)
Unions	-	-	-	-	(12)
Sockolets	½" to 1½"	Class 6000	Socketweld	A182-Gr. F11, MSS SP-97	(15)
Weldolets	2" and above		Buttweld	A182-Gr. F11, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 300	Socketweld RJ	A182-Gr. F11, B16.5	(10), (15)
	2" to 24"	Class 300	Weldneck RJ	A182-Gr. F11, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	5 Cr.-1/2 Mo. Octagonal Ring, ASME B16.20				
Gate Valves	½" to 1½"	Class 800	Socketweld	A182-F11 Cl. 2 body, BB, OS&Y, API 602, Trim No. 8	(15)
	2" and above	Class 300	RJ Flanged	Body A217-WC6 or A182-F11 Cl. 2, BB, OS&Y, API 600, Trim No. 8	(11)
Globe Valves	½" to 1½"	Class 800	Socketweld	A182-F11 Cl. 2 body, BB, OS&Y, Trim No. 8	(15)
	2" and above	Class 300	RJ Flanged	Body A217-WC6 or A182-F11 Cl. 2, BB, OS&Y, Trim No. 8	(11)
Check Valves	½" to 1½"	Class 800	Socketweld	A182-F11 Cl. 2 body, BC, Trim No. 1	(15)
	2" and above	Class 300	RJ Flanged	Body A217-WC6 or A182-F11 Cl. 2, BC, Trim No. 1	(11)

Line Class: 6CJ2H Service: Refer to Table 10.1 Rating Class: 600 RJ B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 3.2 mm (9)			Basic Material: 1¼ Cr. 1/2 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 160	Seamless	A335-Gr. P11	
	2" to 16"	Sch 80	Seamless	A335-Gr. P11	
	18" and above	Calculate	Seamless or EFW	A335-Gr. P11 or A-691 Gr. 1¼ Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 6000	Socketweld	A182 Gr.F11, B16.11	(15)
	2" and above		Buttweld, seamless/welded	A234 Gr. WP11 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"	Sch 160	Socketweld	A335-Gr. P11	(15)
Swages	½" to 1½"	Sch 160	Socketweld	A234 Gr. WP11, MSS SP-95	(15)
Unions	-	-	-	-	(12)
Sockolets	½" to 1½"	Class 6000	Socketweld	A182-Gr. F11, MSS SP-97	(15)
Weldolets	2" and above		Buttweld	A182-Gr. F11, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 600	Socketweld RJ	A182-Gr. F11, B16.5	(10), (15)
	2" to 24"	Class 600	Weldneck RJ	A182-Gr. F11, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	5 Cr.-1/2 Mo. Octagonal Ring, ASME B16.20				
Gate Valves	½" to 1½"	Class 800	Socketweld	A182-F11 Cl. 2 body, BB, OS&Y, API 602, Trim No. 8	(15)
	2" and above	Class 600	RJ Flanged	Body A217-WC6 or A182-F11 Cl. 2, BB, OS&Y, API 600, Trim No. 8	(11)
Globe Valves	½" to 1½"	Class 800	Socketweld	A182-F11 Cl. 2 body, BB, OS&Y, Trim No. 8	(15)
	2" and above	Class 600	RJ Flanged	Body A217-WC6 or A182-F11 Cl. 2, BB, OS&Y, Trim No. 8	(11)
Check Valves	½" to 1½"	Class 800	Socketweld	A182-F11 Cl. 2 body, BC, Trim No. 1	(15)
	2" and above	Class 600	RJ Flanged	Body A217-WC6 or A182-F11 Cl. 2, BC, Trim No. 1	(11)

Line Class: 1CJ1P Service: Refer to Table 10.1 Rating Class: 150 RF B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: 1¼ Cr. 1/2 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	XS	Seamless	A335-Gr. P11	
	3" to 24"	Std	Seamless	A335-Gr. P11	
	26" and above	Calculate	Seamless or EFW	A335-Gr. P11 or A-691 Gr. 1¼ Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld/ Threaded	A182 Gr.F11, B16.11	(15)
	2" and above		Buttweld, seamless/ welded	A234 Gr. WP11 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"	XS	Socketweld/ Threaded	A335-Gr. P11	
Swages	½" to 1½"	XS	Socketweld/ Threaded	A234 Gr. WP11, MSS SP-95	
Unions	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-Gr. F11, MSS SP-83	
Sockolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-Gr. F11, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-Gr. F11, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 150	Socketweld/ Threaded RF	A182-Gr. F11, B16.5	(10)
	2" to 24"	Class 150	Weldneck RF	A182-Gr. F11, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			(16)
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring and 316 SS inner ring, B16.20			
Gate Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F11 Cl. 2 body, BB, OS&Y, API 602, Trim No. 8	(11)
	2" and above	Class 150	RF Flanged	Body A217-WC6 or A182-F11 Cl. 2, BB, OS&Y, API 600, Trim No. 8	
Globe Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F11 Cl. 2 body, BB, OS&Y, Trim No. 8	(11)
	2" and above	Class 150	RF Flanged	Body A217-WC6 or A182-F11 Cl. 2, BB, OS&Y, Trim No. 8	
Check Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F11 Cl. 2 body, BC, Trim No. 1	(11)
	2" and above	Class 150	RF Flanged	Body A217-WC6 or A182-F11 Cl. 2, BC, Trim No. 1	

Line Class: 3CJ1P Service: Refer to Table 10.1 Rating Class: 300 RF B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: 1¼ Cr. 1/2 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	XS	Seamless	A335-Gr. P11	
	3" to 16"	Sch 40	Seamless	A335-Gr. P11	
	18" and above	Calculate	Seamless or EFW	A335-Gr. P11 or A-691 Gr. 1¼ Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld/ Threaded	A182 Gr.F11, B16.11	(15)
	2" and above		Buttweld, seamless/ welded	A234 Gr. WP11 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"	XS	Socketweld/ Threaded	A335-Gr. P11	
Swages	½" to 1½"	XS	Socketweld/ Threaded	A234 Gr. WP11, MSS SP-95	
Unions	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-Gr. F11, MSS SP-83	
Sockolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-Gr. F11, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-Gr. F11, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 300	Socketweld/ Threaded RF	A182-Gr. F11, B16.5	(10)
	2" to 24"	Class 300	Weldneck RF	A182-Gr. F11, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20.			(16)
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring and 316 SS inner ring, B16.20.			
Gate Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F11 Cl. 2 body, BB, OS&Y, API 602, Trim No. 8	(11)
	2" and above	Class 300	RF Flanged	Body A217-WC6 or A182-F11 Cl. 2, BB, OS&Y, API 600, Trim No. 8	
Globe Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F11 Cl. 2 body, BB, OS&Y, Trim No. 8	(11)
	2" and above	Class 300	RF Flanged	Body A217-WC6 or A182-F11 Cl. 2, BB, OS&Y, Trim No. 8	
Check Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F11 Cl. 2 body, BC, Trim No. 1	(11)
	2" and above	Class 300	RF Flanged	Body A217-WC6 or A182-F11 Cl. 2, BC, Trim No. 1	

Line Class: 6CJ1P Service: Refer to Table 10.1 Rating Class: 600 RF B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: 1¼ Cr. 1/2 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 8"	XS	Seamless	A335-Gr. P11	
	10" and above	Calculate	Seamless or EFW	A335-Gr. P11 or A-691 Gr. 1¼ Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld/ Threaded	A182 Gr.F11, B16.11	(15)
	2" and above		Buttweld, seamless/ welded	A234 Gr. WP11 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"	XS	Socketweld/ Threaded	A335-Gr. P11	
Swages	½" to 1½"	XS	Socketweld/ Threaded	A234 Gr. WP11, MSS SP-95	
Unions	-	-	-	-	(12)
Sockolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-Gr. F11, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-Gr. F11, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 600	Socketweld/ Threaded RF	A182-Gr. F11, B16.5	(10)
	2" to 24"	Class 600	Weldneck RF	A182-Gr. F11, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			(16)
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring and 316 SS inner ring, B16.20			
Gate Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F11 Cl. 2 body, BB, OS&Y, API 602, Trim No. 8	(11)
	2" and above	Class 600	RF Flanged	Body A217-WC6 or A182-F11 Cl. 2, BB, OS&Y, API 600, Trim No. 8	
Globe Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F11 Cl. 2 body, BB, OS&Y, Trim No. 8	(11)
	2" and above	Class 600	RF Flanged	Body A217-WC6 or A182-F11 Cl. 2, BB, OS&Y, Trim No. 8	
Check Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F11 Cl. 2 body, BC, Trim No. 1	(11)
	2" and above	Class 600	RF Flanged	Body A217-WC6 or A182-F11 Cl. 2, BC, Trim No. 1	

Line Class: 9CJ1P Service: Refer to Table 10.1 Rating Class: 900 RJ B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: 1¼ Cr. 1/2 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 3"	XS	Seamless	A335-Gr. P11	
	4" to 12"	Sch 12	Seamless	A335-Gr. P11	
	14" and above	Calculate	Seamless or EFW	A335-Gr. P11 or A-691 Gr. 1¼ Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld/ Threaded	A182 Gr.F11, B16.11	(15)
	2" and above		Buttweld, seamless/ welded	A234 Gr. WP11 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"	XS	Socketweld/ Threaded	A335-Gr. P11	
Swages	½" to 1½"	XS	Socketweld/ Threaded	A234 Gr. WP11, MSS SP-95	
Unions	-	-	-	-	(12)
Sockolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-Gr. F11, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-Gr. F11, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 900	Socketweld/ Threaded RJ	A182-Gr. F11, B16.5	(10)
	2" to 24"	Class 900	Weldneck RJ	A182-Gr. F11, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	5Cr-1/2Mo Octagonal Ring, ASME B16.20				
Gate Valves	½" to 1½"	Class 1500	Socketweld/ Threaded	A182-F11 Cl. 2 body, BB, OS&Y, API 602, Trim No. 8	(11)
	2" and above	Class 900	RJ Flanged	Body A217-WC6 or A182-F11 Cl. 2, BB, OS&Y, API 600, Trim No. 8	
Globe Valves	½" to 1½"	Class 1500	Socketweld/ Threaded	A182-F11 Cl. 2 body, BB, OS&Y, Trim No. 8	(11)
	2" and above	Class 900	RJ Flanged	Body A217-WC6 or A182-F11 Cl. 2, BB, OS&Y, Trim No. 8	
Check Valves	½" to 1½"	Class 1500	Socketweld/ Threaded	A182-F11 Cl. 2 body, BC, Trim No. 1	(11)
	2" and above	Class 900	RJ Flanged	Body A217-WC6 or A182-F11 Cl. 2, BC, Trim No. 1	

Line Class: 15CJ1P Service: Refer to Table 10.1 Rating Class: 1500 RJ B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: 1¼ Cr. 1/2 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 1 ½"	Sch 160	Seamless	A335-Gr. P11	
	2" and above	Calculate	Seamless or EFW	A335-Gr. P11 or A-691 Gr. 1¼ Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 6000	Socketweld/ Threaded	A182 Gr.F11, B16.11	(15)
	2" and above		Buttweld, seamless/ welded	A234 Gr. WP11 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"	Sch 160	Socketweld/ Threaded	A335-Gr. P11	
Swages	½" to 1½"	Sch 160	Socketweld/ Threaded	A234 Gr. WP11, MSS SP-95	
Unions	-	-	-	-	(12)
Sockolets	½" to 1½"	Class 6000	Socketweld/ Threaded	A182-Gr. F11, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-Gr. F11, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 1500	Socketweld/ Threaded RJ	A182-Gr. F11, B16.5	(10)
	2" to 24"	Class 1500	Weldneck RJ	A182-Gr. F11, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	5Cr-1/2Mo Octagonal Ring, ASME B16.20				
Gate Valves	½" to 1½"	Class 1500	Socketweld/ Threaded	A182-F11 Cl. 2 body, BB, OS&Y, API 602, Trim No. 8	(11)
	2" and above	Class 1500	RJ Flanged	Body A217-WC6 or A182-F11 Cl. 2, BB, OS&Y, API 600, Trim No. 8	
Globe Valves	½" to 1½"	Class 1500	Socketweld/ Threaded	A182-F11 Cl. 2 body, BB, OS&Y, Trim No. 8	(11)
	2" and above	Class 1500	RJ Flanged	Body A217-WC6 or A182-F11 Cl. 2, BB, OS&Y, Trim No. 8	
Check Valves	½" to 1½"	Class 1500	Socketweld/ Threaded	A182-F11 Cl. 2 body, BC, Trim No. 1	(11)
	2" and above	Class 1500	RJ Flanged	Body A217-WC6 or A182-F11 Cl. 2, BC, Trim No. 1	

Line Class: 25CJ1P Service: Refer to Table 10.1 Rating Class: 2500 RJ B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: 1¼ Cr. 1/2 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 1 ½"	Sch 160	Seamless	A335-Gr. P11	
	2" and above	Calculate	Seamless or EFW	A335-Gr. P11 or A-691 Gr. 1¼ Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1 ½"	Class 6000	Socketweld/ Threaded	A182 Gr.F11, B16.11	(15)
	2" and above		Buttweld, seamless/ welded	A234 Gr. WP11 Seamless/Welded, B16.9	(10)
Nipples	½" to 1 ½"	Sch 160	Socketweld/ Threaded	A335-Gr. P11	
Swages	½" to 1 ½"	Sch 160	Socketweld/ Threaded	A234 Gr. WP11, MSS SP-95	
Unions	-	-	-	-	(12)
Sockolets	½" to 1 ½"	Class 6000	Socketweld/ Threaded	A182-Gr. F11, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-Gr. F11, MSS SP-97	(10)
FLANGES	½" to 1 ½"	Class 1500	Socketweld/ Threaded RJ	A182-Gr. F11, B16.5	(10)
	2" to 24"	Class 1500	Weldneck RJ	A182-Gr. F11, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	5Cr-1/2Mo Octagonal Ring, ASME B16.20				
Gate Valves	½" to 1 ½"	Class 2500	Socketweld/ Threaded	A182-F11 Cl. 2 body, BB, OS&Y, Trim No. 8	(11)
	2" and above	Class 2500	RJ Flanged	Body A217-WC6 or A182-F11 Cl. 2, BB, OS&Y, API 600, Trim No. 8	
Globe Valves	½" to 1 ½"	Class 2500	Socketweld/ Threaded	A182-F11 Cl. 2 body, BB, OS&Y, Trim No. 8	(11)
	2" and above	Class 2500	RJ Flanged	Body A217-WC6 or A182-F11 Cl. 2, BB, OS&Y, Trim No. 8	
Check Valves	½" to 1 ½"	Class 2500	Socketweld/ Threaded	A182-F11 Cl. 2 body, BC, Trim No. 1	(11)
	2" and above	Class 2500	RJ Flanged	Body A217-WC6 or A182-F11 Cl. 2, BC, Trim No. 1	

Line Class: 6CK2H Service: Refer to Table 10.1 Rating Class: 600 RJ B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 3.2 mm (9)			Basic Material: 2¼ Cr. 1 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 160	Seamless	A335-Gr. P22	
	2" to 16"	Sch 80	Seamless	A335-Gr. P22	
	18" and above	Calculate	Seamless or EFW	A335-Gr. P22 or A-691 Gr. 2¼ Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 6000	Socketweld	A182 Gr.F22, B16.11	(15)
	2" and above		Buttweld, seamless/welded	A234 Gr. WP22 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"	Sch 160	Socketweld	A335-Gr. P22	(15)
Swages	½" to 1½"	Sch 160	Socketweld	A234 Gr. WP22, MSS SP-95	(15)
Unions	-	-	-	-	(12)
Sockolets	½" to 1½"	Class 6000	Socketweld	A182-Gr. F22, MSS SP-97	(15)
Weldolets	2" and above		Buttweld	A182-Gr. F22, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 600	Socketweld RJ	A182-Gr. F22, B16.5	(10), (15)
	2" to 24"	Class 600	Weldneck RJ	A182-Gr. F22, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	5 Cr.-1/2 Mo. Octagonal Ring, ASME B16.20				
Gate Valves	½" to 1½"	Class 800	Socketweld	A182-F22 body, BB, OS&Y, API 602, Trim No. 8	(15)
	2" and above	Class 600	RJ Flanged	Body A217-WC9 or A182-F22 Cl. 3, BB, OS&Y, API 600, Trim No. 8	(11)
Globe Valves	½" to 1½"	Class 800	Socketweld	A182-F22 body, BB, OS&Y, Trim No. 8	(15)
	2" and above	Class 600	RJ Flanged	Body A217-WC9 or A182-F22 Cl. 3, BB, OS&Y, Trim No. 8	(11)
Check Valves	½" to 1½"	Class 800	Socketweld	A182-F22 body, BC, Trim No. 1	(15)
	2" and above	Class 600	RJ Flanged	Body A217-WC9 or A182-F22 Cl. 3, BC, Trim No. 1	(11)

Line Class: 9CK2H Service: Refer to Table 10.1 Rating Class: 900 RJ B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 3.2 (9)			Basic Material: 2¼ Cr. 1 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½"	XXS	Seamless	A335-Gr. P22	
	¾" to 6"	Sch 160	Seamless	A335-Gr. P22	
	8" and above	Calculate	Seamless or EFW	A335-Gr. P22 or A-691 Gr. 2¼ Cr. Class 32.	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	¾"	Class 9000	Socketweld	A182 Gr.F22, B16.11	(15)
	½" to 1½"	Class 6000			
	2" and above		Buttweld	A234 Gr. WP22 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"		Socketweld	A335-Gr. P22	(10),(15)
Swages	½" to 1½"		Socketweld	A234 Gr. WP22, MSS SP-95	(10),(15)
Unions	-	-	-	-	(12)
Sockets/ Threadolets	¾"	Class 9000	Socketweld	A182-Gr. F22, MSS SP-97	(15)
	½" to 1½"	Class 6000			
Weldolets	2" and above		Buttweld	A182-Gr. F22, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 1500	Socketweld RJ	A182-Gr. F22, B16.5	(10), (15)
	2" to 24"	Class 900	Weldneck RJ	A182-Gr. F22, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	5 Cr.-1/2 Mo. Octagonal Ring, ASME B16.20				
Gate Valves	½" to 1½"	Class 1500	Socketweld	A182-F22 body, BB, OS&Y, API 602, Trim No. 8	(15)
	2" and above	Class 900	RJ Flanged	Body A217-WC9 or A182-F22 Cl. 3, BB, OS&Y, API 600, Trim No. 8	(11)
Globe Valves	½" to 1½"	Class 1500	Socketweld	A182-F22 body, BB, OS&Y, Trim No. 8	(15)
	2" and above	Class 900	RJ Flanged	Body A217-WC9 or A182-F22 Cl. 3, BB, OS&Y, Trim No. 8	(11)
Check Valves	½" to 1½"	Class 1500	Socketweld	A182-F22 body, BC, Trim No. 1	(15)
	2" and above	Class 900	RJ Flanged	Body A217-WC9 or A182-F22 Cl. 3, BC, Trim No. 1	(11)

Line Class: 15CK2H Service: Refer to Table 10.1 Rating Class: 1500 RJ B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 3.2 (9)			Basic Material: 2¼ Cr. 1 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 8"	Calculate	Seamless	A335-Gr. P22	
	10" and above	Calculate	Seamless or EFW	A335-Gr. P22 or A-691 Gr. 2¼ Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 9000	Socketweld	A182 Gr.F22, B16.11	(15)
	2" and above		Buttweld	A234 Gr. WP22 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"		Socketweld	A335-Gr. P22	(10),(15)
Swages	½" to 1½"		Socketweld	A234 Gr. WP22, MSS SP-95	(10),(15)
Unions	-	-	-	-	(12)
Sockolets/ Threadolets	½" to 1½"	Class 9000	Socketweld	A182-Gr. F22, MSS SP-97	(15)
Weldolets	2" and above		Buttweld	A182-Gr. F22, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 1500	Socketweld RJ	A182-Gr. F22, B16.5	(10), (15)
	2" to 24"	Class 1500	Weldneck RJ	A182-Gr. F22, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	5 Cr.-1/2 Mo. Octagonal Ring, ASME B16.20				
Gate Valves	½" to 1½"	Class 1500	Socketweld	A182-F22 body, BB, OS&Y, API 602, Trim No. 8	(15)
	2" and above	Class 1500	RJ Flanged	Body A217-WC9 or A182-F22 Cl. 3, BB, OS&Y, API 600, Trim No. 8	(11)
Globe Valves	½" to 1½"	Class 1500	Socketweld	A182-F22 body, BB, OS&Y, Trim No. 8	(15)
	2" and above	Class 1500	RJ Flanged	Body A217-WC9 or A182-F22 Cl. 3, BB, OS&Y, Trim No. 8	(11)
Check Valves	½" to 1½"	Class 1500	Socketweld	A182-F22 body, BC, Trim No. 1	(15)
	2" and above	Class 1500	RJ Flanged	Body A217-WC9 or A182-F22 Cl. 3, BC, Trim No. 1	(11)

Line Class: 25CK2H Service: Refer to Table 10.1 Rating Class: 2500 RJ B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 3.2 (9)			Basic Material: 2¼ Cr. 1 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 8"	Calculate	Seamless	A335-Gr. P22	
	10" and above	Calculate	Seamless or EFW	A335-Gr. P22 or A-691 Gr. 2¼ Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 9000	Socketweld	A182 Gr.F22, B16.11	(15)
	2" and above		Buttweld	A234 Gr. WP22 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"		Socketweld	A335-Gr. P22	(10),(15)
Swages	½" to 1½"		Socketweld	A234 Gr. WP22, MSS SP-95	(10),(15)
Unions	-	-	-	-	(12)
Sockolets/ Threadolets	½" to 1½"	Class 9000	Socketweld	A182-Gr. F22, MSS SP-97	(15)
Weldolets	2" and above		Buttweld	A182-Gr. F22, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 2500	Socketweld RJ	A182-Gr. F22, B16.5	(10), (15)
	2" to 24"	Class 2500	Weldneck RJ	A182-Gr. F22, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	5 Cr.-1/2 Mo. Octagonal Ring, ASME B16.20				
Gate Valves	½" to 1½"	Class 2500	Socketweld	A182-F22 body, BB, OS&Y, API 602, Trim No. 8	(15)
	2" and above	Class 2500	RJ Flanged	Body A217-WC9 or A182-F22 Cl. 3, BB, OS&Y, API 600, Trim No. 8	(11)
Globe Valves	½" to 1½"	Class 2500	Socketweld	A182-F22 body, BB, OS&Y, Trim No. 8	(15)
	2" and above	Class 2500	RJ Flanged	Body A217-WC9 or A182-F22 Cl. 3, BB, OS&Y, Trim No. 8	(11)
Check Valves	½" to 1½"	Class 2500	Socketweld	A182-F22 body, BC, Trim No. 1	(15)
	2" and above	Class 2500	RJ Flanged	Body A217-WC9 or A182-F22 Cl. 3, BC, Trim No. 1	(11)

Line Class: 1CK1P Service: Refer to Table 10.1 Rating Class: 150 RF B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: 2¼ Cr. 1 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	XS	Seamless	A335-Gr. P22	
	3" to 24"	Std	Seamless	A335-Gr. P22	
	26" and above	Calculate	Seamless or EFW	A335-Gr. P22 or A-691 Gr. 2¼ Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld/ Threaded	A182 Gr.F22, B16.11	(15)
	2" and above		Buttweld, seamless/ welded	A234 Gr. WP22 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"	XS	Socketweld/ Threaded	A335-Gr. P22	
Swages	½" to 1½"	XS	Socketweld/ Threaded	A234 Gr. WP22, MSS SP-95	
Unions	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-Gr. F22, MSS SP-83	
Sockolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-Gr. F22, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-Gr. F22, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 150	Socketweld/ Threaded RF	A182-Gr. F22, B16.5	(10)
	2" to 24"	Class 150	Weldneck RF	A182-Gr. F22, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20.			(16)
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring and 316 SS inner ring, B16.20.			
Gate Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F22 Cl. 3 body, BB, OS&Y, API 602, Trim No. 8	(11)
	2" and above	Class 150	RF Flanged	Body A217-WC9 or A182-F22 Cl. 3, BB, OS&Y, API 600, Trim No. 8	
Globe Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F22 Cl. 3 body, BB, OS&Y, Trim No. 8	(11)
	2" and above	Class 150	RF Flanged	Body A217-WC9 or A182-F22 Cl. 3, BB, OS&Y, Trim No. 8	
Check Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F22 Cl. 3 body, BC, Trim No. 1	(11)
	2" and above	Class 150	RF Flanged	Body A217-WC9 or A182-F22 Cl. 3, BC, Trim No. 1	

Line Class: 3CK1P Service: Refer to Table 10.1 Rating Class: 300 RF B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: 2¼ Cr. 1 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	XS	Seamless	A335-Gr. P22	
	3" to 16"	Sch 40	Seamless	A335-Gr. P22	
	18" and above	Calculate	Seamless or EFW	A335-Gr. P22 or A-691 Gr. 2¼ Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld/ Threaded	A182 Gr.F22, B16.11	(15)
	2" and above		Buttweld, seamless/ welded	A234 Gr. WP22 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"	XS	Socketweld/ Threaded	A335-Gr. P22	
Swages	½" to 1½"	XS	Socketweld/ Threaded	A234 Gr. WP22, MSS SP-95	
Unions	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-Gr. F22, MSS SP-83	
Sockolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-Gr. F22, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-Gr. F22, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 300	Socketweld/ Threaded RF	A182-Gr. F22, B16.5	(10)
	2" to 24"	Class 300	Weldneck RF	A182-Gr. F22, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20.			(16)
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring and 316 SS inner ring, B16.20.			
Gate Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F22 Cl. 3 body, BB, OS&Y, API 602, Trim No. 8	(11)
	2" and above	Class 300	RF Flanged	Body A217-WC9 or A182-F22 Cl. 3, BB, OS&Y, API 600, Trim No. 8	
Globe Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F22 Cl. 3 body, BB, OS&Y, Trim No. 8	(11)
	2" and above	Class 300	RF Flanged	Body A217-WC9 or A182-F22 Cl. 3, BB, OS&Y, Trim No. 8	
Check Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F22 Cl. 3 body, BC, Trim No. 1	(11)
	2" and above	Class 300	RF Flanged	Body A217-WC9 or A182-F22 Cl. 3, BC, Trim No. 1	

Line Class: 6CK1P Service: Refer to Table 10.1 Rating Class: 600 RF B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: 2¼ Cr. 1 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 8"	XS	Seamless	A335-Gr. P22	
	10" and above	Calculate	Seamless or EFW	A335-Gr. P22 or A-691 Gr. 2¼ Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld/ Threaded	A182 Gr.F22, B16.11	(15)
	2" and above		Buttweld, seamless/ welded	A234 Gr. WP22 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"	XS	Socketweld/ Threaded	A335-Gr. P22	
Swages	½" to 1½"	XS	Socketweld/ Threaded	A234 Gr. WP22, MSS SP-95	
Unions	-	-	-	-	(12)
Sockolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-Gr. F22, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-Gr. F22, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 600	Socketweld/ Threaded RF	A182-Gr. F22, B16.5	(10)
	2" to 24"	Class 600	Weldneck RF	A182-Gr. F22, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20.			(16)
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring and 316 SS inner ring, B16.20.			
Gate Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F22 Cl. 3 body, BB, OS&Y, API 602, Trim No. 8	(11)
	2" and above	Class 600	RF Flanged	Body A217-WC9 or A182-F22 Cl. 3, BB, OS&Y, API 600, Trim No. 8	
Globe Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F22 Cl. 3 body, BB, OS&Y, Trim No. 8	(11)
	2" and above	Class 600	RF Flanged	Body A217-WC9 or A182-F22 Cl. 3, BB, OS&Y, Trim No. 8	
Check Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F22 Cl. 3 body, BC, Trim No. 1	(11)
	2" and above	Class 600	RF Flanged	Body A217-WC9 or A182-F22 Cl. 3, BC, Trim No. 1	

Line Class: 9CK1P Service: Refer to Table 10.1 Rating Class: 900 RJ B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: 2¼ Cr. 1 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 3"	XS	Seamless	A335-Gr. P22	
	4" to 12"	Sch 12	Seamless	A335-Gr. P22	
	14" and above	Calculate	Seamless or EFW	A335-Gr. P22 or A-691 Gr. 2¼ Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld/ Threaded	A182 Gr.F22, B16.11	(15)
	2" and above		Buttweld, seamless/ welded	A234 Gr. WP22 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"	XS	Socketweld/ Threaded	A335-Gr. P22	
Swages	½" to 1½"	XS	Socketweld/ Threaded	A234 Gr. WP22, MSS SP-95	
Unions	-	-	-	-	(12)
Sockolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-Gr. F22, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-Gr. F22, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 900	Socketweld/ Threaded RJ	A182-Gr. F22, B16.5	(10)
	2" to 24"	Class 900	Weldneck RJ	A182-Gr. F22, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	5Cr-1/2Mo Octagonal Ring, ASME B16.20				
Gate Valves	½" to 1½"	Class 1500	Socketweld/ Threaded	A182-F22 Cl. 3 body, BB, OS&Y, API 602, Trim No. 8	(11)
	2" and above	Class 900	RJ Flanged	Body A217-WC9 or A182-F22 Cl. 3, BB, OS&Y, API 600, Trim No. 8	
Globe Valves	½" to 1½"	Class 1500	Socketweld/ Threaded	A182-F22 Cl. 3 body, BB, OS&Y, Trim No. 8	(11)
	2" and above	Class 900	RJ Flanged	Body A217-WC9 or A182-F22 Cl. 3, BB, OS&Y, Trim No. 8	
Check Valves	½" to 1½"	Class 1500	Socketweld/ Threaded	A182-F22 Cl. 3 body, BC, Trim No. 1	(11)
	2" and above	Class 900	RJ Flanged	Body A217-WC9 or A182-F22 Cl. 3, BC, Trim No. 1	

Line Class: 15CK1P Service: Refer to Table 10.1 Rating Class: 1500 RJ B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: 2¼ Cr. 1 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 1 ½"	Sch 160	Seamless	A335-Gr. P22	
	2" and above	Calculate	Seamless or EFW	A335-Gr. P22 or A-691 Gr. 2¼ Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 6000	Socketweld/ Threaded	A182 Gr.F22, B16.11	(15)
	2" and above		Buttweld, seamless/ welded	A234 Gr. WP22 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"	Sch 160	Socketweld/ Threaded	A335-Gr. P22	
Swages	½" to 1½"	Sch 160	Socketweld/ Threaded	A234 Gr. WP22, MSS SP-95	
Unions	-	-	-	-	(12)
Sockolets	½" to 1½"	Class 6000	Socketweld/ Threaded	A182-Gr. F22, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-Gr. F22, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 1500	Socketweld/ Threaded RJ	A182-Gr. F22, B16.5	(10)
	2" to 24"	Class 1500	Weldneck RJ	A182-Gr. F22, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	5Cr-1/2Mo Octagonal Ring, ASME B16.20				
Gate Valves	½" to 1½"	Class 1500	Socketweld/ Threaded	A182-F22 Cl. 3 body, BB, OS&Y, API 602, Trim No. 8	(11)
	2" and above	Class 1500	RJ Flanged	Body A217-WC9 or A182-F22 Cl. 3, BB, OS&Y, API 600, Trim No. 8	
Globe Valves	½" to 1½"	Class 1500	Socketweld/ Threaded	A182-F22 Cl. 3 body, BB, OS&Y, Trim No. 8	(11)
	2" and above	Class 1500	RJ Flanged	Body A217-WC9 or A182-F22 Cl. 3, BB, OS&Y, Trim No. 8	
Check Valves	½" to 1½"	Class 1500	Socketweld/ Threaded	A182-F22 Cl. 3 body, BC, Trim No. 1	(11)
	2" and above	Class 1500	RJ Flanged	Body A217-WC9 or A182-F22 Cl. 3, BC, Trim No. 1	

Line Class: 25CK1P Service: Refer to Table 10.1 Rating Class: 2500 RJ B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: 2¼ Cr. 1 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 1 ½"	Sch 160	Seamless	A335-Gr. P22	
	2" and above	Calculate	Seamless or EFW	A335-Gr. P22 or A-691 Gr. 2¼ Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 6000	Socketweld/ Threaded	A182 Gr.F22, B16.11	(15)
	2" and above		Buttweld, seamless/ welded	A234 Gr. WP22 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"	Sch 160	Socketweld/ Threaded	A335-Gr. P22	
Swages	½" to 1½"	Sch 160	Socketweld/ Threaded	A234 Gr. WP22, MSS SP-95	
Unions	-	-	-	-	(12)
Sockolets	½" to 1½"	Class 6000	Socketweld/ Threaded	A182-Gr. F22, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-Gr. F22, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 2500	Socketweld/ Threaded RJ	A182-Gr. F22, B16.5	(10)
	2" to 24"	Class 2500	Weldneck RJ	A182-Gr. F22, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	5Cr-1/2Mo Octagonal Ring, ASME B16.20				
Gate Valves	½" to 1½"	Class 2500	Socketweld/ Threaded	A182-F22 Cl. 3 body, BB, OS&Y, Trim No. 8	(11)
	2" and above	Class 2500	RJ Flanged	Body A217-WC9 or A182-F22 Cl. 3, BB, OS&Y, API 600, Trim No. 8	
Globe Valves	½" to 1½"	Class 2500	Socketweld/ Threaded	A182-F22 Cl. 3 body, BB, OS&Y, Trim No. 8	(11)
	2" and above	Class 2500	RJ Flanged	Body A217-WC9 or A182-F22 Cl. 3, BB, OS&Y, Trim No. 8	
Check Valves	½" to 1½"	Class 2500	Socketweld/ Threaded	A182-F22 Cl. 3 body, BC, Trim No. 1	(11)
	2" and above	Class 2500	RJ Flanged	Body A217-WC9 or A182-F22 Cl. 3, BC, Trim No. 1	

Line Class: 1CL1P Service: Refer to Table 10.1 Rating Class: 150 RF B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: 5 Cr. 1/2 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	XS	Seamless	A335-Gr. P5	
	3" to 24"	Std	Seamless	A335-Gr. P5	
	26" and above	Calculate	Seamless or EFW	A335-Gr. P5 or A-691 Gr. 5 Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld/ Threaded	A182 Gr.F5, B16.11	(15)
	2" and above		Buttweld, seamless/ welded	A234 Gr. WP5 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"	XS	Socketweld/ Threaded	A335-Gr. P5	
Swages	½" to 1½"	XS	Socketweld/ Threaded	A234 Gr. WP5, MSS SP-95	
Unions	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-Gr. F5, MSS SP-83	
Sockolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-Gr. F5, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-Gr. F5, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 150	Socketweld/ Threaded RF	A182-Gr. F5, B16.5	(10)
	2" to 24"	Class 150	Weldneck RF	A182-Gr. F5, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			(16)
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring and 316 SS inner ring, B16.20			
Gate Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F5 body, BB, OS&Y, API 602, Trim No. 8	(11)
	2" and above	Class 150	RF Flanged	Body A217-C5 or A182-F5, BB, OS&Y, API 600, Trim No. 8	
Globe Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F5 body, BB, OS&Y, Trim No. 8	(11)
	2" and above	Class 150	RF Flanged	Body A217-C5 or A182-F5, BB, OS&Y, Trim No. 8	
Check Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F5 body, BC, Trim No. 1	(11)
	2" and above	Class 150	RF Flanged	Body A217-C5 or A182-F5, BC, Trim No. 1	

Line Class: 3CL1P Service: Refer to Table 10.1 Rating Class: 300 RF B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: 5 Cr. 1/2 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	XS	Seamless	A335-Gr. P5	
	3" to 16"	Sch 40	Seamless	A335-Gr. P5	
	18" and above	Calculate	Seamless or EFW	A335-Gr. P5 or A-691 Gr. 5 Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld/ Threaded	A182 Gr.F5, B16.11	(15)
	2" and above		Buttweld, seamless/ welded	A234 Gr. WP5 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"	XS	Socketweld/ Threaded	A335-Gr. P5	
Swages	½" to 1½"	XS	Socketweld/ Threaded	A234 Gr. WP5, MSS SP-95	
Unions	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-Gr. F5, MSS SP-83	
Sockolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-Gr. F5, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-Gr. F5, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 300	Socketweld/ Threaded RF	A182-Gr. F5, B16.5	(10)
	2" to 24"	Class 300	Weldneck RF	A182-Gr. F5, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			(16)
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring and 316 SS inner ring, B16.20			
Gate Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F5 body, BB, OS&Y, API 602, Trim No. 8	(11)
	2" and above	Class 300	RF Flanged	Body A217-C5 or A182-F5, BB, OS&Y, API 600, Trim No. 8	
Globe Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F5 body, BB, OS&Y, Trim No. 8	(11)
	2" and above	Class 300	RF Flanged	Body A217-C5 or A182-F5, BB, OS&Y, Trim No. 8	
Check Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F5 body, BC, Trim No. 1	(11)
	2" and above	Class 300	RF Flanged	Body A217-C5 or A182-F5, BC, Trim No. 1	

Line Class: 6CL1P Service: Refer to Table 10.1 Rating Class: 600 RF B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: 5 Cr. 1/2 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 8"	XS	Seamless	A335-Gr. P5	
	10" and above	Calculate	Seamless or EFW	A335-Gr. P5 or A-691 Gr. 5 Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld/ Threaded	A182 Gr.F5, B16.11	(15)
	2" and above		Buttweld, seamless/ welded	A234 Gr. WP5 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"	XS	Socketweld/ Threaded	A335-Gr. P5	
Swages	½" to 1½"	XS	Socketweld/ Threaded	A234 Gr. WP5, MSS SP-95	
Unions	-	-	-	-	(12)
Sockolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-Gr. F5, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-Gr. F5, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 600	Socketweld/ Threaded RF	A182-Gr. F5, B16.5	(10)
	2" to 24"	Class 600	Weldneck RF	A182-Gr. F5, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20.			(16)
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring and 316 SS inner ring, B16.20.			
Gate Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F5 body, BB, OS&Y, API 602, Trim No. 8	(11)
	2" and above	Class 600	RF Flanged	Body A217-C5 or A182-F5, BB, OS&Y, API 600, Trim No. 8	
Globe Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F5 body, BB, OS&Y, Trim No. 8	(11)
	2" and above	Class 600	RF Flanged	Body A217-C5 or A182-F5, BB, OS&Y, Trim No. 8	
Check Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F5 body, BC, Trim No. 1	(11)
	2" and above	Class 600	RF Flanged	Body A217-C5 or A182-F5, BC, Trim No. 1	

Line Class: 9CL1P Service: Refer to Table 10.1 Rating Class: 900 RJ B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: 5 Cr. 1/2 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 3"	XS	Seamless	A335-Gr. P5	
	4" to 12"	Sch 12	Seamless	A335-Gr. P5	
	14" and above	Calculate	Seamless or EFW	A335-Gr. P5 or A-691 Gr. 5 Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld/ Threaded	A182 Gr.F5, B16.11	(15)
	2" and above		Buttweld, seamless/ welded	A234 Gr. WP5 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"	XS	Socketweld/ Threaded	A335-Gr. P5	
Swages	½" to 1½"	XS	Socketweld/ Threaded	A234 Gr. WP5, MSS SP-95	
Unions	-	-	-	-	(12)
Sockolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-Gr. F5, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-Gr. F5, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 900	Socketweld/ Threaded RJ	A182-Gr. F5, B16.5	(10)
	2" to 24"	Class 900	Weldneck RJ	A182-Gr. F5, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	5Cr-1/2Mo Octagonal Ring, ASME B16.20				
Gate Valves	½" to 1½"	Class 1500	Socketweld/ Threaded	A182-F5 body, BB, OS&Y, API 602, Trim No. 8	(11)
	2" and above	Class 900	RJ Flanged	Body A217-C5 or A182-F5, BB, OS&Y, API 600, Trim No. 8	
Globe Valves	½" to 1½"	Class 1500	Socketweld/ Threaded	A182-F5 body, BB, OS&Y, Trim No. 8	(11)
	2" and above	Class 900	RJ Flanged	Body A217-C5 or A182-F5, BB, OS&Y, Trim No. 8	
Check Valves	½" to 1½"	Class 1500	Socketweld/ Threaded	A182-F5 body, BC, Trim No. 1	(11)
	2" and above	Class 900	RJ Flanged	Body A217-C5 or A182-F5, BC, Trim No. 1	

Line Class: 1CM1P Service: Refer to Table 10.1 Rating Class: 150 RF B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: 9 Cr. 1 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	XS	Seamless	A335-Gr. P9	
	3" to 24"	Std	Seamless	A335-Gr. P9	
	26" and above	Calculate	Seamless or EFW	A335-Gr. P9 or A-691 Gr. 9 Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld/ Threaded	A182 Gr.F9, B16.11	(15)
	2" and above		Buttweld, seamless/ welded	A234 Gr. WP9 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"	XS	Socketweld/ Threaded	A335-Gr. P9	
Swages	½" to 1½"	XS	Socketweld/ Threaded	A234 Gr. WP9, MSS SP-95	
Unions	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-Gr. F9, MSS SP-83	
Sockolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-Gr. F9, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-Gr. F9, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 150	Socketweld/ Threaded RF	A182-Gr. F9, B16.5	(10)
	2" to 24"	Class 150	Weldneck RF	A182-Gr. F9, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			(16)
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring and 316 SS inner ring, B16.20			
Gate Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F9 body, BB, OS&Y, API 602, Trim No. 8	(11)
	2" and above	Class 150	RF Flanged	Body A217-C12 or A182-F9, BB, OS&Y, API 600, Trim No. 8	
Globe Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F9 body, BB, OS&Y, Trim No. 8	(11)
	2" and above	Class 150	RF Flanged	Body A217-C12 or A182-F9, BB, OS&Y, Trim No. 8	
Check Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F9 body, BC, Trim No. 1	(11)
	2" and above	Class 150	RF Flanged	Body A217-C12 or A182-F9, BC, Trim No. 1	

Line Class: 3CM1P Service: Refer to Table 10.1 Rating Class: 300 RF B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: 9 Cr. 1 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	XS	Seamless	A335-Gr. P9	
	3" to 16"	Sch 40	Seamless	A335-Gr. P9	
	18" and above	Calculate	Seamless or EFW	A335-Gr. P9 or A-691 Gr. 9 Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld/ Threaded	A182 Gr.F9, B16.11	(15)
	2" and above		Buttweld, seamless/ welded	A234 Gr. WP9 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"	XS	Socketweld/ Threaded	A335-Gr. P9	
Swages	½" to 1½"	XS	Socketweld/ Threaded	A234 Gr. WP9, MSS SP-95	
Unions	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-Gr. F9, MSS SP-83	
Sockolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-Gr. F9, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-Gr. F9, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 300	Socketweld/ Threaded RF	A182-Gr. F9, B16.5	(10)
	2" to 24"	Class 300	Weldneck RF	A182-Gr. F9, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			(16)
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring and 316 SS inner ring, B16.20			
Gate Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F9 body, BB, OS&Y, API 602, Trim No. 8	(11)
	2" and above	Class 300	RF Flanged	Body A217-C12 or A182-F9, BB, OS&Y, API 600, Trim No. 8	
Globe Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F9 body, BB, OS&Y, Trim No. 8	(11)
	2" and above	Class 300	RF Flanged	Body A217-C12 or A182-F9, BB, OS&Y, Trim No. 8	
Check Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F9 body, BC, Trim No. 1	(11)
	2" and above	Class 300	RF Flanged	Body A217-C12 or A182-F9, BC, Trim No. 1	

Line Class: 6CM1P Service: Refer to Table 10.1 Rating Class: 600 RF B16.5 Temperature Limit: 595°C Max. (3) Corrosion Allowance: 1.6 mm (9)			Basic Material: 9 Cr. 1 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 8"	XS	Seamless	A335-Gr. P9	
	10" and above	Calculate	Seamless or EFW	A335-Gr. P9 or A-691 Gr. 9 Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld/ Threaded	A182 Gr.F9, B16.11	(15)
	2" and above		Buttweld, seamless/ welded	A234 Gr. WP9 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"	XS	Socketweld/ Threaded	A335-Gr. P9	
Swages	½" to 1½"	XS	Socketweld/ Threaded	A234 Gr. WP9, MSS SP-95	
Unions	-	-	-	-	(12)
Sockolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-Gr. F9, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-Gr. F9, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 600	Socketweld/ Threaded RF	A182-Gr. F9, B16.5	(10)
	2" to 24"	Class 600	Weldneck RF	A182-Gr. F9, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	24" and under	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring, B16.20			(16)
	26" and above	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring and 316 SS inner ring, B16.20			
Gate Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F9 body, BB, OS&Y, API 602, Trim No. 8	(11)
	2" and above	Class 600	RF Flanged	Body A217-C12 or A182-F9, BB, OS&Y, API 600, Trim No. 8	
Globe Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F9 body, BB, OS&Y, Trim No. 8	(11)
	2" and above	Class 600	RF Flanged	Body A217-C12 or A182-F9, BB, OS&Y, Trim No. 8	
Check Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F9 body, BC, Trim No. 1	(11)
	2" and above	Class 600	RF Flanged	Body A217-C12 or A182-F9, BC, Trim No. 1	

Line Class: 1CM2P03 Service: Refer to Table 10.1 Rating Class: 150 RF B16.5 Temperature Limit: 455°C Max. (3) Corrosion Allowance: 3.2 mm (9, 26)			Basic Material: 9 Cr. 1 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to ¾"	Sch 160	Seamless	A335-Gr. P9	
	¾" to 2"	XS	Seamless	A335-Gr. P9	
	3" to 24"	Std	Seamless	A335-Gr. P9	
	26" and above	Calculate	Seamless or EFW	A335-Gr. P9 or A-691 Gr. 9 Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 6000	Socketweld/ Threaded	A182 Gr.F9, B16.11	(15)
	2" and above		Buttweld, seamless/ welded	A234 Gr. WP9 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"		Socketweld/ Threaded	A335-Gr. P9	(10), (15)
Swages	½" to 1½"	XS	Socketweld/ Threaded	A234 Gr. WP9, MSS SP-95	
Unions	-	-	-	-	(12)
Sockolets	½" to 1½"	Class 6000	Socketweld/ Threaded	A182-Gr. F9, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-Gr. F9, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 150	Socketweld/ Threaded RF	A182-Gr. F9, B16.5	(10)
	2" to 24"	Class 150	Weldneck RF	A182-Gr. F9, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring and 316 SS inner ring, B16.20				(16)
Gate Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F9 body, BB, OS&Y, API 602, Trim No. 5	(11)
	2" and above	Class 150	RF Flanged	Body A217-C12 or A182-F9, BB, OS&Y, API 600, Trim No. 5	
Globe Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F9 body, BB, OS&Y, Trim No. 5	(11)
	2" and above	Class 150	RF Flanged	Body A217-C12 or A182-F9, BB, OS&Y, Trim No. 5	
Check Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F9 body, BC, Trim No. 5	(11)
	2" and above	Class 150	RF Flanged	Body A217-C12 or A182-F9, BC, Trim No. 5	

Line Class: 3CM2P03 Service: Refer to Table 10.1 Rating Class: 300 RF B16.5 Temperature Limit: 455°C Max. (3) Corrosion Allowance: 3.2 mm (9, 26)			Basic Material: 9 Cr. 1 Mo. Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to ¾"	Sch 160	Seamless	A335-Gr. P9	
	1" to 16"	XS	Seamless	A335-Gr. P9	
	18" and above	Calculate	Seamless or EFW	A335-Gr. P9 or A-691 Gr. 9 Cr. Class 32.	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 6000	Socketweld/ Threaded	A182 Gr.F9, B16.11	(15)
	2" and above		Buttweld, seamless/ welded	A234 Gr. WP9 Seamless/Welded, B16.9	(10)
Nipples	½" to 1½"		Socketweld/ Threaded	A335-Gr. P9	(10), (15)
Swages	½" to 1½"	XS	Socketweld/ Threaded	A234 Gr. WP9, MSS SP-95	
Unions	-	-	-	-	(12)
Sockolets	½" to 1½"	Class 6000	Socketweld/ Threaded	A182-Gr. F9, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-Gr. F9, MSS SP-97	(10)
FLANGES	½" to 1½"	Class 300	Socketweld/ Threaded RF	A182-Gr. F9, B16.5	(10)
	2" to 24"	Class 300	Weldneck RF	A182-Gr. F9, B16.5	(10)
BOLTING	A193 B7 stud bolts, with A194 2H heavy hex nuts for temperature up to 450°C. A193 B16 stud bolts, A194 Gr.4 heavy hex nuts for temperature up to 595°C.				
GASKETS	Spiral-wound, 316 SS windings, flexible graphite filled, with carbon steel outer ring and 316 SS inner ring, B16.20				(16)
Gate Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F9 body, BB, OS&Y, API 602, Trim No. 5	(11)
	2" and above	Class 300	RF Flanged	Body A217-C12 or A182-F9, BB, OS&Y, API 600, Trim No. 5	
Globe Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F9 body, BB, OS&Y, Trim No. 5	(11)
	2" and above	Class 300	RF Flanged	Body A217-C12 or A182-F9, BB, OS&Y, Trim No. 5	
Check Valves	½" to 1½"	Class 800	Socketweld/ Threaded	A182-F9 body, BC, Trim No. 5	(11)
	2" and above	Class 300	RF Flanged	Body A217-C12 or A182-F9, BC, Trim No. 5	

Line Class: 1SA1P Service: Refer to Table 10.1 Rating Class: 150 RF B16.5 Temperature Limit: -29 to 400°C Corrosion Allowance: 1.6 mm (9)			Basic Material: 304/304L SS Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	A312 Type 304/304L	
	3" to 14"	Sch 10S	Seamless or	A312 Type 304/304L or	
	16" to 24"	Calculate Min Sch 10S	Welded	A358 Gr 304/304L Class 1	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings etc.	½" to 1½"	Class 3000	Socketweld	A182-F304/304L, B16.11	10
	2" – 24"		Buttweld	A403 WP304/304L, Seamless, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	A403 WP304/304L, Seamless, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	A312 Type 304/304L Seamless	
Unions					12
Sockolets/ Threadolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-F304/304L, MSS-SP-97	
Weldolets	2" and above		Buttweld	A182-F304/304L MSS-SP-97	10
FLANGES	1½" and under	Class 150	Socketweld RF	A182-F304/304L, B16.5	10
	2" – 24"	Class 150	Weldneck RF		
BOLTING	A193 Gr. B7 stud bolts, semi-finished heavy pattern, A194 Gr 2H heavy hex nuts				
GASKETS	Spiral-wound, 316 SS windings, flexible graphite filled with 304 SS outer ring, per B16.20				
GATE VALVES	1½" and under	Class 800	Socketweld	A182-F316/316L body, BB, OS&Y, graphite packing, API 602, Trim No. 12	11
	2" and above	Class 150	RF Flanged	A351-CF3 body, BB, OS&Y, graphite packing, Trim No. 12	
GLOBE VALVES	1½" and under	Class 800	Socketweld	A182-F316/316L body, BB, OS&Y, graphite packing, API 602, Trim No. 12	11
	2" and above	Class 150	RF Flanged	A351-CF3 body, BB, OS&Y, graphite packing, Trim No. 12	
CHECK VALVES	1½" and under	Class 800	Socketweld	A182-F316/316L body, BC, API 602, Trim No. 12	11
	2" and above	Class 150	RF Flanged	A351-CF3 body, BC, Trim No. 12	

Line Class: 3SA1P Service: Refer to Table 10.1 Rating Class: 300 RF B16.5 Temperature Limit: -29 to 400°C Corrosion Allowance: 1.6 mm (9)			Basic Material: 304/304L SS Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	A312 Type 304/304L	
	3" to 6"	Sch 10S	Seamless or	A312 Type 304/304L or	
	8" to 24"	Calculate Min Sch 10S	Welded	A358 Gr 304/304L Class 1	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings etc.	½" to 1½"	Class 3000	Socketweld	A182-F304/304L, B16.11	10
	2" – 24"		Buttweld	A403 WP304/304L, Seamless, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	A403 WP304/304L, Seamless, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	A312 Type 304/304L Seamless	
Unions					12
Sockolets/ Thredolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-F304/304L, MSS-SP-97	
Weldolets	2" and above		Buttweld	A182-F304/304L MSS-SP-97	10
FLANGES	1½" and under	Class 300	Socketweld RF	A182-F304/304L, B16.5	10
	2" – 24"	Class 300	Weldneck RF		
BOLTING	A193 Gr. B7 stud bolts, semi-finished heavy pattern, A194 Gr 2H heavy hex nuts				
GASKETS	Spiral-wound, 316 SS windings, flexible graphite filled with 304 SS outer ring, per B16.20.				
GATE VALVES	1½" and under	Class 800	Socketweld	A182-F316/316L body, BB, OS&Y, graphite packing, API 602, Trim No. 12	11
	2" and above	Class 300	RF Flanged	A351-CF3 body, BB, OS&Y, graphite packing, Trim No. 12	
GLOBE VALVES	1½" and under	Class 800	Socketweld	A182-F316/316L body, BB, OS&Y, graphite packing, API 602, Trim No. 12	11
	2" and above	Class 300	RF Flanged	A351-CF3 body, BB, OS&Y, graphite packing, Trim No. 12	
CHECK VALVES	1½" and under	Class 800	Socketweld	A182-F316/316L body, BC, API 602, Trim No. 12	11
	2" and above	Class 300	RF Flanged	A351-CF3 body, BC, Trim No. 12	

Line Class: 1SC1P Service: Refer to Table 10.1 Rating Class: 150 RF, B16.5 Temperature Limit: 677°C Corrosion Allowance: 1.6 mm (9)			Basic Material: Type 304H SS Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	2" and under	40S	Seamless	A312-Type 304H	
	3" and above	Calculate Sch 10S min.	Seamless or Welded	A312-Type 304H A312-Type 304H	
Nipples	½"-1½"	40S	Socketweld/ Threaded	A312-Type 304H	
Swages	½"-1½"	40S	Socketweld/ Threaded	A403-WP304H, MSS SP-95	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	1½" and under	Class 3000	Socketweld/ Threaded	A182-F304H, B16.11	
	2" and above		Buttweld	A403-Gr. WP304, B16.9	10
Unions	-	-	-	-	12
Sockolets/ Threadolets	1½" and under	Class 3000	Socketweld/ Threaded	A182-F 304H, B16.11	
Weldolets	2" and above		Buttweld	A182-F304H, B16.9	10
FLANGES	1½" and under	Class 150	Socketweld RF	A182-F304H, B16.5	
	2" -24"	Class 150	Weldneck RF	A182-F304H, B16.5	10
BOLTING	A193 B8M stud bolts, heavy pattern with A194 8MA heavy hex nuts.				
GASKETS	Spiral-wound, 316 SS windings, flexible graphite filled with 316 SS outer rings, per B16.20 up to 425°C. Spiral wound type 304H SS windings and inner ring w/ 3stage mica (outer)/flexible graphite middle/ mica inner filler, B16.20 for above 425°C.				
Gate Valves	1½" and under	Class 800	Socketweld/ Threaded	A182-F304H body, BB, OS&Y, API 602, Trim No. 2 w/HFS	
	2" and above	Class 150	RF Flanged	A351-CF8 body, BB, OS&Y, Trim No.2 w/HFS	11
Globe Valves	1½" and under	Class 800	Socketweld/ Threaded	A182-F304H body, BB, OS&Y, Trim No. 2 w/HFS	
	2" and above	Class 150	RF Flanged	A351-CF8 body, OS&Y, Trim No. 2 w/HFS.	11
Check Valves	1½" and under	Class 800	Socketweld/ Threaded	A182-F304H body, BC, Trim No. 2	
	2" and above	Class 150	RF Flanged	A351-CF8 body, BC, Trim No. 2	11

Line Class: 3SC1P Service: Refer to Table 10.1 Rating Class: 300 RF, B16.5 Temperature Limit: 677°C Corrosion Allowance: 1.6 mm (9)			Basic Material: Type 304H SS Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	2" and under	40S	Seamless	A312-Type 304H	
	3" and above	Calculate Sch 10S min.	Seamless or Welded	A312-Type 304H A312-Type 304H	
Nipples	½"-1½"	40S	Socketweld/ Threaded	A312-Type 304H	
Swages	½"-1½"	40S	Socketweld/ Threaded	A403-WP304H, MSS SP-95	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	1½" and under	Class 3000	Socketweld/ Threaded	A182-F304H, B16.11	
	2" and above		Buttweld	A403-Gr. WP304, B16.9	10
Unions	-	-	-	-	12
Sockolets/ Threadolets	1½" and under	Class 3000	Socketweld/ Threaded	A182-F 304H, B16.11	
Weldolets	2" and above		Buttweld	A182-F304H, B16.9	10
FLANGES	1½" and under	Class 300	Socketweld RF	A182-F304H, B16.5	
	2" -24"	Class 300	Weldneck RF	A182-F304H, B16.5	10
BOLTING	A193 B8M stud bolts, heavy pattern with A194 8MA heavy hex nuts.				
GASKETS	Spiral-wound, 316 SS windings, flexible graphite filled with 316 SS outer rings, per B16.20 up to 425°C. Spiral wound type 304H SS windings and inner ring w/ 3stage mica (outer)/flexible graphite middle/ mica inner filler, B16.20 for above 425°C				
Gate Valves	1½" and under	Class 800	Socketweld/ Threaded	A182-F304H body, BB, OS&Y, API 602, Trim No. 2 w/HFS	
	2" and above	Class 300	RF Flanged	A351-CF8 body, BB, OS&Y, Trim No.2 w/HFS	11
Globe Valves	1½" and under	Class 800	Socketweld/ Threaded	A182-F304H body, BB, OS&Y, Trim No. 2 w/HFS	
	2" and above	Class 300	RF Flanged	A351-CF8 body, OS&Y, Trim No. 2 w/HFS	11
Check Valves	1½" and under	Class 800	Socketweld/ Threaded	A182-F304H body, BC, Trim No. 2	
	2" and above	Class 300	RF Flanged	A351-CF8 body, BC, Trim No. 2	11

Line Class: 1SD0P Service: Refer to Table 10.1 Rating Class: 150 RF B16.5 Temperature Limit: -200 to 400°C Corrosion Allowance: 0.0 mm (9)			Basic Material: 316/316L SS Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	A312 Type 316/316L	
	3" to 24"	Sch 10S	Seamless or Welded	A312 Type 316/316L or A358 Gr 316/316L Class 1	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld	A182-F316/316L, B16.11	10
	2" – 24"		Buttweld	A403 WP316/316L, Seamless, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	A403 WP316/316L, Seamless, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	A312 Type 316/316L Seamless	
Unions					12
Sockolets/ Threadolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-F316/316L, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-F316/316L, MSS SP-97	10
FLANGES	1½" and under	Class 150	Socketweld RF	A182-F316/316L, B16.5	
	2" and above	Class 150	Weldneck RF		10
BOLTING	A193 Gr. B7 stud bolts, semi-finished heavy pattern, A194 Gr 2H heavy hex nuts				
GASKETS	Spiral-wound, 316 SS windings, flexible graphite filled with 316 SS outer ring, per B16.20.				
GATE VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F316/316L body, BB, OS&Y, graphite packing, API 602, Trim No. 12	11
	2" and above	Class 150	RF Flanged	A351-CF8M body, BB, OS&Y, graphite packing, Trim No. 12	
GLOBE VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F316/316L body, BB, OS&Y, graphite packing, API 602, Trim No. 12	11
	2" and above	Class 150	RF Flanged	A351-CF8M body, BB, OS&Y, graphite packing, Trim No. 12	
CHECK VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F316/316L body, BC, API 602, Trim No. 12	11
	2" and above	Class 150	RF Flanged	A351-CF8M body, BC, Trim No. 12	

Line Class: 3SD0P Service: Refer to Table 10.1 Rating Class: 300 RF B16.5 Temperature Limit: -200 to 400°C Corrosion Allowance: 0.0 mm (9)			Basic Material: 316/316L SS Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	A312 Type 316/316L	
	3" to 24"	Calculate Sch 10S min.	Seamless or Welded	A312 Type 316/316L or A358 Gr 316/316L Class 1	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld	A182-F316/316L, B16.11	10
	2" – 24"		Buttweld	A403 WP316/316L, Seamless, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	A403 WP316/316L, Seamless, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	A312 Type 316/316L Seamless	
Unions					12
Sockolets/ Threadolets	½" to 1½"	Class 6000	Socketweld/ Threaded	A182-F316/316L, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-F316/316L, MSS SP-97	10
FLANGES	1½" and under	Class 300	Socketweld RF	A182-F316/316L, B16.5	10
	2" and above	Class 300	Weldneck RF		
BOLTING	A193 Gr. B7 stud bolts, semi-finished heavy pattern, A194 Gr 2H heavy hex nuts				
GASKETS	Spiral-wound, 316 SS windings, flexible graphite filled with 316 SS outer ring, per B16.20.				
GATE VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F316/316L body, BB, OS&Y, graphite packing, API 602, Trim No. 12	11
	2" and above	Class 300	RF Flanged	A351-CF8M body, BB, OS&Y, graphite packing, Trim No. 12	
GLOBE VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F316/316L body, BB, OS&Y, graphite packing, API 602, Trim No. 12	11
	2" and above	Class 300	RF Flanged	A351-CF8M body, BB, OS&Y, graphite packing, Trim No. 12	
CHECK VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F316/316L body, BC, API 602, Trim No. 12	11
	2" and above	Class 300	RF Flanged	A351-CF8M body, BC, Trim No. 12	

Line Class: 6SD0P Service: Refer to Table 10.1 Rating Class: 600 RF B16.5 Temperature Limit: -200 to 400°C Corrosion Allowance: 0.0 mm (9)			Basic Material: 316/316L SS Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	A312 Type 316/316L	
	3" to 24"	Calculate Sch 10S min.	Seamless or Welded	A312 Type 316/316L or A358 Gr 316/316L Class 1	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld	A182-F316/316L, B16.11	10
	2" – 24"		Buttweld	A403 WP316/316L, Seamless, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	A403 WP316/316L, Seamless, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	A312 Type 316/316L Seamless	
Unions					12
Sockolets/ Threadolets	½" to 1½"	Class 6000	Socketweld/ Threaded	A182-F316/316L, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-F316/316L, MSS SP-97	10
FLANGES	1½" and under	Class 600	Socketweld RF	A182-F316/316L, B16.5	10
	2" and above	Class 600	Weldneck RF		
BOLTING	A193 Gr. B7 stud bolts, semi-finished heavy pattern, A194 Gr 2H heavy hex nuts				
GASKETS	Spiral-wound, 316 SS windings, flexible graphite filled with 316 SS outer ring, per B16.20.				
GATE VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F316/316L body, BB, OS&Y, graphite packing, API 602, Trim No. 12	11
	2" and above	Class 600	RF Flanged	A351-CF8M body, BB, OS&Y, graphite packing, Trim No. 12	
GLOBE VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F316/316L body, BB, OS&Y, graphite packing, API 602, Trim No. 12	11
	2" and above	Class 600	RF Flanged	A351-CF8M body, BB, OS&Y, graphite packing, Trim No. 12	
CHECK VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F316/316L body, BC, API 602, Trim No. 12	11
	2" and above	Class 600	RF Flanged	A351-CF8M body, BC, Trim No. 12	

Line Class: 9SD0P Service: Refer to Table 10.1 Rating Class: 900 RJ B16.5 Temperature Limit: -200 to 400°C Corrosion Allowance: 0.0 mm (9)			Basic Material: 316/316L SS Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	A312 Type 316/316L	
	3" to 24"	Calculate Sch 10S min.	Seamless or Welded	A312 Type 316/316L or A358 Gr 316/316L Class 1	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld	A182-F316/316L, B16.11	10
	2" – 24"		Buttweld	A403 WP316/316L, Seamless, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	A403 WP316/316L, Seamless, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	A312 Type 316/316L Seamless	
Unions					12
Sockolets/ Threadolets	½" to 1½"	Class 6000	Socketweld/ Threaded	A182-F316/316L, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-F316/316L, MSS SP-97	10
FLANGES	1½" and under	Class 900	Socketweld RJ	A182-F316/316L, B16.5	10
	2" and above	Class 900	Weldneck RJ		
BOLTING	A193 Gr. B7 stud bolts, semi-finished heavy pattern, A194 Gr 2H heavy hex nuts				
GASKETS	347 SS Ring, 140 BHN Max Hardness per ASME B16.20				
GATE VALVES	1½" and under	Class 1500	Socketweld/ Threaded	A182-F316/316L body, BB, OS&Y, graphite packing, API 602, Trim No. 12	11
	2" and above	Class 900	RJ Flanged	A351-CF8M body, BB, OS&Y, graphite packing, Trim No. 12	
GLOBE VALVES	1½" and under	Class 1500	Socketweld/ Threaded	A182-F316/316L body, BB, OS&Y, graphite packing, API 602, Trim No. 12	11
	2" and above	Class 900	RJ Flanged	A351-CF8M body, BB, OS&Y, graphite packing, Trim No. 12	
CHECK VALVES	1½" and under	Class 1500	Socketweld/ Threaded	A182-F316/316L body, BC, API 602, Trim No. 12	11
	2" and above	Class 900	RJ Flanged	A351-CF8M body, BC, Trim No. 12	

Line Class: 15SD0P Service: Refer to Table 10.1 Rating Class: 900 RJ B16.5 Temperature Limit: -200 to 400°C Corrosion Allowance: 0.0 mm (9)			Basic Material: 316/316L SS Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	A312 Type 316/316L	
	3" to 24"	Calculate Sch 10S min.	Seamless or Welded	A312 Type 316/316L or A358 Gr 316/316L Class 1	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld	A182-F316/316L, B16.11	10
	2" – 24"		Buttweld	A403 WP316/316L, Seamless, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	A403 WP316/316L, Seamless, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	A312 Type 316/316L Seamless	
Unions					12
Sockolets/ Threadolets	½" to 1½"	Class 6000	Socketweld/ Threaded	A182-F316/316L, MSS SP-97	
Weldolets	2" and above		Buttweld	A182-F316/316L, MSS SP-97	10
FLANGES	1½" and under	Class 1500	Socketweld RJ	A182-F316/316L, B16.5	10
	2" and above	Class 1500	Weldneck RJ		
BOLTING	A193 Gr. B7 stud bolts, semi-finished heavy pattern, A194 Gr 2H heavy hex nuts				
GASKETS	347 SS Ring, 140 BHN Max Hardness per ASME B16.20				
GATE VALVES	1½" and under	Class 1500	Socketweld/ Threaded	A182-F316/316L body, BB, OS&Y, graphite packing, API 602, Trim No. 12	11
	2" and above	Class 1500	RJ Flanged	A351-CF8M body, BB, OS&Y, graphite packing, Trim No. 12	
GLOBE VALVES	1½" and under	Class 1500	Socketweld/ Threaded	A182-F316/316L body, BB, OS&Y, graphite packing, API 602, Trim No. 12	11
	2" and above	Class 1500	RJ Flanged	A351-CF8M body, BB, OS&Y, graphite packing, Trim No. 12	
CHECK VALVES	1½" and under	Class 1500	Socketweld/ Threaded	A182-F316/316L body, BC, API 602, Trim No. 12	11
	2" and above	Class 1500	RJ Flanged	A351-CF8M body, BC, Trim No. 12	

Line Class: 1SJ1P Service: Refer to Table 10.1 Rating Class: 150 RF B16.5 Temperature Limit: -29° C to 510°C Corrosion Allowance: 1.6 mm (9)			Basic Material: 321 S with 347 SS Valves Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	A312 Type 321	
	3" to 14"	Sch 10S	Seamless or	A312 Type 321	
	16" to 24"	Calculate Sch 10 Min.	Welded	or A358 Gr 321 Class 1	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld	A182-F321, B16.11	10
	2" -24"		Buttweld	A403 WP321, Seamless, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	A403 WP321, Seamless, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	A312 Type 321, Seamless	
Unions					12
Sockolets/ Threadolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-F321, MSS-SP-97	
Weldolets	2" and above		Buttweld	A182-F321, MSS-SP-97	10
FLANGES	1½" and under	Class 150	Socketweld RF	A182-F321, B16.5	
	2" – 24"	Class 150	Weldneck RF		10
BOLTING	A193 Gr. B7 stud bolts, semi-finished heavy pattern, A194 Gr 2H heavy hex nuts				
GASKETS	Spiral-wound, 321 SS windings, flexible graphite filled with 316 SS outer ring, per B16.20				16
GATE VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F347 body, BB, OS&Y, graphite packing, API 602, Trim No. 5	11
	2" and above	Class 150	RF Flanged	A351-CF8C body, BB, OS&Y, graphite packing, Trim No. 5	
GLOBE VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F347 body, BB, OS&Y, graphite packing, API 602, Trim No. 5	11
	2" and above	Class 150	RF Flanged	A351-CF8C body, BB, OS&Y, graphite packing, Trim No. 5	
CHECK VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F347 body, BC, API 602, Trim No. 5	11
	2" and above	Class 150	RF Flanged	A351-CF8C body, BC, Trim No. 5	

Line Class: 3SJ1P Service: Refer to Table 10.1 Rating Class: 300 RF B16.5 Temperature Limit: -29° C to 510°C Corrosion Allowance: 1.6 mm (9)			Basic Material: 321 S with 347 SS Valves Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	A312 Type 321	
	3" to 24"	Calculate Sch 10 Min.	Seamless	A312 Type 321	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld	A182-F321, B16.11	10
	2" -24"		Buttweld	A403 WP321, Seamless, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	A403 WP321, Seamless, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	A312 Type 321, Seamless	
Unions					12
Sockolets/ Threadolets	½" to 1½"	Class 6000	Socketweld/ Threaded	A182-F321, MSS-SP-97	
Weldolets	2" and above		Buttweld	A182-F321, MSS-SP-97	10
FLANGES	1½" and under	Class 300	Socketweld RF	A182-F321, B16.5	
	2" – 24"	Class 300	Weldneck RF		10
BOLTING	A193 Gr. B7 stud bolts, semi-finished heavy pattern, A194 Gr 2H heavy hex nuts				
GASKETS	Spiral-wound, 321 SS windings, flexible graphite filled with 316 SS outer ring, per B16.20.				16
GATE VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F347 body, BB, OS&Y, graphite packing, API 602, Trim No. 5	11
	2" and above	Class 300	RF Flanged	A351-CF8C body, BB, OS&Y, graphite packing, Trim No. 5	
GLOBE VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F347 body, BB, OS&Y, graphite packing, API 602, Trim No. 5	11
	2" and above	Class 300	RF Flanged	A351-CF8C body, BB, OS&Y, graphite packing, Trim No. 5	
CHECK VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F347 body, BC, API 602, Trim No. 5	11
	2" and above	Class 300	RF Flanged	A351-CF8C body, BC, Trim No. 5	

Line Class: 6SJ1P Service: Refer to Table 10.1 Rating Class: 600 RF B16.5 Temperature Limit: -29° C to 510°C Corrosion Allowance: 1.6 mm (9)			Basic Material: 321 S with 347 SS Valves Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	A312 Type 321	
	3" to 24"	Calculate Sch 10 Min.	Seamless	A312 Type 321	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld	A182-F321, B16.11	10
	2" -24"		Buttweld	A403 WP321, Seamless, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	A403 WP321, Seamless, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	A312 Type 321, Seamless	
Unions					12
Sockolets/ Threadolets	½" to 1½"	Class 6000	Socketweld/ Threaded	A182-F321, MSS-SP-97	
Weldolets	2" and above		Buttweld	A182-F321, MSS-SP-97	10
FLANGES	1½" and under	Class 600	Socketweld RF	A182-F321, B16.5	
	2" – 24"	Class 600	Weldneck RF		10
BOLTING	A193 Gr. B7 stud bolts, semi-finished heavy pattern, A194 Gr 2H heavy hex nuts				
GASKETS	Spiral-wound, 321 SS windings, flexible graphite filled with 316 SS outer ring, per B16.20.				16
GATE VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F347 body, BB, OS&Y, graphite packing, API 602, Trim No. 5	11
	2" and above	Class 600	RF Flanged	A351-CF8C body, BB, OS&Y, graphite packing, Trim No. 5	
GLOBE VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F347 body, BB, OS&Y, graphite packing, API 602, Trim No. 5	11
	2" and above	Class 600	RF Flanged	A351-CF8C body, BB, OS&Y, graphite packing, Trim No. 5	
CHECK VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F347 body, BC, API 602, Trim No. 5	11
	2" and above	Class 600	RF Flanged	A351-CF8C body, BC, Trim No. 5	

Line Class: 9SJ1P Service: Refer to Table 10.1 Rating Class: 900 RF B16.5 Temperature Limit: -29° C to 510°C Corrosion Allowance: 1.6 mm (9)			Basic Material: 321 S with 347 SS Valves Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	A312 Type 321	
	3" to 24"	Calculate Sch 10 Min.	Seamless or	A312 Type 321	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld	A182-F321, B16.11	10
	2" -24"		Buttweld	A403 WP321, Seamless, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	A403 WP321, Seamless, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	A312 Type 321, Seamless	
Unions					12
Sockolets/ Threadolets	½" to 1½"	Class 6000	Socketweld/ Threaded	A182-F321, MSS-SP-97	
Weldolets	2" and above		Buttweld	A182-F321, MSS-SP-97	10
FLANGES	1½" and under	Class 900	Socketweld RJ	A182-F321, B16.5	
	2" – 24"	Class 900	Weldneck RJ		10
BOLTING	A193 Gr. B7 stud bolts, semi-finished heavy pattern, A194 Gr 2H heavy hex nuts				
GASKETS	321 SS Octagonal Ring, per ASME B16.20				
GATE VALVES	1½" and under	Class 1500	Socketweld/ Threaded	A182-F347 body, BB, OS&Y, graphite packing, API 602, Trim No. 5	11
	2" and above	Class 900	RJ Flanged	A351-CF8C body, BB, OS&Y, graphite packing, Trim No. 5	
GLOBE VALVES	1½" and under	Class 1500	Socketweld/ Threaded	A182-F347 body, BB, OS&Y, graphite packing, API 602, Trim No. 5	11
	2" and above	Class 900	RJ Flanged	A351-CF8C body, BB, OS&Y, graphite packing, Trim No. 5	
CHECK VALVES	1½" and under	Class 1500	Socketweld/ Threaded	A182-F347 body, BC, API 602, Trim No. 5	11
	2" and above	Class 900	RJ Flanged	A351-CF8C body, BC, Trim No. 5	

Line Class: 15SJ1P Service: Refer to Table 10.1 Rating Class: 1500 RJ B16.5 Temperature Limit: -29° C to 510°C Corrosion Allowance: 1.6 mm (9)			Basic Material: 321 S with 347 SS Valves Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	A312 Type 321	
	3" to 24"	Calculate Sch 10 Min.	Seamless	A312 Type 321	
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld	A182-F321, B16.11	10
	2" -24"		Buttweld	A403 WP321, Seamless, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	A403 WP321, Seamless, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	A312 Type 321, Seamless	
Unions					12
Sockolets/ Threadolets	½" to 1½"	Class 6000	Socketweld/ Threaded	A182-F321, MSS-SP-97	
Weldolets	2" and above		Buttweld	A182-F321, MSS-SP-97	10
FLANGES	1½" and under	Class 1500	Socketweld RJ	A182-F321, B16.5	
	2" – 24"	Class 1500	Weldneck RJ		10
BOLTING	A193 Gr. B7 stud bolts, semi-finished heavy pattern, A194 Gr 2H heavy hex nuts				
GASKETS	321 SS Octagonal Ring, per ASME B16.20				
GATE VALVES	1½" and under	Class 1500	Socketweld/ Threaded	A182-F347 body, BB, OS&Y, graphite packing, API 602, Trim No. 5	11
	2" and above	Class 1500	RJ Flanged	A351-CF8C body, BB, OS&Y, graphite packing, Trim No. 5	
GLOBE VALVES	1½" and under	Class 1500	Socketweld/ Threaded	A182-F347 body, BB, OS&Y, graphite packing, API 602, Trim No. 5	11
	2" and above	Class 1500	RJ Flanged	A351-CF8C body, BB, OS&Y, graphite packing, Trim No. 5	
CHECK VALVES	1½" and under	Class 1500	Socketweld/ Threaded	A182-F347 body, BC, API 602, Trim No. 5	11
	2" and above	Class 1500	RJ Flanged	A351-CF8C body, BC, Trim No. 5	

Line Class: 1SL0P Service: Refer to Table 10.1 Rating Class: 150 RF B16.5 Temperature Limit: -29°C to 540°C Corrosion Allowance: 0.0 mm (9)			Basic Material: 347 SS Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	A312 Type 347	
	3" to 24"	Calculate Sch 10S Min.	Seamless or Welded	A312 Type 347 or A358 Gr 347, Class 1	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld	A182-F347, B16.11	10
	2" -24"		Buttweld	A403 WP347, Seamless, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	A403 WP347, Seamless, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	A312 Type 347 Seamless	
Unions					12
Sockolets / Threadolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-F347, MSS-SP-97	
Weldolets	2" and above		Buttweld	A182-F347, MSS-SP-97	10
FLANGES	1½" and under	Class 150	Socketweld RF	A182-F347, B16.5	
	2" -24"	Class 150	Weldneck RF		10
BOLTING	A193 Gr. B16 stud bolts, semi-finished heavy pattern, A194 Gr 4 heavy hex nuts				
GASKETS	Spiral-wound, 347 SS windings, flexible graphite filled with 347 SS inner ring and 316 SS outer ring, per B16.20				16
GATE VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F347 body, BB, OS&Y, graphite packing, API 602, Trim No. 5	11
	2" and above	Class 150	RF Flanged	A351-CF8C body, BB, OS&Y, graphite packing, API 600, Trim No. 5	
GLOBE VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F347 body, BB, OS&Y, graphite packing, API 602, Trim No. 5	11
	2" and above	Class 150	RF Flanged	A351-CF8C body, BB, OS&Y, graphite packing, Trim No. 5	
CHECK VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F347 body, BC, Trim No. 5	11
	2" and above	Class 150	RF Flanged	A351-CF8C body, BC, Trim No. 5	

Line Class: 1SP0P Service: Refer to Table 10.1 Rating Class: 150 RF B16.5 Temperature Limit: -29°C to 315°C Corrosion Allowance: 0.0 mm (9)			Basic Material: Duplex SS UNS N0S32205/S31803 (Uranus 45 N™) Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	A790 S32205/S31803	
	3" to 24"	Calculate Sch 10S Min.			
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld	A182-F51, B16.11	10
	2" -24"		Buttweld	A815-WPS32205/S31803, Seamless, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	A815-WPS32205/S31803, Seamless, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	A790 S31803 Seamless	
Unions					12
Sockolets/ Thredolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-F51, MSS-SP-97	
Weldolets	2" and above		Buttweld	A182-F51, MSS-SP-97	10
FLANGES	1½" and under	Class 150	Socketweld RF	A182-F51, B16.5	10
	2" and above	Class 150	Weldneck RF		
BOLTING	A193 Gr. B7 stud bolts, semi-finished heavy pattern, A194 Gr 2H heavy hex nuts				
GASKETS	Spiral-wound, DUPLEX SS S31803 windings, flexible graphite filled with 316 SS outer ring, per B16.20				
GATE VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F51 body and trim, BB, OS&Y, graphite packing, API 602	11
	2" and above	Class 150	RF Flanged	A890 GR 4A CD3MN body, BB, OS&Y, graphite packing, API 600, A182-F51 body and trim	
GLOBE VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F51 body and trim, BB, OS&Y, graphite packing, API 602	11
	2" and above	Class 150	RF Flanged	A890 GR 4A CD3MN body, BB, OS&Y, graphite packing, A182-F51 body and trim	
CHECK VALVES	1½" and under	Class 800	Socketweld/ Threaded	A182-F51 body and trim, BC	11
	2" and above	Class 150	RF Flanged	A890 GR 4A CD3MN body, BC, A182-F51 body and trim	

Line Class: 1SY0P Service: Refer to Table 10.1 Rating Class: 150 RF B16.5 Temperature Limit: -29°C to 315°C Corrosion Allowance: 0.0 mm (9)			Basic Material: Duplex SS UNS N032750 (Uranus 47 N™) Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	A790 S32750	
	3" to 24"	Calculate Sch 10S Min.			
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld	A182-F53, B16.11	10
	2" and above		Buttweld	A815- WPS32750, Seamless, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	A815- WPS32750, Seamless, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	A790 S32750 Seamless	
Unions					12
Sockolets/ Thredolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-F53, MSS-SP-97	
Weldolets	2" and above		Buttweld	A182-F53, MSS-SP-97	10
FLANGES	1½" and under	Class 150	Socketweld RF	A182-F53, B16.5	10
	2" and above	Class 150	Weldneck RF		
BOLTING	A193 Gr. B7 stud bolts, semi-finished heavy pattern, A194 Gr 2H heavy hex nuts				
GASKETS	Spiral-wound, DUPLEX SS S32750 windings, flexible graphite filled with 316 SS outer ring, per B16.20.				
GATE VALVES	1½" and under	Class 600/800	Socketweld	A182-F53 body and trim, BB, OS&Y, graphite packing, API 602	11
	2" and above	Class 150	RF Flanged	A890 GR 5A CE3MN body, BB, OS&Y, graphite packing, API 600, A182-F53 trim	
GLOBE VALVES	1½" and under	Class 600/800	Socketweld	A182-F53 body and trim, BB, OS&Y, graphite packing, API 602	11
	2" and above	Class 150	RF Flanged	A890 GR 5A CE3MN body, BB, OS&Y, graphite packing, A182-F53 trim	
CHECK VALVES	1½" and under	Class 600/800	Socketweld	A182-F53 body and trim, BC	11
	2" and above	Class 150	RF Flanged	A890 GR 5A CE3MN body, BC, A182-F53 trim	

Line Class: 1SV0P Service: Refer to Table 10.1 Rating Class: 150 RF B16.5 Temperature Limit: -29°C to 315°C Corrosion Allowance: 0.0 mm (9)			Basic Material: Super Austenitic SS UNS S31254 (254 SMO) Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	A312 S31254	
	3" to 24"	Calculate Sch 10S Min.			
FITTINGS					
El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld	A182-F44, B16.11	10
	2" and above		Buttweld	A403- WPS31254, Seamless, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	A403- WPS31254, Seamless, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	A312 S31254 Seamless	
Unions					12
Sockolets/ Thredolets	½" to 1½"	Class 3000	Socketweld/ Threaded	A182-F44, MSS-SP-97	
Weldolets	2" and above		Buttweld	A182-F44, MSS-SP-97	10
FLANGES	1½" and under	Class 150	Socketweld RF	A182-F44, B16.5	10
	2" and above	Class 150	Weldneck RF		
BOLTING	A193 Gr. B7 stud bolts, semi-finished heavy pattern, A194 Gr 2H heavy hex nuts				
GASKETS	Spiral-wound, DUPLEX SS S32750 windings, flexible graphite filled with 316 SS outer ring, per B16.20				
GATE VALVES	1½" and under	Class 600/800	Socketweld	A182-F44 body and trim, BB, OS&Y, graphite packing, API 602	11
	2" and above	Class 150	RF Flanged	A351 GR CK-3MCuN body, BB, OS&Y, graphite packing, API 600, A182-F44 body and trim	
GLOBE VALVES	1½" and under	Class 600/800	Socketweld	A182-F44 body and trim, BB, OS&Y, graphite packing, API 602	11
	2" and above	Class 150	RF Flanged	A351 GR CK-3MCuN body, BB, OS&Y, graphite packing, A182-F44 body and trim	
CHECK VALVES	1½" and under	Class 600/800	Socketweld	A182-F44 body and trim, BC	11
	2" and above	Class 150	RF Flanged	A351 GR CK-3MCuN body, BC, A182-F44 body and trim	

Line Class: 1NM1C Service: Refer to Table 10.1 Rating Class: 150 RF B16.5 Temperature Limit: 0 to 400°C Corrosion Allowance: 1.6 mm (9)			Basic Material: Monel-400, Annealed (2, 8) Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless or welded	B165, (UNS N04400), Annealed Condition B725, (UNS N04400), Annealed Condition	
	3" to 24"	Calculate Sch 10S Min.			
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld	B564 (UNS N04400), Annealed, B16.11	10
	2" and above		Buttweld	B366-WPNC Annealed, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/Threaded	B366-WPNC, Annealed, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/Threaded	B165, (UNS N04400), Annealed	
Unions					12
Sockolets/	½" to 1½"	Class 3000	Socketweld	B564 (UNS N04400), Annealed, MSS SP-97	
Weldolets	2" and above		Buttweld	B564. (UNS N04400), Annealed, MSS SP-97	10
FLANGES	1½" and under	Class 150	Socketweld RF	B564 (UNS N04400), Annealed, B16.5	
BOLTING	A193 Gr. B7 stud bolts, semi-finished heavy pattern, A194 Gr 2H heavy hex nuts				
GASKETS	Spiral-wound, Monel 400 windings, flexible graphite filled with Monel 400 outer and inner rings, per B16.20.				
GATE VALVES	1½" and under	Class 600/800	Socketweld	B564 Gr. NO4400 body, BB, OS&Y, graphite packing, API 602, Trim No. 9	11
	2" and above	Class 150	RF Flanged	A494 Gr. M-35-1body, BB, OS&Y, graphite packing, Trim No. 9	
GLOBE VALVES	1½" and under	Class 600/800	Socketweld	B564-Gr. NO4400 body, BB, OS&Y, graphite packing, API 602, Trim No. 9	11
	2" and above	Class 150	RF Flanged	A494 Gr. M-35-1 body, BB, OS&Y, graphite packing, Trim No. 9	
CHECK VALVES	1½" and under	Class 600/800	Socketweld	B564-Gr. NO4400 body, BC, Trim No. 9	11
	2" and above	Class 150	RF Flanged	A494 Gr. M-35-1 1body, BC, Trim No. 9	

Line Class: 1NR0P Service: Refer to Table 10.1 Rating Class: 150 RF B16.5 Temperature Limit: 0°C to 510°C Corrosion Allowance: 0 mm (9)			Basic Material: Incoloy 800, Annealed Code: B31.3 Stress Relief: SAES-W-011 Examination: SAES-W-011 Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	B407, (UNS N08800), Annealed Condition	
	3" to 8"	Calculate Sch 10S Min.			
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld	B564 (UNS N08800), Annealed, B16.11	10
	2" and above		Buttweld	B366-WPNIC Annealed, Annealed, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	B366-WPNIC, Annealed, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	B407, (UNS N08800), Annealed	
Unions					12
Sockolets/ Threadolets	½" to 1½"	Class 3000	Socketweld/ Threaded	B564 (UNS N08800), Annealed, MSS SP-97	
Weldolets	2" and above		Buttweld	B564. (UNS N08800), Annealed, MSS SP-97	10
FLANGES	1½" and under	Class 150	Socketweld RF	B564 (UNS N08800), Annealed, B16.5	10
BOLTING	A193 Gr. B16 stud bolts, semi-finished heavy pattern, A194 Gr 4 heavy hex nuts				
GASKETS	Nickel 201 octagonal ring, 95 BHN maximum hardness, B16.20				
GATE VALVES	1½" and under	Class 600/800	Socketweld	B564 Gr. NO8800 body, BB, OS&Y, graphite packing, API 602, Trim No. 5	11
	2" and above	Class 150	RF Flanged	A351-CT15C body, BB, OS&Y, graphite packing, Trim No. 5	
GLOBE VALVES	1½" and under	Class 600/800	Socketweld	B564-Gr. NO8800 body, BB, OS&Y, graphite packing, API 602, Trim No. 5	11
	2" and above	Class 150	RF Flanged	A351-CT15C body, BB, OS&Y, graphite packing, Trim No. 5	
CHECK VALVES	1½" and under	Class 600/800	Socketweld	B564-Gr. NO8800 body, BC, Trim No. 5	11
	2" and above	Class 150	RF Flanged	A351-CT15C body, BC, Trim No. 5	

Line Class: 1NS0P Service: Refer to Table 10.1 Rating Class: 150 RF B16.5 Temperature Limit: 0°C to 540°C Corrosion Allowance: 0 mm (9)			Basic Material: Incoloy 825, Annealed Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	B423, (UNS N08825), Annealed Condition	
	3" to 8"	Calculate Sch 10S Min.			
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld	B564 (UNS N08825), Annealed, B16.11	10
	2" and above		Buttweld	B366-WPNICMC Annealed, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	B366-WPNICMC, Annealed, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	B423, (UNS N08825), Annealed, Seamless	
Unions					12
Sockolets/ Threadolets	½" to 1½"	Class 3000	Socketweld/ Threaded	B564 (UNS N08825), Annealed, MSS SP-97	
Weldolets	2" and above		Buttweld	B564. (UNS N08825), Annealed, MSS SP-97	10
FLANGES	1½" and under	Class 150	Socketweld RF	B564 (UNS N08825), Annealed, B16.5	10
	2" and above	Class 150	Weldneck RF		
BOLTING	A193 Gr. B16 stud bolts, semi-finished heavy pattern, A194 Gr 4 heavy hex nuts				
GASKETS	Spiral-wound, Incoloy 825 (UNS N08825) windings, flexible graphite filled with Incoloy 825 inner ring and 316 SS outer ring, per B16.20				
GATE VALVES	1½" and under	Class 600/800	Socketweld	B564 Gr. NO8825 body, BB, OS&Y, graphite packing, API 602, Trim No. 5	11
	2" and above	Class 150	RF Flanged	A494 Gr. CU5MCuC body, BB, OS&Y, graphite packing, Trim No. 5	
GLOBE VALVES	1½" and under	Class 600/800	Socketweld	B564-Gr. NO8825 body, BB, OS&Y, graphite packing, API 602, Trim No. 5	11
	2" and above	Class 150	RF Flanged	A494 Gr. CU5MCuC body, BB, OS&Y, graphite packing, Trim No. 5	
CHECK VALVES	1½" and under	Class 600/800	Socketweld	B564-Gr. NO8825 body, BC, Trim No. 5	11
	2" and above	Class 150	RF Flanged	A494 Gr. CU5MCuC body, BC, Trim No. 5	

Line Class: 1NT1A Service: Refer to Table 10.1 Rating Class: 150 RF B16.5 Temperature Limit: -18 to 66°C Corrosion Allowance: 1.6 mm (9)			Basic Material: Alloy 20 UNS8020 (8) Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	B729 (UNS N08020)	
	3" to 12"	Calculate Sch 10S Min.		Annealed	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld	B462 (UNS N08020), Annealed, B16.11	10
	2" and above		Buttweld	B366-WP20CB, Annealed, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	B366-WP20CB, Annealed, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	B729, (UNS N08020), Annealed, Seamless	
Unions					12
Sockolets/ Threadolets	½" to 1½"	Class 3000	Socketweld/ Threaded	B462 (UNS N08020), Annealed, MSS SP-97	204
Weldolets	2" and above		Buttweld	B462 (UNS N08020), Annealed, MSS SP-97	10
FLANGES	1½" and under	Class 150	Socketweld RF	B462 (UNS N08020), Annealed, B16.5	10
	2" and above	Class 150	Weldneck RF		
BOLTING	A193 Gr. B7 stud bolts, semi-finished heavy pattern, A194 Gr 2H heavy hex nuts				
GASKETS	Full Facem PTFE/Filler Blend, Garlocks' Gylon 3504 or equal, 1/16" thick, ASME B16.21				
GATE VALVES	1½" and under	Class 600/800	Socketweld	B462 Gr. NO8020 body, BB, OS&Y, graphite packing, API 602, Trim No. 13	11
	¾" to 1½"	Class 600/800	Socketweld x Threaded	B462 Gr. NO8020 body, BB, OS&Y, graphite packing, API 602, Trim No. 13	
GLOBE VALVES	2" and above	Class 150	RF Flanged	A351 Gr. CN7M body, BB, OS&Y, graphite packing, API 600, Trim No. 13	11
	2" and above	Class 150	RF Flanged	A351 Gr. CN7M body, BB, OS&Y, graphite packing, Trim No. 13	
CHECK VALVES	1½" and under	Class 600/800	Socketweld	B462-Gr. NO8020 body, BC, Trim No. 13	11
	2" and above	Class 150	RF Flanged	A351 Gr. CN7M body, BC, Trim No. 13	

Line Class: 3NT1A Service: Refer to Table 10.1 Rating Class: 300 RF B16.5 Temperature Limit: -18 to 82°C Corrosion Allowance: 1.6 mm (9)			Basic Material: Alloy 20 UNS8020 (8) Code: B31.3 Stress Relief: Per Code Examination: Per Code Buttweld Construction: B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" to 2"	Sch 40S	Seamless	B729 (UNS N08020)	
	3" to 12"	Calculate Sch 10S Min.		Annealed	
FITTINGS El's, Tees, Reducers, Caps, Couplings, etc.	½" to 1½"	Class 3000	Socketweld	B462 (UNS N08020), Annealed, B16.11	10
	2" and above		Buttweld	B366-WP20CB, Annealed, B16.9	
Swages	½" to 1½"	Sch 40S	Socketweld/ Threaded	B366-WP20CB, Annealed, MSS SP-95	
Nipples	½" to 1½"	Sch 40S	Socketweld/ Threaded	B729, (UNS N08020), Annealed, Seamless	
Unions					12
Sockolets/ Threadolets	½" to 1½"	Class 3000	Socketweld/ Threaded	B462 (UNS N08020), Annealed, MSS SP-97	204
Weldolets	2" and above		Buttweld	B462 (UNS N08020), Annealed, MSS SP-97	10
FLANGES	1½" and under	Class 300	Socketweld RF	B462 (UNS N08020), Annealed, B16.5	10
	2" and above	Class 300	Weldneck RF		
BOLTING	A193 Gr. B7 stud bolts, semi-finished heavy pattern, A194 Gr 2H heavy hex nuts				
GASKETS	Full Facem PTFE/Filler Blend, Garlocks' Gylon 3504 or equal, 1/16" thick, ASME B16.21				
GATE VALVES	1½" and under	Class 600/800	Socketweld	B462 Gr. NO8020 body, BB, OS&Y, graphite packing, API 602, Trim No. 13	11
	¾" to 1½"	Class 600/800	Socketweld x Threaded	B462 Gr. NO8020 body, BB, OS&Y, graphite packing, API 602, Trim No. 13	
GLOBE VALVES	2" and above	Class 300	RF Flanged	A351 Gr. CN7M body, BB, OS&Y, graphite packing, API 600, Trim No. 13	11
	2" and above	Class 300	RF Flanged	A351 Gr. CN7M body, BB, OS&Y, graphite packing, Trim No. 13	
CHECK VALVES	1½" and under	Class 600/800	Socketweld	B462-Gr. NO8020 body, BC, Trim No. 13	11
	2" and above	Class 300	RF Flanged	A351 Gr. CN7M body, BC, Trim No. 13	

11 Line Class Index - Part III (Utility and Nonmetallic)

11.1 [Table 11.1](#) provides the line class index which summarizes: the service applications, primary materials, design pressure/code, temperature range, and valve trim for Part III (Utility and Nonmetallic).

Table 11.1 - Piping Line Classes Index for Part III (Utility and Nonmetallic)

LINE CLASS	SERVICE	MATERIAL	DESIGN PRESSURE/CODE	TEMP RANGE	VALVE TRIM	NOTES
GRAVITY DRAINS						
80DC0D	Gravity drains, oily water for inside/outside buildings, sanitary water for inside buildings	Cast iron soil pipe	Non-Pressure / SAES-S-020 or SAES-S-030 as the service requires	0 to 60°C	See detailed line class	
80PV0D	Sewer outside building, and for plumbing (drain, waste, and vent)	PVC	Non-Pressure / SAES-S-010 or SAES-S-030 as the service requires	0 to 60°C	See detailed line class	
80FE0D	Gravity flow sanitary system	RTR per 01-SAMSS-029	Non-Pressure / SAES-S-020 or SAES-S-030 as the service requires	0 to 49°C	See detailed line class	
80CG0D	Vent piping	Galvanized CS	Non-Pressure / SAES-S-020 and SAES-S-060	18 to 49°C	See detailed line class	
UTILITY PIPING						
1CG0U	Non-corrosive low pressure utilities-air and water, inhibited	Galvanized carbon steel (3" and smaller)	ASME B16.5 Flange rating/ ASME B31.3	0 to 100°C	Trim 8	
1LC0U	Corrosive low pressure utilities	Cement-lined CS	ASME B16.5 Flange rating/ ASME B31.3	See detailed line class	See detailed line class	
1LE0U		Fusion Bonded Epoxy-Lined CS				
1LH0U		HDPE-lined CS				
1LP0U		Polypropylene-lined CS				
1BD0U		90/10 Cu-Ni				
1PV0U		PVC/UPVC				
1PU0U		CPVC				
1FE0U		RTR per 01-SAMSS-034				
1BC0U		Copper tube and fittings with soldered or brazed joints				
PRESSURE PIPING						
99FE0P	Hydrocarbons, Sea Water, Formation Water, Oily Water	RTR per 01-SAMSS-042	Design Pressure or MAOP/ASME B31.3/B31.4/31.8	See detailed line class	See detailed line class	
1LT0P	Corrosive Services	PTFE Lined CS	ASME B16.5 Flange rating/ B31.3/B31.4/31.8	See detailed line class	See detailed line class	

11.2 Detailed Line Classes of Part III (Utility and Nonmetallic)

Line Class: 80DC0D Service: Refer to Table 11.1 Pressure Rating: Non-Pressure Temperature Limit: 60°C Corrosion Allowance: 0 mm			Basic Material: Cast Iron Design Code: Note (1) Stress Relief: Not Required Examination: Note (1) Joint Construction: Per Manufacturer		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	2" - 12"	Service Weight	Single or double hub type	Cast iron soil, ASTM A74 single or double hub, service weight, 60°C max.	(2) (3)
FITTINGS	2" - 12"	Service Weight		Cast iron soil ASTM A74 service weight, 60°C max.	(2) (3)

Notes:

- (1) Per Saudi Aramco [SAES-S-020](#) or [SAES-S-030](#) as the service requires
- (2) Service weight pipe and fittings can be joined to extra heavy pipe and fittings.
- (3) For caulked joints, acid-resisting oakum shall be used.

Line Class: 80PV0D Service: Refer to Table 11.1 Pressure Rating: Non-Pressure Temperature Limit: 60°C Corrosion Allowance: 0 mm			Basic Material: PVC Design Code: Note (1) Examination: Note (1) Joint Construction: Solvent Cement per Manufacturer		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	160 mm - 315 mm	Class 3		uPVC SAS 14/15 Class 3 with Anger joints 60°C max. LOCALLY MADE ARTICLE	(1) (2)
FITTINGS	160 mm - 315 mm	Class 3	Sewer Pattern	uPVC 14/15 Class 3 sewer services fittings with Anger joints 60°C max. LOCALLY MADE ARTICLES	

Notes:

- (1) Per Saudi Aramco [SAES-S-010](#) or [SAES-S-030](#) as the service requires.
- (2) ASTM D3034, Type PSM, PVC pipe and fittings may be used to match existing pipe.

Line Class: 80FE0D Service: Refer to Table 11.1 Pressure Rating: Non-Pressure Temperature Limit: 0 to 49°C Corrosion Allowance: 0 mm			Basic Material: RTR per 01-SAMSS-029 Design Code: Note (1) Examination: Per Manufacturer Joint Construction: Per Manufacturer		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	80 mm - 3700 mm	Refer to 01-SAMSS-029	Refer to 01-SAMSS-029	01-SAMSS-029 RTR sewer pipe and fittings, 0 to 49°C	(2)
FITTINGS AND FLANGES	80 mm - 3700 mm	Refer to 01-SAMSS-029	Refer to 01-SAMSS-029	Shall be made by the Manufacturer supplying the pipe	

Notes:

- (1) Per Saudi Aramco [SAES-S-020](#) or [SAES-S-030](#) as the service requires.
- (2) Use ASTM A307 Grade A or B bolts with ASTM A563 Grade A heavy hex nuts and use washers on both sides for flanges.
 Use 3.2 mm thick full face elastomeric gaskets with 50 to 60 Shore A durometer hardness for all flanges.

Line Class: 80PV0D1 Service: Refer to Table 11.1 Pressure Rating: Non-Pressure Temperature Limit: 60°C Corrosion Allowance: 0 mm			Basic Material: PVC Design Code: SAES-S-060 Stress Relief: Not Required Examination: Per SAES-S-060 Joint Construction: Solvent Cement		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	2" - 8"	Sch. 40	Drain, Waste and Vent Pipe	ASTM D2665 PVC, 60°C	(1)
FITTINGS Bends Elbows Tees Traps Wyes	2" - 8"	Sch. 40	Drain, Waste and Vent Fittings	ASTM D2665 PVC, 60°C ASTM D3311 patterns for solvent cement joints	
SOLVENT CEMENT				ASTM D2564 PVC	

Note:

- (1) See Saudi Aramco Plumbing Code [SAES-S-060](#) for limitations on plastic materials used in plumbing systems.

Line Class: 1CG0U Service: Refer to Table 11.1 Rating Class: 150 FF, ASME B16.1 Temperature Limit: 0 to 100°C Corrosion Allowance: 0 mm			Basic Material: Galvanized/Carbon Steel Design Code: Note (1) Stress Relief: Not Required Examination: Per Applicable Code Buttweld Construction: Note (2)		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE				ASTM A53, ASTM A106 or API 5L	
	3" and smaller	40	Smls, threaded	Gr. B Galvanized	
	4" and 6"	40	Smls or ERW		
	8" - 24"	0.25 in. min.	Smls or ERW		
NIPPLES	3" and smaller	40	Seamless	Gr. B Galvanized	
THREADED FITTINGS Caps Elbows Tees Couplings Plugs	3" and smaller	Class 150		ASME B16.3 malleable iron, galvanized	
Unions	3" and smaller	Class 300		Malleable iron, galvanized, brass seat/ASME B16.39	
Swaged Nipples	3" and smaller	Sch. 80	Seamless	ASTM A53, ASTM A106 or API SPEC 5L Gr. B Galvanized	
Bosses	2" and smaller	Class 3000		Welding, threaded female outlet (AE-036175)	
BUTT WELD FITTINGS Elbows Tees Caps Reducers	4" - 24"	Match pipe		ASME B16.9	
MECHANICAL JOINTS Water Service only	2" and smaller			Dresser style No. 65-B	
	3" - 24"			Dresser style No. 38	
FLANGES Weld Neck or Slip on	4" and 6"	Class 150 FF, Std. bore		B16.5	
	8" - 24"	Class 150 FF		B16.5	
Blinds	4" - 24"	Class 150 FF		B16.5	
Spec. Blinds	4" - 24"	Flat Face		AD-036631 or AD-036633	
GASKETS	4" - 24"			1.6 mm Synthetic fiber	(3)

Line Class 1CG0U (Continued)

Item	NPS	Rating Schedule	Type	Specification	Notes
BOLTING	1¼" and smaller			Mild steel machine bolts/ square heads and hex nuts to ASTM A307, Grade B	
	1½" and larger			ASTM A193 B7 stud bolts, semi-finished, heavy pattern ASTM A194 2H hex nuts	
GATE VALVES	2" and smaller	Class 800	Socketweld/ Threaded	ASTM A105 body, BB, OS&Y, API 602, Trim No.8	
	3" and larger	Class 150	FF Flanged	ASTM A216-WCB body, BB, OS&Y, API 600, Trim No.8	
GLOBE VALVES	2" and smaller	Class 800	Socketweld/ Threaded	ASTM A105 body, BB, OS&Y, Trim No.8	
	3" and larger	Class 150	FF Flanged	ASTM A216-WCB body, BB, OS&Y, Trim No.8	
CHECK VALVES	2" and smaller	Class 800	Socketweld/ Threaded	ASTM A105 body, BC, Trim No.8	
	3" and larger	Class 150	FF Flanged	ASTM A216-WCB body, BC, Trim No.1	
BALL VALVES	2" and smaller	Class 300	Socketweld/ Threaded	ASTM A105 body, floating ball, RTFE seats, Trim No.10	
	3" and 4"	Class 150	FF Flanged	ASTM A216-WCB body, floating ball, RTFE seats, Trim No.10	
	6" and larger	Class 150	FF Flanged	ASTM A216-WCB body, trunnion mounted, Trim ENP	
BUTTERFLY VALVES	4" and larger	200 psig	Wafer or lug	Ductile Iron ASTM A395 body, API 609 Cat.A, Trim ENP	

Notes:

- (1) Select design code in accordance with ASME B31.3 or [SAES-B-017](#) as the service requires.
- (2) Butt welded pipe and fittings per 1CS1P may be substituted for threaded pipe when economic or operating circumstances dictate.
- (3) For flat face flanges use full face gaskets.

Line Class: 1LC0U Service: Refer to Table 11.1 Rating Class: 150 FF ASME B16.5 Temperature Limit: 0 to 100°C Corrosion Allowance: 0 mm			Basic Material: Cement Lined CS Design Code: ASME B31.3 Note (5) Stress Relief: Not Required Examination: Per ASME B31.3 Joint Construction: Note (2, 10, 11, 12)		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	4" and larger	Calculate	Seamless or welded	ASTM A106 or API SPEC 5L, Cement-lined per 01-SAMSS-005	(1) (4)
FITTINGS Elbows Tees Caps Reducers	4" and larger	Calculate to match pipe		02-SAMSS-005 / ASME B16.9	(2) (4)
Sleeve Couplings	4" and larger			Std. Dwg. AE-036768	
FLANGES Weld Neck Slip-on Blinds	4" and larger	Class 150 FF Bore to match pipe		02-SAMSS-011	(3)
GASKETS	4" and larger			1.6 mm, synthetic fiber	
BOLTING				Machine bolts ASTM A307 Gr. A or B	
GATE VALVES	4" and larger	Class 150	FF Flanged	Ductile iron ASTM A395 epoxy lined body, BB, ASTM B61/B62 bronze trim (less than 16% zinc)	(7) (8)
CHECK VALVES	4" and larger	Class 150	FF Flanged	Ductile iron ASTM A395 epoxy lined body, BC, ASTM B61/B62 bronze trim (less than 16% zinc)	
GLOBE VALVES	4" and larger	Class 150	FF Flanged	Ductile iron ASTM A395 epoxy lined body, BB, ASTM B61/B62 bronze trim (less than 16% zinc)	
BUTTERFLY VALVES	4" and larger	200 psig min.	Wafer or Lug or FF Flanged	Ductile iron ASTM A395 rubber lined body, stem packing integral with liner, protected SS stem, AL-BR disc (less than 16% zinc), Monel pins	(6) (9)

Line Class 1LC0U (Continued)

Notes:

- (1) This line class is normally limited to the range of 4 to 30-inch NPS and is used in conjunction with line class 1BD0U or 1BC0U for smaller diameter pipe material.
- (2) Pipe fittings with butt welded pipe pups shall be cement lined per [01-SAMSS-005](#) and installed with sleeve couplings per Standard Drawing [AE-036768](#) or per approved alternative method.
- (3) The raised face shall be removed when matching with flat face flanged valves.
- (4) Welding to cement-lined pipe (e.g., branch connections, vents and drains) requires special consideration and must be planned during the design phase. Contact the Materials Engineering Unit in CSD for welding procedures.
- (5) For non-process services, see SAES-S series for applicable design code.
- (6) Use EPDM lining if no hydrocarbons are present. Otherwise, use NBR lining.
- (7) OS&Y style for above ground valves, ISNRS style with stem extensions for buried valves.
- (8) Wedge may be solid, double-disc, or rubber lined.
- (9) If either the wafer or lug style is selected, the cement lining in the adjacent pipe must be shaved to accommodate the movement of the disc.
- (10) Connections between 12LC0U and 12BD0U or 12BC0U shall be made with an isolation gasket, such as Pikotek or equal, or a dielectric union to prevent galvanic corrosion. Cathodic protection, if provided, must be on separate circuits for the different materials. Care must be taken to assure that the isolated joint is not short-circuited by pipe supports.
- (11) Connections between cement-lined steel pipe and the same size Copper-Nickel pipe shall be made with an isolated, flanged joint in accordance with Standard Drawing [AB-036865](#). The raised face of the cement-lined steel flange shall be machined off to accommodate the connection to the flat-faced Copper-Nickel flange.
- (12) Connections between a larger cement-lined steel header and Copper-Nickel pipe shall be accomplished with special cement-lined, flanged tees with a 4-inch minimum size branch. The flanged branch connection to the Copper-Nickel pipe shall be isolated in accordance with Standard Drawing [AB-036865](#). A Copper-Nickel reducer may then be incorporated to obtain the desired pipe size. Welding bosses shall not be used.

Line Class: 1LE0U Service: Refer to Table 11.1 Rating Class: 150 FF ASME B16.5 Temperature Limit: 0 to 90°C Corrosion Allowance: 0 mm			Basic Material: FBE-Lined CS Design Code: ASME B31.3 Note (1) Stress Relief: Not Required Examination: Per ASME B31.3 Buttweld Construction: ASME B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	2" and larger	Calculate	Seamless or welded	ASTM A106 or API 5L Fusion Bonded Epoxy lined per 09-SAMSS-091 (internal)	(2)
FITTINGS Elbows Tees Caps Reducers	2" and larger	Calculate to match pipe		02-SAMSS-005 / ASME B16.9	
FLANGES Weld Neck Slip-on Blinds	2" and larger	Class 150 FF		02-SAMSS-011 / ASME B16.5/ASME B16.47	
GASKETS	2" and larger			1.6 mm, Synthetic fiber	
BOLTING				Machine bolts ASTM A307 Gr. B or ASME A193 B7 stud bolts semi-finished, heavy pattern A194 Gr. 2H hex nuts	
VALVES	2" and larger	Same as Line Class 1LC0U			

Notes:

- (1) For non-process services, see SAES-S series for applicable design code.
- (2) Welding to FBE-lined pipe (e.g., branch connections, vents and drains) requires special consideration and must be planned during the design phase. Contact the Materials Engineering Unit in CSD for welding procedures.

Line Class: 1LH0U Service: Refer to Table 11.1 Rating Class: 150 FF ASME B16.5 Temperature Limit: Refer to manufacturer Corrosion Allowance: 0 mm			Basic Material: HDPE-Lined CS Design Code: ASME B31.3 Note (1) Stress Relief: Not Required Examination: Per ASME B31.3 Buttweld Construction: ASME B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	2" and larger	Calculate	Seamless or welded	ASTM A106 or API SPEC 5L HDPE lined (internal)	(2)
FITTINGS Elbows Tees Caps Reducers	2" and larger	Calculate to match pipe		02-SAMSS-005 / ASME B16.9	
FLANGES Weld Neck Slip-on Blinds	2" and larger	Class 150 FF		02-SAMSS-011 / ASME B16.5/ASME B16.47	
GASKETS	2" and larger			1.6 mm, Synthetic fiber	
BOLTING				Machine bolts ASTM A307 Gr. B or ASME A193 B7 stud bolts semi-finished, heavy pattern A194 Gr. 2H hex nuts	
VALVES	2" and larger	Same as Line Class 1LC0U			

Notes:

- (1) For non-process services, see SAES-S series for applicable design code.
- (2) Welding to HDPE-lined pipe (e.g., branch connections, vents and drains) requires special consideration and must be planned during the design phase. Contact the Materials Engineering Unit in CSD for welding procedures.

Line Class: 1LP0U Service: Refer to Table 11.1 Rating Class: 150 FF ASME B16.5 Temperature Limit: Refer to manufacturer Corrosion Allowance: 0 mm			Basic Material: Polypropylene-Lined CS Design Code: ASME B31.3 Note (1) Stress Relief: Not Required Examination: Per ASME B31.3 Buttweld Construction: ASME B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	2" and larger	Calculate	Seamless or welded	ASTM A106 or API SPEC 5L Polypropylene lined (internal)	(2)
FITTINGS Elbows Tees Caps Reducers	2" and larger	Calculate to match pipe		02-SAMSS-005 / ASME B16.9	
FLANGES Weld Neck Slip-on Blinds	2" and larger	Class 150 FF		02-SAMSS-011 / ASME B16.5/ASME B16.47	
GASKETS	2" and larger			1.6 mm, Synthetic fiber	
BOLTING				Machine bolts ASTM A307 Gr. B or ASME A193 B7 stud bolts semi-finished, heavy pattern A194 Gr. 2H hex nuts	
VALVES	2" and larger	Same as Line Class 1LC0U			

Notes:

- (1) For non-process services, see SAES-S series for applicable design code.
- (2) Welding to HDPE-lined pipe (e.g., branch connections, vents and drains) requires special consideration and must be planned during the design phase. Contact the Materials Engineering Unit in CSD for welding procedures.

Line Class: 1BD0U Service: Refer to Table 11.1 Rating Class: 150 FF ASME B16.5 Temperature Limit: 0 to 100°C Corrosion Allowance: 0 mm			Basic Material: 90/10 Cu-Ni Design Code: ASME B31.3 Stress Relief: Not Required Examination: Per ASME B31.3 Buttweld Construction: Note (8)		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE/TUBE	½" - 4"	Calculate	Seamless	UNS-C70610 to BS 2871, Part 2 and EEMUA Publication No. 144, Section 1	(1) (2) (3) (4)
FITTINGS	½" - 2"	Match pipe	Socket Weld	90/10 Cu-Ni	(8)
	3" - 4"		Butt Weld	90/10 Cu-Ni	
Plug	½"		Hexagon	90/10 Cu-Ni	
Adapter	16 mm API x ½ Male end for insertion into fitting		Female Thread x Male Socket Weld	90/10 Cu-Ni	
Connectors	½" - 2"		Socket weld, straight, with male threads for connecting Cu-Ni Pipe to Female Threaded Bronze Valves	90/10 Cu-Ni	(5)
FLANGES	2" - 4"	Class 150	Composite, Blind Disc	90/10 Cu-Ni, ASME B16.5 dimensions, 5 mm thick, to BS 2871	(6)
	6" - 16"	Class 150	Composite Slip On	90/10 Cu-Ni (UNS C70610) to BS 2871, Part 2 and EEMUA Publication No. 145, Sections 2.2 and 2.3. 90/10 Cu-Ni inner stub end, ASTM, A105 backing flange, Class 150, Galvanized to BS 729	
BLIND (BLANK)	2" - 4"	Class 150		Forged steel, ASTM A105, Flat Face, Galvanized to BS 729	
GASKETS	1.6 mm			Synthetic fiber	
BOLTING				ASTM A193 B7 Stud Bolts, semi-finished, heavy pattern ASTM A194 2H hex nuts	(7)

Line Class 1BD0U (Continued)

Item	NPS	Rating Schedule	Type	Specification	Notes
GATE VALVES	2" and below	Class 150	Threaded	Bronze body and trim ASTM B61/B62, ISRS, MSS-SP-80	(10)
	3" and above	Class 150	FF Flanged	Bronze ASTM B61/B62 or AL-BR body, trim ASTM B61/B62 or Monel or AL-BR, BB	
GLOBE VALVES	2" and below	Class 150	Threaded	Bronze body and trim ASTM B61/B62, ISRS, MSS-SP-80	(9) (10)
	3" and above	Class 150	FF Flanged	Bronze ASTM B61/B62 or AL-BR body, trim ASTM B61/B62 or Monel or AL-BR, BB	
CHECK VALVES	2" and below	Class 150	Threaded	Bronze body and trim ASTM B61/B62, MSS-SP-80	(9) (10)
	3" and above	Class 150	FF Flanged	Bronze ASTM B61/B62 or AL-BR body, trim ASTM B61/B62 or Monel or AL-BR, BC	
BALL VALVES	2" and below	Class 150	Threaded	Bronze body and trim ASTM B61/B62, TFE seats	(9) (10)
BUTTERFLY VALVES	3" and above	Class 150	wafer or lug or FF Flanged	Bronze ASTM B61/B62 or AL-BR body, trim ASTM B61/B62 or Monel or AL-BR	(9) (10)
FIRE HYDRANT VALVES	2½" x 2½"	300 psi	NPT x hose	Angle type, bronze body, ISRS, renewable SBR disc	
	3" x 2½"	300 psi	NPT x hose	Angle type, bronze body, ISRS, renewable SBR disc	
	4" x 4½"	300 psi	NPT x hose	Angle type, bronze body, ISRS, renewable SBR disc	

Line Class 1BD0U (Continued)

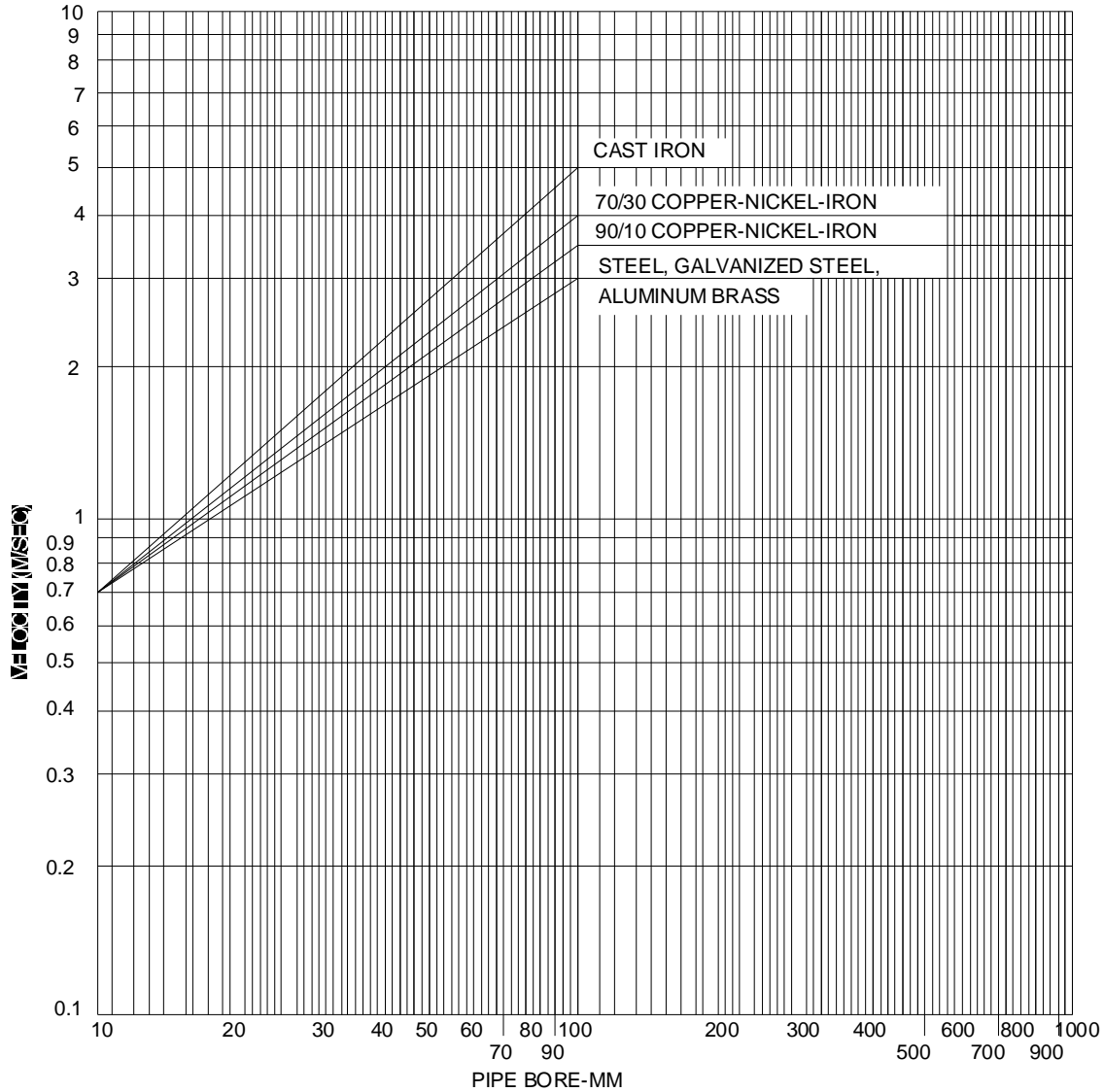
Notes:

- (1) This line class is normally limited to ½ to 4-inch NPS (16 to 108 mm OD). This size is used in conjunction with Specification 1LC0U cement lined pipe 4-inch NPS and larger.
- (2) The terms pipe and tube are used interchangeably in this specification.
- (3) Alternative copper alloy materials may be specified for applications where higher strength or increased erosion resistance is required, such as:
 - 70/30 Copper Nickel, UNS C71500
 - Aluminum Bronze, UNS C61400
- (4) Design Notes for Copper-Nickel Piping Systems:
 - a) The design velocity for liquids in UNS C70610 Cu-Ni pipe is indicated in [Figure 1](#). The layout of pipe bends and valves shall be made to minimize the damaging effects of erosion;
 - b) The piping shall be adequately supported by means of suitable hangers or supports to prevent mechanical damage to the copper-nickel alloy pipe;
 - c) When Copper-Nickel pipe is connected to cement-lined carbon steel pipe systems, insulating flanges or dielectric unions shall be used to prevent galvanic corrosion of the steel. Care shall be taken to assure that the insulated joint is not short-circuited by pipe supports.
 - d) Solid 90/10 Copper Nickel weld neck flanges shall be utilized in the corrosive splash and spray zone. These will have to be DC ordered.
- (5) Straight male connectors are required to allow connection between pipe and female threaded valves, threads shall be lubricated with an anti-galling grease (SAP 9CAT material number 1000174870).
- (6) Solid copper-nickel weld neck flanges rather than composite flanges shall be utilized in the splash zone.
- (7) Consideration shall be given to fluoropolymer coated bolts for offshore applications.
- (8) The GTAW process shall be used for all copper-nickel wall thicknesses less than 4.75 mm. AWS A5.7 Type ERCuNi or ERCuNi-1 consumables are required per [SAES-W-011](#). Type ERCuNi filler rod is available SAP 9CAT material number 1000116221.
- (9) All Copper alloys for valves shall contain a maximum of 16% zinc to avoid dezincification.
- (10) All valves shall have a minimum rating of 200 psi.

Line Class 1BD0U (Continued)

AS DESIGNATED IN LLOYDS RULES AND BSMA 18, FOR CONTINUOUS FLOW (E.G., PROCESS COOLING AND OTHER CONTINUALLY OPERATED SYSTEMS) THE FOLLOWING WATER SPEEDS APPLY:

MAXIMUM SEA WATER VELOCITIES IN PIPES, FOR CONTINUOUS FLOW CONDITIONS *



* WHERE INTERMITTENT TO MAINLY NO-FLOW APPLICATIONS OCCUR, SUCH AS IN FIRE MAINS, WATER SPEEDS OF BETWEEN SIX AND TEN METERS PER SECOND CAN BE ACCEPTABLE, DEPENDENT ON DURATION/FREQUENCY OF SYSTEMS TESTING.

FIGURE 1 - PIPING SPECIFICATION 1BD0U

Line Class: 1PV0U Service: Refer to Table 11.1 Pressure/Temperature Limit: Notes (7),(8) Corrosion Allowance: 0 mm			Basic Material: PVC/UPVC Design Code: ASME B31.3, Note (1) Examination: Per ASME B31.3 Joint Construction: Notes (2) thru (6)		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	20 - 200 mm	Class 5	PVC/uPVC	PVC/uPVC, SAS 14/15 Class 5 Local Made Article	(1) (2)
	½" - 6"	Sch. 80	PVC/uPVC	ASTM D1785 PVC 1120 or 1220	(3)
FITTINGS FOR SOLVENT WELD JOINTS					
Bushings	20 - 200 mm	Class 5	PVC/uPVC	uPVC, SAS 14/15 Class 5	(2)
Couplings	½" - 6"	Sch. 80	PVC/uPVC or CPVC	(0 to 49°C), ASTM F439 Sch. 80 CPVC 4120 (0 to 49°C)	
Elbows					
Tees					
Unions					
Pipe Union	½" - 3"	Sch. 80	CPVC	ASTM F439 CPVC female socket by male IPS adaptor	(4)
DIN X ASTM ADAPTORS	½ in x 20 mm 3 in x 90 mm	Class 5 Sch. 80	PVC/uPVC or CPVC	PVC/uPVC, SAS 14/15 Class 5, Local Made Article	
FLANGES					
Socket Type	¾" - 8"	Class 150 Sch. 80	Flat Face	ASTM F439 CPVC Schedule 80 Class 150 FF	(5)
Threaded Type	½" - 2"	Class 150 Sch. 80	Flat Face	ASTM F437 CPVC Schedule 80 Class 150 FF	(3)
GASKETS	3.2 mm	50-60 Shore A durometer	elastomeric	Full face, elastomeric, 50-60 Shore A durometer	
BOLTING	All Sizes			ASTM A307 Grade A or B bolts with ASTM A563 Grade A heavy hex nuts	(6)
SOLVENT CEMENT				ASTM D2564 PVC to PVC ASTM F-493 CPVC to PVC or CPVC	(9)
VALVES (All Types)	Use 12LC0U and 12BD0U valves				(5)
Ball Valves and Ball Check Valves	½" and above	150 psi	Threaded Socketweld Flanged FF	PVC ASTM D1784 CL. 12454-B or CPVC ASTM D1784 CL. 23447-B body and ball, EPDM seats, double union	

Line Class 1PV0U (Continued)

Notes:

- (1) See Saudi Aramco Plumbing Code [SAES-S-060](#) for material usage within buildings. For non-process services, see SAES-S series for applicable design code.
- (2) ASTM F439 schedule 80 CPVC 4120 fittings may be used with ASTM D1785 pipe. (Use ASTM F-493 CPVC solvent cement). PVC fittings Sch. 80 per ASTM D2467 may also be used with Sch. 80 PVC pipe.
- (3) Threaded pipe shall be derated 50% from the applicable pressure rating. Threaded joints 2-inch and larger shall be seal welded with solvent cement.
- (4) Union adaptors between thermoplastic and metallic pipe have a plastic socket for solvent cementing and a red brass female pipe threaded end.
- (5) Inch dimension flanges and valves shall be used with metric PVC pipe. The exception is in Saudi Aramco-built Home Ownership areas where metric valves are usually used.
 Connections shall be made using DIN X ASME adaptor couplings and inch dimension nipples.
- (6) Use washers on both ends of the bolts. Corrosion protection is required for below ground use. Consideration shall be given to fluoropolymer coated bolts for buried service.
- (7) SAS 14/15 Class 5 PVC has the following ratings: 1600 kPa at 23°C, 992 kPa at 38°C and 640 kPa at 50°C.
- (8) Maximum operating pressures for ASTM D1785 Sch 80 PVC 1120 appear in the table below. PVC 1120, formerly Type I Grade 1 PVC, now meets cell classification PVC 12454-B.

MAXIMUM OPERATING PRESSURE FOR PVC 1120, SCHEDULE 80

Nominal Size Inches	23°C kPa	38°C kPa	49°C kPa
¼	7790	4830	3115
½	5860	3630	2345
¾	4760	2950	1905
1	4340	2690	1735
1-½	3240	2010	1295
2	2760	1710	1105
3	2550	1580	1020
4	2210	1370	885
6	1930	1195	770
8	1720	1065	690

- (9) Solvent cement shall be stored in an air conditioned room at approximately 21°C and shall not be used after the date indicated on the label or one year after date of manufacture.

Line Class: 1PU0U Service: Refer to Table 11.1 Pressure/Temperature Limit: Notes (5) Corrosion Allowance: 0 mm			Basic Material: CPVC Design Code: ASME B31.3, Note (1) Examination: ASME B31.3 Joint Construction: Notes (2) (3)		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	½" - 6"	Sch. 80	CPVC	ASTM F441 CPVC 4120	(2)
FITTINGS FOR SOLVENT WELD JOINTS Bushings Couplings Elbows Tees	½" - 6"	Sch. 80	CPVC	ASTM F439 CPVC 4120, Sch. 80, 0 to 72°C	
Pipe Union	½" - 3"	Sch. 80	CPVC	ASTM F439 CPVC female socket by male IPS adaptor	(3)
FLANGES Socket Type	¾" - 6"	Class 150, Sch. 80	Flat Face	ASTM F439 CPVC, Sch. 80 Class 150 FF	
Threaded Type	½" - 2"	Class 150, Sch. 80	Flat Face	ASTM F437 CPVC Class 150 FF	(2)
GASKETS	3.2 mm	50-60 Shore A durometer	elastomeric	Full face elastomeric, 50-60 Shore A durometer	
BOLTING	All Sizes			ASTM A307 Grade A or B bolts, ASTM A563 Grade A heavy hex nuts	(4)
SOLVENT CEMENT				ASTM F493 CPVC to PVC or CPVC	(6)
VALVES (All Types)	Use 1LC0U and 1BD0U valves				
Ball Valves and Ball Check Valves	½" and above	150 psi	Threaded Socketweld Flanged FF	CPVC ASTM D1784 CL. 23447-B body and ball, EPDM seats, double union	

Line Class 1PU0U (Continued)

Notes:

- (1) See Saudi Aramco Plumbing Code [SAES-S-060](#) for material usage within buildings. For non-process services, see SAES-S series for applicable design code.
- (2) Threaded pipe shall be derated 50% from the applicable pressure rating.
Threaded joints 2 inch and larger shall be seal welded with solvent cement.
- (3) Union adaptors between thermoplastic and metallic pipe have a plastic socket for solvent cementing and a red brass female pipe threaded end.
- (4) Use washers on both ends of the bolts. Corrosion protection is required for below ground use. Consideration shall be given to fluoropolymer coated bolts for buried service.
- (5) Maximum operating pressures appear in the table below. CPVC 4120, formerly Type IV Grade 1 CPVC, now meets cell classification CPVC 23447-B.

MAXIMUM OPERATING PRESSURE FOR CPVC, SCHEDULE 80

Nominal Size Inches	SAP 9CAT	23°C kPa	38°C kPa	60°C kPa	71°C kPa
½	1000001770	5860	4100	3225	2345
¾	1000001773	4760	3330	2620	1905
1	1000001775	4340	3040	2390	1735
1-¼	1000001777	3590	2515	1975	1435
1-½	1000001779	3240	2270	1780	1295
2	1000001781	2760	1930	1520	1105
3	1000001783	2550	1785	1400	1020
4	1000001785	2210	1550	1215	885
6	1000001804	1930	1350	1060	770

- (6) Solvent cement shall be stored in an air conditioned area at approximately 21°C and shall not be used past the date indicated on the label or one year after date of manufacture.

Line Class: 1FE0U Service: Refer to Table 11.1 Pressure Limit: 1030 kPa Temperature Limit: 0 to 93°C Corrosion Allowance: 0 mm			Basic Material: RTR Per 01-SAMSS-034 Design Code: ASME B31.3 Note (1) Stress Relief: None Req'd Examination: Per Manufacturer Joint Construction: Per Manufacturer		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	25 - 3700 mm	Refer to 01-SAMSS-034	Refer to 01-SAMSS-034	01-SAMSS-034 RTR Pipe and Fittings, 0 to 93°C	
FITTINGS and FLANGES	25 - 3700 mm	Refer to 01-SAMSS-034	Refer to 01-SAMSS-034	Shall be made by the Manufacturer supplying the pipe	(2)
GASKETS	3.2 mm	50-60 Shore A durometer	elastomeric	Full face elastomeric, 50-60 Shore A durometer	
BOLTING	All Sizes			ASTM A307 Grade A or B bolts with ASTM A563 Grade A heavy hex nuts	(3)
VALVES	Use 1LC0U or 1BD0U flanged valves				(2)

Notes:

- (1) For non-process services, see SAES-S series for applicable design code.
- (2) Inch-dimension flanges and valves are used with metric RTR pipe.
- (3) Use washers on both ends of the bolts. Corrosion protection is required for below ground use. Consideration shall be given to fluoropolymer coated bolts for buried service.

Line Class: 1BC0U Service: Refer to Table 11.1 Pressure/Temperature Limit: Up to 1034 kPa @ 65°C Corrosion Allowance: 0 mm			Basic Material: Copper Tubing Design Code: ASME B31.3 Note (6) Stress Relief: Not Required Examination: Per ASME B31.3 Joint Construction: Note (1)		
Item	NPS	Rating Schedule	Type	Specification	Notes
TUBE	½" - 3-1/8" O.D. (3/8" - 3" in std. Tube size)	Type "K" or "L"	Plain Ends	Copper, ASTM B88 Type "K" or "L", plain ends	(3) (4) (5)
FITTINGS	½" - 3-1/8" O.D. (3/8" - 3" in std. Tube size)	Type "K" or "L"	Pressure Fittings	Copper, ASME B16.22 For solder or brazed joints	(1)
VALVES	Use threaded 1BD0U valves with adapters or equivalent pattern copper valves.				

Notes:

- | | |
|--|--|
| (1) Service | Brazing Wire |
| Potable Water | AWS Bag-7
AWS BCuP-5 |
| Non-Potable Water
(Including Firewater)
and Instrument Air | AWS Bag-3
AWS Bag-7
AWS BCuP-5 |
| Other Services | Any of the above plus
95/5 tin-antimony solder
50/50 tin-lead solder |
- (2) Maximum temperature/pressure ratings of type L copper tube soldered with 50/50 tin-lead solder follow:
 Up to 65°C: sizes thru 1-in., 1035 kPa; 1½-in. and larger 760 kPa.
 65 to 90°C: sizes thru 1-in., 690 kPa; 1½-in. and larger 520 kPa.
 With 95/5 solder or silver brazing wire, all ratings exceed the requirements for piping specifications in [paragraph 7.3](#).
- (3) Where use of copper tube below ground is justified or required, Type K tube shall be used. Copper will corrode in some soils; wrapping and cathodic protection or external protection with heat-shrink tubing may be required.
- (4) The use of larger diameter copper tubing, although not a stock item, is permissible, or 12BD0U (former 2E1B) tubing may be used as an alternate.
- (5) Flow velocity shall not exceed 1.2 m/s.
- (6) For non-process services, see SAES-S series for applicable design code.

Line Class: 99FE0P Service: Refer to Table 11.1 Pressure Limit: Depend on size, refer to manufacturer specs. Temperature Limit: 0 to 93°C Corrosion Allowance: 0 mm			Basic Material: RTR Per 01-SAMSS-042 Design Code: ASME B31.3 Note (1) Stress Relief: None Req'd Examination: Per Manufacturer Joint Construction: Per Manufacturer		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	25 - 3700 mm	Refer to 01-SAMSS-042	Refer to 01-SAMSS-042	01-SAMSS-042 RTR Pipe and Fittings, 0 to 93°C	
FITTINGS and FLANGES	25 - 3700 mm	Refer to 01-SAMSS-042	Refer to 01-SAMSS-042	Shall be made by the Manufacturer supplying the pipe	(2)
GASKETS	3.2 mm	50-60 Shore A durometer	elastomeric	Full face elastomeric, 50-60 Shore A durometer	
BOLTING	All Sizes			ASTM A307 Grade A or B bolts with ASTM A563 Grade A heavy hex nuts	(3)
VALVES	Use 1LC0U or 1BD0U flanged valves				(2)

Notes:

- (1) ASME B31.4 or ASME B31.8 may be used as per the application.
- (2) Inch-dimension flanges and valves are used with metric RTR pipe.
- (3) Use washers on both ends of the bolts. Corrosion protection is required for below ground use. Consideration shall be given to fluoropolymer coated bolts for buried service.

Line Class: 1LT0P Service: Refer to Table 11.1 Rating Class: 150 RF ASME B16.5 Temperature Limit: Refer to manufacturer Corrosion Allowance: 0 mm			Basic Material: PTFE-Lined CS Design Code: ASME B31.3 Note (1) Stress Relief: Not Required Examination: Per ASME B31.3 Buttweld Construction: ASME B16.25		
Item	NPS	Rating Schedule	Type	Specification	Notes
PIPE	2" and larger	Calculate	Seamless or welded	API 5L Polypropylene lined (internal)	(2)
FITTINGS Elbows Tees Caps Reducers	2" and larger	Calculate to match pipe		02-SAMSS-005 / ASME B16.9	
FLANGES Weld Neck Slip-on Blinds	2" and larger	Class 150 RF		02-SAMSS-011 / ASME B16.5/ASME B16.47	
GASKETS	2" and larger			Gaskets with Teflon sealed, glass reinforced epoxy laminated to 316 stainless steel core	
BOLTING				ASTM A193 B7 stud bolts semi-finished, heavy pattern A194 Gr. 2H hex nuts	
VALVES	2" and larger	Same as Line Class 1LC0U			

Notes:

- (1) ASME B31.4 or ASME B31.8 may be used as per the application.
- (2) Welding to HDPE-lined pipe (e.g., branch connections, vents and drains) requires special consideration and must be planned during the design phase. Contact the Materials Engineering Unit in CSD for welding procedures.

7 July 2013 **Revision Summary**
 Major revision.