

Job No.	MSPP
Doc. No.	SGC-3100-LEZ-002
Rev. No.	В
Date	2024. 12. 16

PIPING MATERIAL SPECIFICATION

Discipline : Piping Team

Project Title : Moorim Steam Piping Project

Location : Ulsan, Korea

Client : MOORIM P&P

	WORK MAY PROCEED. Supplier may proceed with fabrication and construction in accordance to this drawing/documents.
	REVISE AND RESUBMIT. Work may proceed subject to incorporation of changes indicated. Supplier may proceed in accordance with this drawing/document based on marking revisions as commented and resubmit.
	REVISE AND RESUBMIT (WORK MAY NOT
_	PROCEED) Revise as comments and resubmit. Hold fabrication and construction.
	PROCEED) Revise as comments and resubmit. Hold fabrication and construction. RESUBMIT. Not acceptable for image file and reproduction.

В	2024.12.16	Issue For Approval	J.G.KIM	G.T.LEE	S.M.PARK	K.C.ROH	Y.J.HWANG	
Α	2024.11.28	Issue For Approval	J.G.KIM	G.T.LEE	S.M.PARK	K.C.ROH	Y.J.HWANG	
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REVISION LOG

REV. NO.	REV. DATE	REVISED PAGE	REVISION DESCRIPTION
112 110.	NEV. DATE	TEVIOLD I AGE	- Minimum Wall Thickness 기준 변경(#3RB 기준 준수)
В	2024.12.16	6	- Minimum Wall Mickness 기군 한성(#5KB 기군 군구) DN 50 and Smaller : Sch.40 → Sch.80
	202 1112110		DN 300 and Larger : Sch.20 → STD
		37	- P & ID 및 Line Condition 설계에 따른, 관련 내용 수정
		38 ~ 46	- Minimum Wall Thickness 기준 변경에 따른 Schedule 수정 - Line Condition 변경에 따른, 압력 / 온도 수정





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#1 Piping Material Classification





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1. GENERAL

- 1.1. The selection of materials shall be accordance with chapter III of ASME B31.1 and shall be based on the fluid conveyed and the design temperature and pressure. The material of special elements. Such as strainers and steam traps shall be conformed to the requirements of manufacturer's standards for the design conditions. The piping material within the package and/or skid of equipment manufacturers shall be in accordance with the supplier's manufacturing standard.
- 1.2. Pipe and fitting wall thickness shall be calculated in accordance with paragraph 104.1.2 of ASME B31.1. Wall thickness calculations shall be based on the lowest strength component in the system considering all factors including the possibility of pipe and fittings having difference maximum allowable stress value. And/or manufacturer's minus tolerance. Pipe wall thickness calculation shall be based on the design pressure and temperature conditions of the individual line. The same shall be applied to reinforcing.

For Low pressure piping, Pipe schedule / rating should be followed as defined in piping class and branch type according to branch table in 11.2.

- 1.3. Material used in piping shall be equal to or better than the following;
 - A. For design metal temperatures below 405 ℃, carbon steel
 - B. For design metal temperatures above and including 405° °C an approved low alloy steel of the chrome molybdenum type.
 - C. In case of the intermittent design metal temperature rise of $405\,^{\circ}$ C & higher, carbon steel can be used if requirements of paragraph 102.2.4, ASME B31.1 are met.
- 1.4. This specification shall be applied to piping materials indicated on P&ID. Piping systems, however, which are furnished, as a regular part of proprietary or standard equipment(or package facility) shall be in accordance with the equipment suppliers standard.
- 1.5. When the piping is connected to equipment, this specification shall be applied to the extent indicated below;
 - A. Companion flanges, gaskets, bolts and nuts at the equipment nozzle.
 - B.First block valve with companion flanges, gaskets, bolts and nuts in the instrument connecting line.
 - C.Companion flanges, gaskets, bolts and nuts for relief valves.
 - D.Companion flanges, gasket, bolts and nuts at the matching point between the piping furnished as a part of equipment by its supplier and that provided by purchaser.

Note: "First block valve" in instrument connecting line as used here in shall mean the nearest valve to the instrument.





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1.6. This specification shall not be applied to specially designed companion flanges, gaskets, bolts and nuts at the equipment nozzles.

2. CODE & STANDARDS

2.1. Design, fabrication, testing and inspection of piping material shall be accomplished in accordance with the following listed codes and standards including revision and addenda in effect at the time of execution of the contract;

ASME American Society of Mechanical Engineers

ASME B31.1 Power piping ASME B31.3 Process piping

ASTM American Society of Testing and Material

PFI Pipe Fabrication Institute
API American Petroleum Institute

MSS Manufacturers Standardization Society of the Valve and Fitting Industry Inc.

ANSI American National Standards Institute
AWWA American Water Works Association
AISC American Institute of Steel Construction

AWS American Welding Society
SSPC Steel Structures Painting Council

ISO International Standardization for Organization

JIS Japanese Industrial Standards ISA Instrument Society of American

EJMA Expansion Joint Manufacturers Association
TEMA Tubular Exchanger Manufacturers Association

KBC Korean Building Code
KS Korean Industrial Standards

- 2.2. Unless otherwise indicated, all piping design is in accordance with the requirements of ASME B31.1 for Power piping as a main design code.
- 2.3. Related code for non-metallic materials.

A. HDPE : KS M3408 B. UPVC : ASTM D1874

C. GRP : AWWA M45, C905, ASTM D2996

D. CPVC : ASTM D1785

3. GENERAL REQUIREMENT

3.1. Unit

Unless otherwise specified, metric, celsius and kilogram units shall be applied as asurement system except for following;

3.2. Wall thicknesses are expressed as schedule number, unit weight or where no





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schedule number exists, in millimeters.

- 3.3. Nominal pipe size(NPS) express in millimeters or both inches and millimeters.
- 3.4. Flanges bolt diameter express in inches and bolt length in millimeters(ex U5/8 250mmL).
- 3.5. Nominal pressure ratings for flanges, valves, socket and thread fittings, etc. are express in pounds.
- 3.6. Standard material

Material for individual piping components shall conform to the requirements of the applicable Codes and Standards in paragraph. 2.0.

- 3.7. Pipes
- 3.7.1. The buried pipes for carbon steel shall be 3 layer high density PE coated and tape wrapped(for field welding points) or shrinkage sheet based on applicable code and standard
- 3.7.2. Dimensions of pipes shall be in accordance with the following standard.

Welded and seamless steel pipe : ASME B36.10M:
Stainless steel pipe : ASME B36.19M

• Other materials : Relevant code & Standard

3.7.3. The standard pipe sizes shall be used in nominal diameter (DN) as below.

Diameter in DN: 10,15, 20, 25, 40, 50, 65, 80, 100, 150, 200, 250, 300, 350, 400, 450, 500, 550, 600, etc.

3.7.4. Minimum wall thickness of pipe shall be in accordance with the following.

Pipe Size	Minimum Wall Thickness		
	Carbon & Alloy steel	Stainless Steel	
DN 50 and Smaller	Sch.80	Sch.40s	
DN 65 Through 250	Sch.40 / STD	Sch.10s	
DN 300 and Larger	STD	Sch.10s	

- 3.8. Fittings
- 3.8.1. Fitting construction shall be as follows.

DN 50 and smaller : Socket weld/Screwed /Flanged

DN 65 and larger : Butt weld / Flanged



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- 3.8.2. All screwed connections shall have taper threads in accordance with ASME B1.20.1 Pipe threads, General purpose.
- 3.8.3. Unions shall be used only for DN50 and smaller threaded line such as utility water and air system including instrument air and other unless otherwise specified.
- 3.8.4. Long radius elbows shall be generally used for all piping, unless otherwise noted.
- 3.8.5. Dimension shall be as follows;

Factory-made wrought steel buttwelding fittings : ASME B16.9

Forged fitting socket-welding and threaded : ASME B16.11

Buttwelding ends : ASME B16.25

Malleable iron threaded fitting : ASME B16.3

• Wrought steel buttwelding short radius elbows and return : ASME B16.28

Non metallic fitting : Maker's standard

- 3.8.6. Miter bend can be used for DN650 & larger size in ASME CL.150 and lower classes based on requirement of ASME B31.1
- 3.8.7. Swage nipples shall be manufactured in accordance with MSS SP-95, and O-let shall be manufactured in accordance with MSS SP-97.
- 3.9. Flanges
- 3.9.1. Flange ratings, facing, face finish and manufacture shall be as per ASME B16.5 unless otherwise noted. Flanges DN650 & above size shall be manufactured as per ASME B16.47 Series A. For circulating cooling water system, AWWA C207 Class D (Ring type) flange shall only be used.
- 3.9.2. The bore of welding neck flanges shall correspond to the inside diameter of the connecting pipe or fitting.
- 3.9.3. All raised face flanges shall be serrated spiral finished having resultant surface finish 125 ~ 250 AARH.
- 3.9.4. Dimensions of blanks (i.e. Spectacle Blinds), paddle blanks (i.e. Spades or Blind) and paddle spacers (i.e. spacers) shall comply with the requirements of ASME B16.48 for the applicable flange class and facing.
- 3.9.5. For large diameter spacers and blinds not covered by ASME B16.48, the item shall be sized to the requirement of ASME B31.1, Clause 104.5.3, with due allowance for corrosion of the wetted surfaces. All other applicable requirements shall be in accordance with ASME B16.48.



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- 3.9.6. Non metallic flange shall be manufactured in accordance with maker's standard except that bolt related dimension and outside diameter of flange shall conform to paragraph 3.9.1.
- 3.9.7. Dimension shall be as follows;

ASME Class 150 to 2500 (DN600 and under) : ASME B16.5

● ASME Class 150 to 900 (DN650 & over) : ASME B16.47 Series A

ASME Cast Iron Class 125, 250 : ASME B16.1
 AWWA Class D (DN650 to 3000) for CW system : AWWA C207

3.10. Gaskets

- 3.10.1. Limitation dimensions of gaskets other than ring joint suitable for ASME flanges shall be in accordance with ASME B16.5, ANNEX C.
- 3.10.2. Gasket dimensions for flanges larger than DN600 shall be in accordance with the flange standard specified in the individual specification class.
- 3.10.3. All gasket materials shall be asbestos free.
- 3.10.4. Dimensions shall be as follows:

Spiral wound gaskets : ASME B16.20
 Ring joint gasket and grooves : ASME B16.20
 Non-metallic flat gaskets : ASME B16.21

- 3.11. Bolts and Nuts for Flange
- 3.11.1. Bolting materials shall be as specified in each piping material class.
- 3.11.2. The bolts shall have full-length thread and the tips shall be flat finished.
- 3.11.3. Bolts and nuts shall be free burrs, seams, laps, loose scale, irregular surface and any defects affecting their service ability.
- 3.11.4. Dimensional requirements of bolts and nuts for flange connection shall be in accordance with ASME B16.5 Table 1C as follows;

Square and Hex Bolts and Screws (Inch Series) : ASME B18.2.1
 Square and Hex Nuts (Inch Series) : ASME B18.2.2





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Continuous and Double End Studs (Inch Series) : ASME B18.31.2

3.12. Valve

3.12.1. General

- A. Valve assemblies shall be designed for the pressure and temperature ratings of the class specified in the piping material classes and valve list.
- B. Valves shall be tested to comply with the applicable section of ASME B16.34.
- C. Unless otherwise specified, socket weld & screw bores shall conform to ASME B16.11.
- D. Valves DN65 and larger shall be designed so that it shall be possible to replace all packing rings with the operator and yoke in place.
- E. Flanged valves may be used in place of socket welded or screwed valves in DN50 and smaller sizes when mounted directly to vessels and other equipment which has been furnished with flanged connections. Rating of valve(s) must match nozzle connection.
- F. DN25 bleed valve is to be installed between upstream block valve and control valve if the control valve fails open, and two bleed valves (one each side of the control valve) if the control valve fails closed.
- G. Ball, Plug & Butterfly valves even with wrench or Lever operators shall have open position indicators.
- H. All lug type of butterfly and check valves shall be supplied with connection bolts & nuts by supplier.
- I. For wedge type gate valve at 900# and higher pressure ratings, overpressure protection, for example, small relief holes or equalizing line, etc., shall be furnished for discharge of entrapped water
- J. Unless otherwise specified, the bodies of valves shall be forged or cast steel. Gun metal or cast iron valves shall not be used in any fuel or oil/gas system or any feed water or similar system where shock loads could result in sudden fracture.
- K. Valves shall be legibly marked in accordance with MSS SP-25. Each valve shall have a durable metal tag attached to the valve yoke by stainless steel wire, or riveted strap, indicating tag number.
- L. Valve labels shall be circular and fitted under the hand wheel captive nut. For check valves and small valves the Supplier may provide rectangular fitted to the valve or secured close by the valve.
- M. Any valve which is designed uni-directional flow shall have an arrow embossed or cast on the valve body clearly indicating the required flow direction.
- N. All valves shall be fitted with indicators to identify open or shut position of the valves.
- O. Hand-gear operation shall be required for the following valve size and rating.





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ASME Class	Gate	Globe	Ball	Butterfly
150#	DN300 & larger	DN300 & larger	DN250 & larger	DN300 & larger
300#	DN300 & larger	DN300 & larger	DN200 & larger	DN300 & larger
600#	DN250 & larger	DN200 & larger	DN200 & larger	
900#	DN250 & larger	DN200 & larger	DN200 & larger	
1500#	DN150 & larger	DN150 & larger		
2500#	DN150 & larger	DN80 & larger		

- P. Gate valves and globe valves shall be equipped with renewable, integral type hard-faced seats. Seating surfaces of plugs and discs shall be hard-faced. Gate and globe valves shall be arranged for back seating, with surfaces hard faced, to permit repacking under full line pressure with the valve open.
- Q. Double isolating valve for instrument, drain, vent shall be provided on the line of which rating is ASME CL.600 & the above.
- R. Gate valves (600# & above, 2.5" & above) except equipped with relief hole or By-pass valve shall be subjected to both side water tightness test.
- S. Valves shall be fitted with indicators to identify open or shut position of the valves. In the case of valves being fitted with extended spindles, indicators shall be fitted to both the extended spindles and to the valve spindles.

3.12.2. Valve Trim Materials

- A. For carbon steel, carbon molybdenum and low chrome alloy steel valves shall normally be provided with 13-chrome trim (i.e. seat and disc).
- B. Main seats and discs seats shall be hard faced for the gate, globe and check valves unless otherwise specified. The hardfacing material shall be of stellite number 6 or equal composition.

3.12.3. Valve Bonnet or Cover

Bonnet type of gate, globe and Cover type of check valve shall be as follows, unless otherwise specified in applicable Piping Material Class and the Valve List.

Valve Class	DN 65 and Larger	DN 50 and Smaller
ASME 300 Class and Below	Bolted Bonnet	Bolted Bonnet
ASME 600 Class	Pressure Seal Type	Bolted Bonnet
ASME 900 Class and Higher	Pressure Seal Type	Welded Bonnet

3.12.4. Valve Packing for Vacuum Service

Reverse "V" Graphite Packing shall be applied for all vacuum service valves.





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3.12.5. Packing material shall be graphite. Packing shall contain suitable corrosion inhibitor to prevent stem pitting.

3.12.6. Gate Valve

Disc types of gate valve shall be as follows, unless otherwise specified in applicable Piping Material Class and the Valve List.

DN 50 and Smaller : Solid WedgeDN 65 and Larger : Flexible Wedge

3.12.7. Globe Valve

Disc types of globe valve shall be as follows, unless otherwise specified in applicable Piping Material Class and the Valve List

DN 50 and Smaller : Plug typeDN 65 and Larger : Cone type

3.12.8. Check Valve

Disc types of check valve shall be as follows, unless otherwise specified in applicable Piping Material Class and the Valve List.

• DN 50 and Smaller : Lift type for ASME CL.600 and under,

Y-Lift with spring type for ASME CL.900 and above

DN 65 and Larger : Swing type for ASME CL.600 and under,

Tilting type for ASME CL.900 and above

3.12.9. Plug Valve

- A. Normally, Non-lubricated plug valves shall be used, unless otherwise specified in applicable Piping Material Class and the Valve List.
- B. All plug valves shall be a type of flanged end.

3.12.10. Ball Valve

- A. All ball valves shall be furnished in full bore, unless otherwise specified in applicable Piping Material Class and the Valve List.
- B. Ball valve shall be disassembled prior to welding to prevent heat damage to stem packing and seats, when required welding.

3.12.11. For Safety Valves





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- A. Unless otherwise specified all safety valves shall generally be of a proven spring loaded type and make. Pilot operated safety valves are accepted for special applications.
- B. The safety valves shall be of the full lift spring-loaded relief angle type. The open spring casing type shall be restricted to applications for air and saturated steam service. Liquids and high pressure steam shall be relieved by encased relief valves.
- C. All safety valves shall have a test certificate issued by an approved authority.
- D. In Situ pop test (hot conditions with steam pressure reaching the safety valve opening pressure) to be witnessed by the Owner's Representative and by a competent and independent control organism, of all safety valves of at least steam systems (LP, IP, HP, etc) shall be carried out.
- E. The valves shall be fitted with easing gear, wherever applicable

3.12.12. Code and Standard

• Face-to-Face and End-to-End dimensions of valves : ASME B16.10

Buttwelding Ends : ASME B16.25

Valves-Flanged, Threaded and Welding End : ASME B16.34

• Fire Test for Soft-Seated Ball Valves : API 607

- 3.13. Joints
- 3.13.1. Pipe to pipe joints shall be made as follows.

Threaded end pipe : Use threaded coupling

Plain end pipe : Use socket welding coupling

Beveled end pipe : Buttweld

- 3.13.2. All field welding parts for galvanized items shall be touched up with zinc rich epoxy as following procedure.
 - Grinding work with power tool
 - Welding work
 - Surface preparation with power tool (SSPC-SP 3)
 - Painting with metallic zinc rich epoxy primer (DFT 80 ~ 100microns)

3.14. Branches

Branch connections for individual line classification shall be made in accordance





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with table of Paragraph 11.2

- 3.15. Line Reductions
 - A. When reducing in to or from a screwed or socket-weld fitting, use a swage nipple or reduction coupling.
 - B. When reducing in Butt-Welding construction, use a butt-welding reducer.
- 3.16. Post Weld Heat Treatment (PWHT) shall be carried out as required by ASME B31.1.
- 3.17. All carbon-steel pipes shall have a minimum corrosion allowance of 1.6 mm. low alloy steel pipes shall have a minimum corrosion allowance of 0.25mm. Stainless steel pipe and Non-metallic pipe lines does not need any corrosion allowance..
- 3.18. Galvanized items shall be only hot dip galvanized as per ASTM A153.
- 3.19. All valves shall be hydrostatic tested in accordance with ASME B16.34 and the acceptance criteria shall be in accordance with MSS SP-61 except that seat leakage shall not exceed 2cc/hr per inch of nominal valve size(NPS). Butterfly valves size 26" and larger shall be hydrostatic tested and acceptance criteria in accordance with AWWA C504.
- 3.20. All P22 materials shall be performed 10% PMI test as following materials at the vendor shop;
 - Pipes
 - Fittings
 - Flanges
 - Steam Trap
 - Valves (Body, Bonnet, Cover, Stem)
- 3.21. PE coating thickness for U/G piping shall be min. 3mm.
- 3.22. All high and intermediate pressure piping shall be manufactured from hot finished, seamless alloy steel tubing.
- 3.23. All castings are to be homogeneous and as free from blowholes, porosity, voids, under sizing, shrinkage, cracks or other flaws as is practicable. No "burn in", welding, filling, plugging or other repair of defective parts is to be carried out without the prior written approval of the owner's representative.

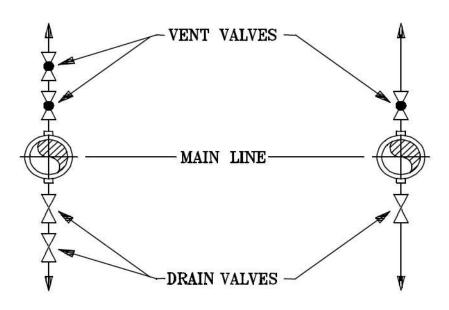




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4. CONNECTIONS

4.1. Vent and Drain Connection



Double Valve Single Valve

	Main Line Size	Valve Size
	DN50A & Smaller	DN20 (Except for DN15 Line)
General Piping	DN65 ~ DN250	DN25
	DN300 & Larger	DN25
Lined Piping	DN65 & Larger	DN50

Notes:

- 1. Detail specification of valves shall be in compliance with the applicable Piping Material Specification.
- 2. Double valve shall be used on all piping classes with pressure temperature rating of 600# & over unless otherwise specified.
- 3. The design drawings will indicate where valve sizes other than the specified size are required.



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- 4. Valves smaller than DN25 shall be used only where the size of main line is DN20 & smaller.
- 5. Connections for lined piping shall be in accordance with "Lined Piping Connections"
- 6. The vent and drain pipe have to install Nipple and Cap(Screw).

5. INSTRUMENT CONNECTION DETAILS

5.1. Pressure & Temperature Instrument Connections

Main Pipe Line Class	Pressure Instrument Connection	Temperature Instrument Connection
2500# and Higher	(Note.3,4)	- Pipe wall thickness greater than 19.05mm(Note.1) - Pipe wall thickness 19.05mm&Less
1500# and 900#	DN20 Socket welding Half coupling (Note.3,4)	(Note.2,3,4) - DN80 and Smaller(Note.2,3,4,5)
600# and Lower	DN20 Socket welding Half coupling (Note.3,4)	- Threaded half-coupling(Note.3,4) - DN80 & smaller(Note.5)
Lined Pipe	See Para 5.9 "Lined piping connection(for rubber or lined piping)"	

Notes:

- 1. Para 5.2 : Thermowell installation detail for nominal pipe wall thickness greater than 19.05mm
- 2. Para 5.3 : Thermowell installation detail for nominal pipe wall thickness 19.05mm & less
- 3. Para 5.4: Half coupling fabrication detail
- 4. Para 5.5: Half coupling installation detail
- 5. Para 5.6: Thermowell installation in DN80 & smaller lines
- 6. Para 5.7: Thermowell installation in DN50 & smaller lines
- 7. Para 5.8: Thermowell material selection chart

General Notes:

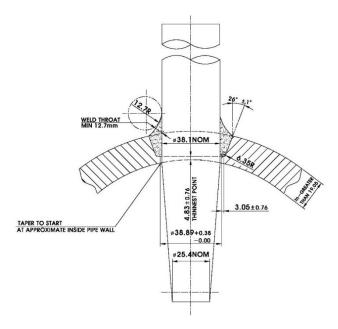
- 1. Half coupling or sockolet material in accordance with piping class sheet.
- 2. Threaded connections may be used only where permitted by piping class sheet.
- 3. Calculations showing adequate reinforcement are required for half-couplings whose nominal size exceeds 1/4 the nominal size of the run for ASME B31.1 piping.
- 4. Pressure class of fitting(i.e., 3000#, 6000#, OR 9000#)in accordance with applicable class sheet.
- 5. Pressure and temperature instrument connections for lined pipe shall be applied in accordance with Para 5.9, Lined piping connection(for rubber or lined piping)





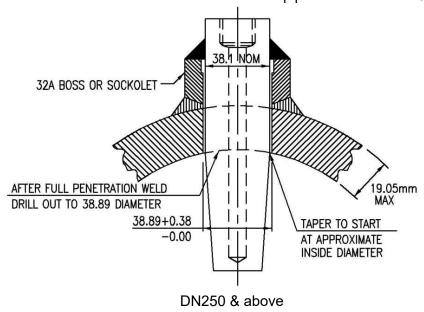
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5.2. Thermowell installation detail for nominal pipe wall thickness greater than 19.05 mm



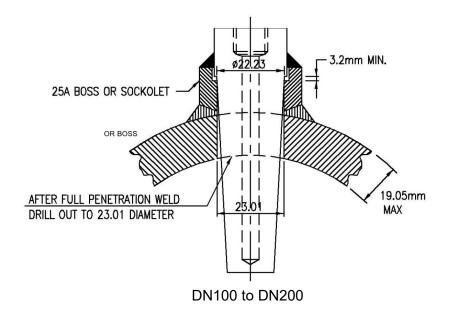
General Notes:

- 1. Weld all around and stress relieve according to the applicable code & standards.
- 2. Thermowell material to the same "P" number of ASME section IX as pipe material.
- 3. Refer to pressure and temperature instrument connection (Para. 5.1)
- 5.3. Thermowell Installation detail for nominal pipe wall thickness 19.05mm & less





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General Notes:

1. For use on : Nominal pipe wall thickness with 19.05 maximum wall.

2. Half Coupling : DN25 fabricated per Para. 5.4, soket Type

3. Thermowell : Material per sheet Para. 5.8

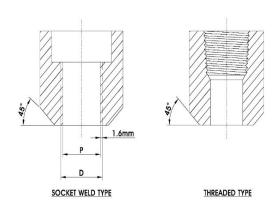
4. Installation : See Para. 5.5 for drill sequence and welding requirements.

Dimension per ASME B16.11 except dimension "D" finish

bore Dia=23.01mm

5. Special : Heat treatment per applicable codes & standards.

5.4. Half coupling fabrication detail



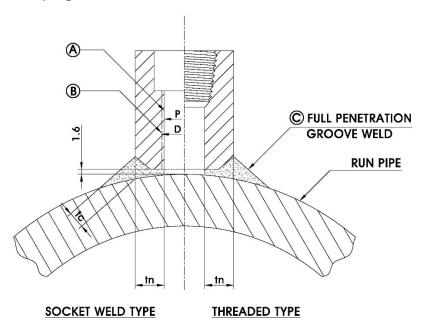
General Notes:

- 1. Socket type half coupling are purchased as blanks. (I,e, no fitting bore "D")
- 2. Fitting dimensions per ASME B16.11 except as shown above.
- 3. Pilot bore diameter(P) equals fitting bore diameter(D) minus 3.2mm
- 4. See installation detail Para. 5.5 for drilling sequence of "P" and "D" dimensions.
- 5. Threaded type half couplings are purchased as standard ASME B16.11 fittings.



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5.5. Half coupling installation detail

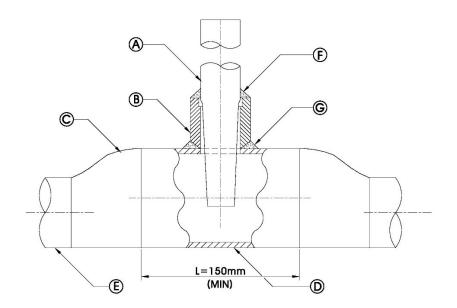


5.5.1. Description of Parts

- A. Bore pilot hole "P" in half coupling prior to fit-up.B. Drill thru finish bore diameter "D" after full penetration weld.(Socket type only)
- C. Full penetration weld, Gas tungsten arc welding(GTAW) not mandatory. tn = Nominal thickness of half coupling wall
 - tc = 0.7tn or 6.35mm whichever is less
- 5.6. Thermowell installation in DN80 & smaller lines



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5.6.1. Description of Parts

- A. Material per Para. 5.8
- B. Half coupling per Para. 5.4 & 5.5
- C. Eccentric or concentric reducer DN100 to run size, butt weld, material per piping class sheet
- D. Pipe DN100 per class sheet, minimum length 150mm
- E. Line pipe, butt weld
- F. Fillet/socket weld per Para. 5.5
- G. Full penetration weld per Para. 5.5

5.6.2. Description of Parts

Vertical lines: Concentric

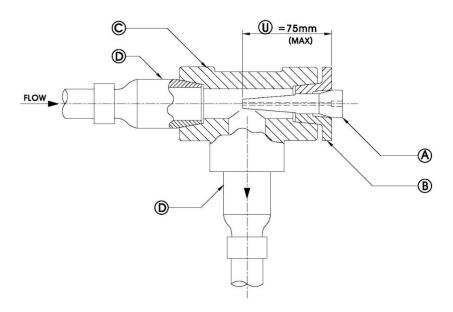
Horizontal lines: Concentric or eccentric

5.7. Thermowell installation in DN80 & smaller lines





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5.7.1. Description of Parts

- A. Material per Para. 5.8
- B. Bushing, threaded type to suit thermowell and line size..
- C. Threaded tee, material per piping class sheet, size DN50
- D. Threaded nipple, used in conjunction with required size reducing coupling.
- E. Reducing coupling, as applicable.
- F. Insertion length (U) = 75mm max.

5.8. Thermowell material selection chart

Pipe material specification		Fittin o	Thermowell	
Pipe II	laterial specification	Fitting	Bar	Forging
Carbon Steel	A53 Gr.B, A106 Gr.B, A106 Gr.C, A672 Gr.C60 CL.13, KS D3562	A105, A234 Gr.WPB, KS B1542/B1533 PH420	A675 Gr.70, A479 Gr.316/316L (Threaded Joint Only)	A105, A182 Gr.F316/316L (Threaded Joint Only)
Low Alloy Steel	A335 Gr.P11, A335 Gr.P22,	A182 Gr.F11, A182 Gr.F22	Not Applicable	A182 Gr.F11, A182 Gr.F22,
Stainless Steel	A312 Gr.TP304/304L A312 Gr.TP316/316L A358 Gr.TP304l CL.1	A182 Gr.F304/304L A182 Gr.F316/316L	A479 Gr.316/316L	A182 Gr.F316/316L,

Notes:

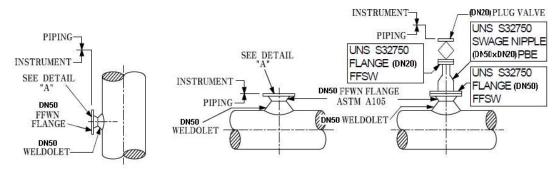
All materials of the above table will be substituted by ASME SA Material For ASME Section $\, \mathbb{I} \,$ and $\, \mathbb{II} \,$ application





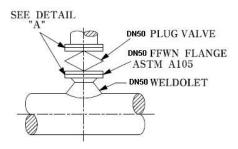
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5.9. Lined piping connection(for rubber or lined piping)

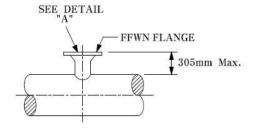


Temperature Instrument Vertical Connection Temperature Instrument Horizontal Connection

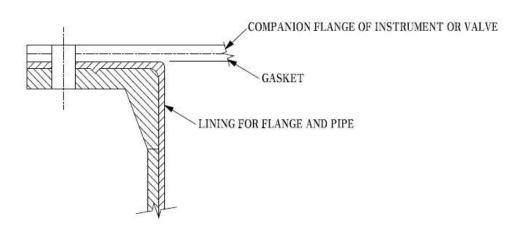
Pressure Connection Instrument



Branch Connection for Vent, Drain and DNSO Pipe



Branch Connection for DN65 and Larger Pipe



Detail "A"

Notes:

- 1. Sharp corners shall be removed before lining.
- 2. The standard shall be submitted to purchaser for approval prior to application.

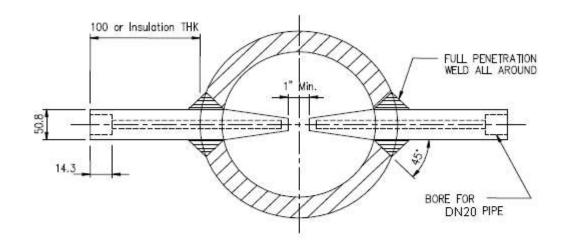


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6. SAMPLE NOZZLE INSTALLATION DETAIL

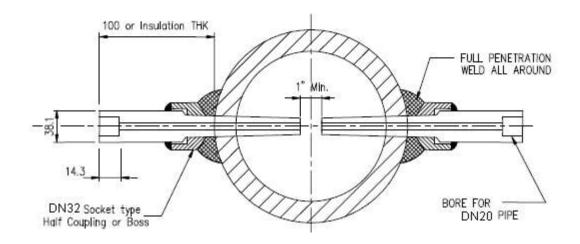
TYPE A

Steam Line for Nominal Pipe Size Larger than DN150 (Nominal Pipe Wall Thickness Greater than 19.05mm)



TYPE B

<u>Steam Line for Nominal Pipe Size Larger than DN</u>150
(Nominal Pipe Wall Thickness 19.05mm & Less)

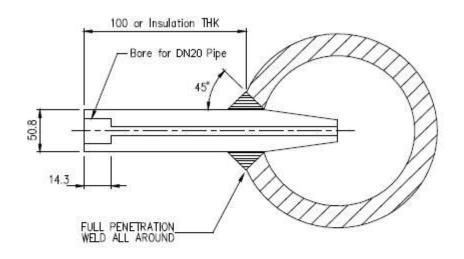




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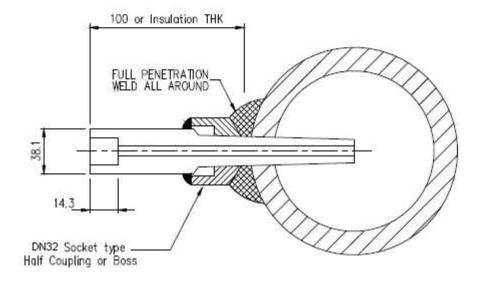
TYPE C

Steam Line for Nominal Pipe Size DN150 & Smaller (Nominal Pipe Wall Thickness Greater than 19.05mm)



TYPE D

Steam Line for Nominal Pipe Size DN150 & Smaller (Nominal Pipe Wall Thickness 19.05mm & less)

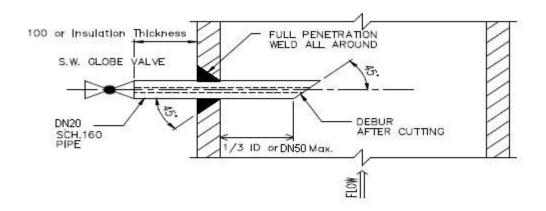




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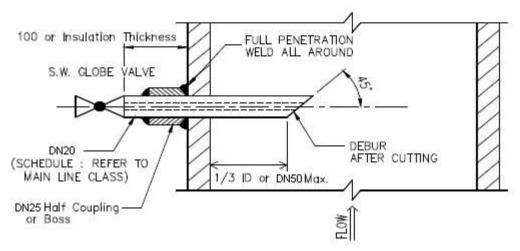
TYPE E

Water Line (Nominal Pipe Wall Thickness Greater than 19.05mm)



TYPE F

Water Line (Nominal Pipe Wall Thickness 19.05mm & less)



Notes:

- 1. For sample nozzle detail, refer to sample nozzle data sheets.
- 2. Nozzle should be installed in lower half of pipe, 45° from bottom and dead center.
- 3. All dimensions are in millimeters.





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7. ABBREVIATIONS

Abbreviations used in this specification are defined as follows.

CODE	ABBREVIATION	DESCRIPTION
A	A/G	Above Ground
A	ANGL GLB	Angle Globe Type
	ANGL GLB	Alloy Steel
В	BB	Bolted Bonnet
В	BE	Beveled Ends
	BHN	Brinelled Hardness Number
	BW	Butt Weld
	B-FLY	
	BALL	Butterfly Valve
		Ball Type
	B&S CL	Bell & Spigot Class
С	CPVC	
		Chlorinate Polyvinyle Chloride Carbon Steel
	CS	
D	DWG	Drawing
E	EFW	Electric Fusion Welding
	ERW	Electric Resistance Welding
F	FB	Full Bore Type
	FF	Full Face (Flat Face)
	FLG	Flange
	FLGD	Flanged
	F to F	Face to Face
	FLX DSC	Flexible Wedge Disc
	FP	Full Port
	F.V	Full Vacuum
G	GALV	Galvanized
	GR	Grade
	GR OP	Gear Operator
	GRP	Glassfibre Reinforced Thermosetting Plastics
	GRE	Glass Reinforced Epoxy
Н	НВ	Brinell Hardness Number symbol per ASTM E10
		(formerly BHN)
	HD	Hardened
	HEX. NUT	Hexagonal Nut
	HF	Hard-faced
	HOR	Horizontal Installation



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CODE	ABBREVIATION	DESCRIPTION
	ADDREVIATION	
	ID	Inside Diameter
	ISNS	Inside Screw and Non-Rising Stem
	ISRS	Inside Screw and Rising Stem
	INTM	Intermittent
L	LIFT	Lift type
	LJ	Lapped (Loose) Joint
	L. DSC	Loose Disc
	LVR OP	Lever Operator
	LR	Long Radius
M	MAT'L	Material
	MAX	Maximum
	MIN	Minimum
	M. BOLT	Machine Bolt
	M & F	Large Male and Female Face
	MFR	Manufacture
	MJ	Mechanical Joint
	MTL ST	Metal seat
N	NB	Non-Bonnet
	NO	Number
	NOM	Nominal
0	OD	Outside Diameter
	OSND	Outside Screw Non-Bonnet
	OS & Y	Outside Screw and Yoke rawing
Р	PSB	Pressure Seal Bonnet
	PSC	Pressure Seal Cap/Cover
	PE	Plain End
	PL	Plate
	PLG DSC	Plug Disc
	PSTN	Piston Type Disc
	PPL	Polypropylene Lined
	PVC	Polyvinyl Chloride
R	R	Radius
	RF	Raised Face
	RL	Rubber Lined
	RP	Reduction Port
	RTJ	Ring Type Joint Face
	RTFE	Reinforced Teflon
S	SB	Screwed Bonnet



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CODE	ABBREVIATION	DESCRIPTION
	SC	Screwed Cap/Cover
	S. BOLT	Stud Bolt
	S. CHECK	Stop Check Valve
	SCR'D	Screwed
	SCH	Schedule
	SMLS	Seamless
	SO	Slip-on Weld
	SW	Socket Weld
	SWING	Swing Type
	SLD WDG	Solid Wedge Disc
	SR	Stress Relieve
	SS	Stainless Steel
	STL	Stellite
	STD	Standard
	SWB	Seal Welded Bonnet
Т	T or THK	Thickness (Inch, mm)
	t & g	Small Tongue and Groove Face
	T & G	Large Tongue and Groove Face
	TE	Threaded End
	TFE	Tetra Fluoro Ethylene
	TFE SLV	TFE Sleeve
	TFE ST	TFE seats
	TFEL	TFE Lining
	TBE	Threaded Both Side End
	THRD	Thread
	TOE	Threaded One Side End
	UB	Union Bonnet
U	UC	Union Cap/Cover
	U/G(UG)	Under Ground
V	VRT	Vertical Installation
	W	Welded Product
	WC	Welded Cap/Cover
W	WN	Welded Neck
	WB	Welded Bonnet
	W. S GATE	Water Seal Gate Valve
Υ	Y TYPE	Y-Type / Y-Pattern



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8. MATERIAL CLASS IDENTIFICATION



- ① Class / Rating
- ② Material
- 3 Material Grade Sequence Number
- 8.1. Class / Rating

:	2500#	ASME B16.5
:	1500#	ASME B16.5
:	900#	ASME B16.5
:	600#	ASME B16.5
:	300#	ASME B16.5
	-	: 1500# : 900# : 600#

150 : 150# ASME B16.5/ B16.47/AWWA C207

8.2. Material

A : Alloy Steel
C : Carbon Steel
S : Stainless Steel

D : DUPLEX S.S (S32205)

H : HDPE

F : PVC / UPVC / CPVC

G : GRP

N : Carbon Steel – Galvanized
 Q : Carbon Steel – PE Coated
 R : Carbon Steel – PTFE Lined
 Z : Stainless Steel – PE Coated

8.3. Material Grade Sequence Number

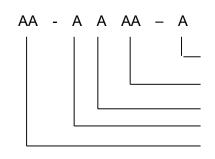
This is a sequential number for the piping material classification.





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9. VALVE MATERIAL CODE NUMBERING



- 5. Suffix(If Necessary)
- 4. Valve Material
- 3. End Connection Type
- 2. Rating
- 1. Valve Type

9.1. Valve Type

GAV Gate Valve Globe Valve GLV CHD Check Valve BAV **Ball Valve** BFV **Butterfly Valve** ANV Angle Valve PLV Plug Valve DPV Diaphragm Valve SAV Safety Valve

Relief Valve

9.2. Rating

REV

- A Special rating as Designated on Class Sheet
- В 2500# **ASME B16.5** С 1500# **ASME B16.5** D 900# **ASME B16.5** Ε 600# **ASME B16.5** F 400# **ASME B16.5** G 300# **ASME B16.5** Н 150# **ASME B16.5**
- X General use as designated on class sheet
- Y General use as designated on class sheet
- Z General use as designated on class sheet

9.3. End Connection Type

- B Butt Welding
- S Socket Welding
- Z Socket Welding x Thread
- P Plane End x Thread
- R Flange(RF)
- F Flange(FF)
- T Thread
- W Wafer



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J RTJ L LUG

9.4. Valve Material

F01	A105 Forged Carbon Steel
F02	A182 F11 Forged Alloy Steel
F03	A182 F22 Forged Alloy Steel
F04	A182 F91 Forged Alloy Steel
F05	A182 F304 Forged Stainless Steel
F06	A182 F304L Forged Stainless Steel
F07	A182 F316 Forged Stainless Steel
F08	A182 F316L Forged Stainless Steel
F11	SF440A Forged Carbon Steel
F12	STS304 Forged Stainless Steel
F13	STS316 Forged Stainless Steel
F51	SA105 Forged Carbon Steel
F52	SA182 F11 Forged Alloy Steel
F53	SA182 F22 Forged Alloy Steel
F54	SA182 F91 Forged Alloy Steel
F55	SA182 F304 Forged Stainless Steel
F56	SA182 F304L Forged Stainless Steel
F57	SA182 F316 Forged Stainless Steel
F58	SA182 F316L Forged Stainless Steel
C01	A216 WCB Cast Carbon Steel
C02	A216 WCC Cast Carbon Steel
C03 C04	A217 WC6 Cost Alloy Steel
C04	A217 WC6 Cast Alloy Steel A217 WC9 Cast Alloy Steel
C05	A217 WC9 Cast Alloy Steel A217 C12A Cast Alloy Steel
C07	A351 CF8 Cast Stainless Steel
C08	A351 CF8M Cast Stainless Steel
C11	SCPH2 Cast Carbon Steel
C12	SSC 13A Cast Stainless Steel
C13	SSC 14A Cast Stainless Steel
C51	SA216 WCB Cast Carbon Steel
C52	SA216 WCC Cast Carbon Steel
C53	SA217 WC1 Cast Alloy Steel
C54	SA217 WC6 Cast Alloy Steel
C55	SA217 WC9 Cast Alloy Steel
C56	SA217 C12A Cast Alloy Steel
C57	SA351 CF8 Cast Stainless Steel
C58	SA351 CF8M Cast Stainless Steel
P01	PVC Poly Vinyl Chloride
P02	CPVC Chlorinated Poly Vinyl Chloride
D01	A395 Duct Iron
D02	GC200 Gray Cast Iron
D03	A126 CL.B Cast Iron

Others Special Material

Z01



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9.5. Suffix(if necessary)

- A Metal to Metal Seat (Inconel Material Seat Ring) Type Butterfly Valve
- B PTFE Seat Type Butterfly Valve
- C EPDM Seat Type Butterfly Valve
- D Rubber Seat Type Butterfly Valve
- E Non Slam Check Valve with Hydraulic Cylinder Type Dampening Device and Counter Weight
- F Dual Plate Check Vale
- G Water Seal Type
- H with Limit Switch
- J Bellows Seal Type or Reversed "V" Packing Type
- K Ball Valve for LNG Piping System, Metal Seat Type Ball Valve (The Valves Shall Be of Approved Product by KOREA GAS SAFETY CORPORATION)
- L Ball Valve for LNG Piping System (The Valves Shall Be of Approved Product by KOREA GAS SAFETY CORPORATION)
- M MSS SP-44 Flanged Valve
- N Check Valve for LNG Piping System (The Valves Shall Be of Approved Product by KOREA GAS SAFETY CORPORATION)
- S Swing Type Check Valve (DN50 and Smaller





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10. SHORT CODE LIST

SHORT CODE	DESIGNATION
Р	Pipe
NPP(3/4/6)	Nipple PBE (? inch) Long
NTT(3/4/6)	Nipple TBE (? inch) Long
NPT(3/4/6)	Nipple TOE (? inch) Long
CPT	Swage Con. PLE x TSE
СВТ	Swage Con. BLE x TSE
СВР	Swage Con. BLE x PSE
CPP	Swage Con. PE
CTT	Swage Con. TE
EPT	Swage PLE x TSE(NPT-M)
EBT	Swage Ecc. BLE x TSE
EBP	Swage Ecc. BLE x PSE
EPP	Swage Ecc. PE
ETT	Swage Ecc. TE
E4	Elbow 45 Deg.
E9	Elbow 90 Deg.
Т	Tee Equal
TR	Tee Reducing
L	Lateral Equal
LR	Lateral Reducing
SE	Stub End
FB	Flange Blind
FB1	Flange Blind for Higher Rating

	T
SHORT CODE	DESIGNATION
RC	Reducer Concentric.
RE	Reducer Eccentric.
С	Сар
FC	Full Coupling
НС	Half Coupling
СТ	Cap Threaded
PL	Plug
U	Union
SO	Sockolet
ТО	Thredolet
EO	Elbolet
WO	Weldolet.
LO	Latrolet
NO	Nipolet
B95	90 DEG Bend, 5D
B48	45 DEG Bend, 8D
18L	Elbow 180 Deg.(LR)
18S	Elbow 180 Deg.(SR)
F	Flange
F1	Flange for Higher Rating
F2	Flange for Higher Rating
AN	Angle Valve
BA	Ball Valve



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SHORT CODE	DESIGNATION						
FF	Flange for Flat Face Type						
FJ	Flange with Jack Screw						
FJ1	Flange with Jack Screw for Higher Rating						
FR	Flange Reducing						
FSB	Figure-8 Blank or Paddle Spacer & Blank						
FSO	Flange Slip-On						
FSW	Flange Socket Weld						
FTH	Flange Screwed						
FWN	Flange Welding Neck						
G	Gasket						
G1	Gasket for Higher Rating						
G2	Gasket for Higher Rating						
GF	Gasket for Full Face Type						
GI	Isolation Kit Set						
В	Bolt & Nut						
STM	Steam Trap						
STL	Steam Trap for Line						
STS	Steam Trap for Tracing						
STE	Steam Trap for Equipment						
AT	Air Trap						
STR	Strainer						
SRB	Strainer Bucket Type						

SHORT CODE	DESIGNATION
SHORT CODE	T
CW	Check Valve Wafer Type
СН	Check Valve
GA	Gate Valve
GAF	Gate Valve Flanged Ends
GAX	Gate Valve SW x TE
GL	Globe Valve
GLF	Globe Valve Flanged Ends
NE	Needle Valve
PA	Plug Valve
BU	Butterfly Valve
DA	Diaphragm Valve
FV	Foot Valve
BDV	Blow Down Valve
BDC	Blow Down Valve (Continue Type)
BDI	Blow Down Valve (Intermittent Type)
SV	Sampling Valve
TDV	Tank Bottom Valve
CHS	
EXT	Extension Stem
EXH	Exhaust Head
DIF	Non-Clog Diffuser
SPN	Spray Nozzle
CHN	Chain Wheel
PIN	Plastic Insulator(Smoother)
IMB	Isolation Mono Block





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	1
SHORT CODE	DESIGNATION
SRC	Strainer Cone Type(Temp.)
SRT	Strainer T-Type
SRY	Strainer Y-Type
SRS	Strainer Special Type
EXP	Expansion Joint
FLX	Flexible Hose
QCU	Quick Conn. for Utility Sys
QC	Quick Connector
QCF	Quick Conn. Female
QCM	Quick Conn. Male
ESW	Safety Shower w/Eye Washer
ES	Safety Shower only
EW	Eye Washer only
CSS	Closed Sampling System
SC	Sample Cooler

SHORT CODE	DESIGNATION
DCO	Dur-O Lock Coupling
DP	Drip Funnel
CLO	Clean Out
TUB	Tube
TUI	Pre-Insulated Tube
T9E	Tube 90 DEG Elbow
T4E	Tube 45 DEG Elbow
TTT	Tube All Tee
TRT	Tube Reducing Tee
TCR	Tube Concentric Reducer
TER	Tube Eccentric Reducer
TFC	Female Tube CONN
TMC	Male Tube CONN
TBU	Tube Union





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11. REDUCING AND BRANCH TABLE

11.1. REDUCING TABLE

Using a range of swages shall be applied DN100 and smaller by MSS SP-95. Reduction coupling (SW) shall be applied up to DN50 as per ASME B16.11. Reducers(BW) shall be in accordance with Table 12 of ASME B16.9 for using size range.

11.2. Branch Table

Branch table shall be as following:

BR-1: Steam and Condensate, Water, Utility for 150# and over

The used code (alphabet) in branch table shall be followed to below criteria

F = Socket Tee

B = Butt Weld Tee

C = Coupling W = Weldolet

S = Sockolet or Half Coupling

* = Butt Weld Tee + Swage Nipple

T = Thread Tee

☐ BR-1 : Steam and Condensate, Water, Utility for 150# and over

	15	F																		
	20	F	F																	
	25	F	F	F																
	50	F	F	F	F															
	65	S	S	S	*	В														
	80	S	S	S	S	В	В													
	100	S	S	S	S	В	В	В												
Щ	150	S	S	S	S	В	В	В	В											
SIZE	200	S	S	S	S	W	W	В	В	В										
RUN	250	S	S	S	S	W	W	В	В	В	В									
_ ₹	300	S S S W W B B	В	В	В															
	350	S	S	S	S	W	W	W	В	В	В	В	В							
	400	S	S	S	Ø	W	W	W	В	В	В	В	В	В						
	450	S	S	S	Ø	W	W	W	W	В	В	В	В	В	В					
	500	S	S	S	Ø	W	W	W	W	В	В	В	В	В	В	В				
	550	S	S	S	Ø	W	W	W	W	W	В	В	В	В	В	В	В			
	600	S	S	S	Ø	W	W	W	W	W	В	В	В	В	В	В	В	В		
	~	S	S	S	S	W	W	W	W	W	W	Т	he crite	ria is A	SME B	16.9 for	TEE si	ze rang	je	
		15	20	25	50	65	80	100	150	200	250	300	350	400	450	500	550	600	~	
BRANCH SIZE																				



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Attachment

#1 Piping Material Classification





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SERVICE SYSTEM INDEX

SERVICE ST							sign dition			
Piping Material Class	Basic Material	Class Rating	Appli- cable Code	C.A (mm)	Line Service	Press (barg)	Temp (°C)	Service	Branch	Remark
150C2A	A106-B	150	ASME	1.6	LSC	5.0	130.0	Condensate Tank to Pump Suction	BR-1	
	SMLS		B31.1			9.7	130.0	Condensate Return from S-Oil to TK		
						9.7	130.0	Condensate after Pump Discharge		
					HSC	5.0	270.0	Reducing Valve Drain after Steam Trap (HPS 3-1)		
						5.0	230.0	MP Steam Main Line Drain to Trench		
300C2A	A106-B SMLS	300	ASME B31.1	1.6	HPS	20.0	370.0	MP Stem (to S-Oil)	BR-1	
	OWLO		D31.1			20.0	370.0 300.0	HPS Reducing Valve Downstream (Transition Piece / HPS 3-1) MP Steam to Silencer		
000004	4.400 B	000	10115	4.0	LIDOO	20.0	300.0	MP Steam Main Line Drain to Steam Trap	DD 4	
600C2A	A106-B SMLS	600	ASME B31.1	1.6	HPS2	41.0	390.0	TBN Extraction Steam (from #RB3)	BR-1	
					LFW	41.0 80.0	390.0 163.0	Reducing Valve Drain to Steam Trap (HPS 3-1) BFP Interstaged Bleed Off (Spray Water)		
					LFVV	80.0	163.0	(from #3RB / HPS 3-1 & 2)		
						55.0	163.0	BFP Interstaged Bleed Off (Spray Water) (from #1RB / HPS 3-3)		
300A2H	A335-P22 SMLS	300	ASME B31.1	0.25	HPS	20.0	370.0	HPS Reducing Valve Downstream (Transition Piece / HPS 3-2 & 3)	BR-1	
	525		20		BSC	5.0	310.0	Reducing Valve Drain to Trench (HPS 3-3)		
600A2H	A335-P22 SMLS	600	ASME B31.1	0.25	HHS3	43.2	413.0	HP Steam (to S-Oil)	BR-1	
	SIVILO		D31.1		BSC	50.0	480.0	Main Steam Drain to #3RB Flash Tank		
						5.0	330.0	Reducing Valve Drain to Trench (HPS 3-2)		
900A1A	A335-P22 SMLS	900	ASME B31.1	0.25	HHS	75.0	470.0	Main Steam (from #PB1 Boiler)	BR-1	
45004011		4500				75.0	470.0	Reducing Valve Drain to Steam Trap (HPS 3-3)		
1500A2H	A335-P22 SMLS	1500	ASME B31.1	0.25	HHS2	101.0	505.0	Main Steam (from #RB3 Boiler)	BR-1	
						101.0	505.0	Main Steam Drain to MOV		
450044	1010	450	10115		2000	101.0	505.0	Reducing Valve Drain to Steam Trap (HPS 3.2)	25.4	
150S1A	A312- TP304	150	ASME B31.1	0	DMW	5.0	70.0	Demi. Water Tank to Pump Suction	BR-1	
	SMLS					15.0 15.0	70.0 70.0	Demi. Water after Pump Discharge (to S-Oil) Demi. Water Min. Flow to Tank		
						15.0	70.0	Samples from Demi. Water		
								·		
						15.0	70.0	Cooling Water to Sample Cooler		
						10.0	70.0	Cooling Water Collect. Tank		
						5.0	70.0	CW Transfer Pump Suction		
						15.0	70.0	CW Transfer Pump Discharge		
						10.0	70.0	Sampling Rack Drain to Trench		
					INA	9.7	70.0	Instrument Air form #3RB INA HDR		
						9.7	70.0	Instrument Air form #1PB INA HDR		
					LSC	9.7	130.0	Samples from Condensate		
300S1A	A312- TP304 SMLS	300	ASME B31.1	0	HPS	20.0	300.0	Samples from MP Steam	BR-1	





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			PRESS.	TEMP.			
SERVICE			(barg)	(°C)	Flange Rating	ASME 150	#
LSC			5.8	103.0	Base Material	CARBON S	STEEL
LSC			9.7	130.0	Design Code	ASME B31	.1
HSC		5.0	270.0	Corrosion Allowance	1.6 mm		
					Branch Table	BR-1	
PIPE AND F	ITTINGS						
ITEM	SIZE (DN)	SCHEDULE/ RATING	MATERIAL	DESCRI	PTION		NOTE
PIPE	15 ~ 50	SCH.80	A106 Gr. B	SMLS P	E		
r IF L	65 ~ 200	STD WT	A106 Gr. B	SMLS B	E		
ELBOW REDUCER TEE	15 ~ 50	CL 3000	A105	SW			
CAP / SWAGE	65 ~ 200	Acc. to pipe	A234 WPB	SMLS B	W		
UNION CPLG	15 ~ 50	CL 3000	A105	SW			
O'LET / BOSS	65 & OVER	Acc. to pipe	A105	BW			
FLANGE	15 ~ 50	CL.150	A105	SWRF, A	ASME B16.5		
FLANGE	65 ~ 200	CL.150	A105	WNRF, ASME B16.5			
GASKET	15 ~ 200	CL.150	304SS Strip with Graphite filler Spiral Wound Gasket, C/S Outer Ring 4.5mm Thk, RF, ASME B16.20				
BOLTING	All		A193 B7 / A194 Stud Bolt /Heavy Hex Nuts with Hot-Dip Galvanized.				
VALVES							
TYPE	SIZE (inch)	BODY MATERIAL	DESCRIPTION				NOTE
	15 ~ 50	A105	ASME 600#, SW, I	3B, OS & Y	1		
GATE	65 ~ 200	A216 WCB	ASME 150#, BW, I	3B, OS & Y	(
	65 ~ 200	A216 WCB	ASME 150#, RF, B	B, OS & Y			
	15 ~ 50	A105	ASME 600#, SW, I	3B, OS & Y	<i>(</i>		
CLORE	15 ~ 50	A105	ASME 600#, SWx	SCRD, BB,	OS & Y		
GLOBE	65 ~ 150	A216 WCB	ASME 150#, BW, I	3B, OS & Y	1		
	65 ~ 200	A216 WCB	ASME 150#, RF, BB, OS & Y				
	15 ~ 50	A105	ASME 600#, SW, I	BC, Lift			
CHECK	65 ~ 200	A216 WCB	ASME 150#, BW, I	BC, Swing			
	65 ~ 200	A216 WCB	ASME 150#, RF, BC, Swing				
	15 ~ 50	A105	ASME 600#, SW(N	NIPP), BB,	OS & Y		
BALL	15 ~ 50	A105	ASME 600#, SW(N	NIPP)xSCR	RD, BB, OS & Y		
	65 ~ 200	A216 WCB	ASME 150#, RF, F	B, Floating	1		
<u>NOTE</u>							





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SERVICE			PRESS. (barg)	TEMP. (°C)	Flange Rating	ASME 300	#
HPS			20.0	370	Base Material	CARBON S	STEEL
HPS			20.0	300	Design Code	ASME B31	.1
					Corrosion Allowance	1.6 mm	
					Branch Table	BR-1	
PIPE AND F	ITTINGS						
ITEM	SIZE (DN)	SCHEDULE/ RATING	MATERIAL	DESCRI	PTION		NOTE
DIDE	15 ~ 50	SCH.80	A106 Gr. B	SMLS PE	≣		
PIPE	65 ~ 250	STD WT	A106 Gr. B	SMLS BE	≣		
	300 ~ 300	STD WT	A106 Gr. B	SMLS BE	=		
ELBOW REDUCER TEE	15 ~ 50	CL 3000	A105	SW			
CAP / SWAGE	65 ~ 300	Acc. to pipe	A234 WPB	SMLS B\	N		
UNION CPLG	15 ~ 50	CL 3000	A105	sw			
O'LET / BOSS	65 & OVER	Acc. to pipe	A105	BW			
	15 ~ 50	CL.300	A105	SWRF, A	SME B16.5		
FLANGE	65 ~ 300	CL.300	A105	WNRF, A	SME B16.5		
GASKET	15 ~ 300	CL.300	304SS Strip with Graphite filler	Spiral Wound Gasket, C/S Outer Ring 4.5mm Thk, RF, ASME B16.20			
BOLTING	All		A193 B7 / A194 2H	Stud Bo Galvaniz	lt /Heavy Hex Nuts w ed.	ith Hot-Dip	
\/A!\/E0							
VALVES			DESCRIPTION				
TYPE	SIZE (inch)	BODY MATERIAL	DESCRIPTION				NOTE
-	SIZE (inch) 15 ~ 50		DESCRIPTION ASME 600#, SW,	BB, OS & Y	,		NOTE
-	, ,	MATERIAL					NOTE
TYPE	15 ~ 50	MATERIAL A105	ASME 600#, SW,	BB, OS & Y			NOTE
TYPE	15 ~ 50 65 ~ 300	MATERIAL A105 A216 WCB	ASME 600#, SW, ASME 300#, BW,	BB, OS & Y BB, OS & Y	,		NOTE
TYPE	15 ~ 50 65 ~ 300 65 ~ 300	MATERIAL A105 A216 WCB A216 WCB	ASME 600#, SW, ASME 300#, BW, ASME 300#, RF, E	BB, OS & Y BB, OS & Y BB, OS & Y	,		NOTE
TYPE	15 ~ 50 65 ~ 300 65 ~ 300 15 ~ 50	MATERIAL A105 A216 WCB A216 WCB A105	ASME 600#, SW, ASME 300#, BW, ASME 300#, RF, E ASME 600#, SW,	BB, OS & Y BB, OS & Y BB, OS & Y SCRD, BB,			NOTE
TYPE	15 ~ 50 65 ~ 300 65 ~ 300 15 ~ 50 15 ~ 50	MATERIAL A105 A216 WCB A216 WCB A105 A105	ASME 600#, SW, ASME 300#, BW, ASME 300#, RF, E ASME 600#, SW, ASME 600#, SWx	BB, OS & Y BB, OS & Y BB, OS & Y SCRD, BB, BB, OS & Y	OS & Y		NOTE
TYPE	15 ~ 50 65 ~ 300 65 ~ 300 15 ~ 50 15 ~ 50	MATERIAL A105 A216 WCB A216 WCB A105 A105 A105	ASME 600#, SW, ASME 300#, BW, ASME 300#, RF, E ASME 600#, SW, ASME 600#, SWx.	BB, OS & Y BB, OS & Y BB, OS & Y SCRD, BB, BB, OS & Y BB, OS & Y	OS & Y		NOTE
TYPE	15 ~ 50 65 ~ 300 65 ~ 300 15 ~ 50 15 ~ 50 65 ~ 150	MATERIAL A105 A216 WCB A216 WCB A105 A105 A105 A105 A216 WCB	ASME 600#, SW, ASME 300#, BW, ASME 300#, RF, E ASME 600#, SW, ASME 600#, RF, E ASME 300#, BW,	BB, OS & Y BB, OS & Y BB, OS & Y SCRD, BB, BB, OS & Y BB, OS & Y BB, OS & Y	OS & Y		NOTE
TYPE GATE GLOBE	15 ~ 50 65 ~ 300 65 ~ 300 15 ~ 50 15 ~ 50 15 ~ 50 65 ~ 150	MATERIAL A105 A216 WCB A216 WCB A105 A105 A105 A216 WCB A216 WCB	ASME 600#, SW, ASME 300#, RF, E ASME 600#, SW, ASME 600#, RF, E ASME 600#, RF, E ASME 300#, RF, E	BB, OS & Y BB, OS & Y BB, OS & Y SCRD, BB, BB, OS & Y BB, OS & Y BB, OS & Y BB, OS & Y	OS & Y		NOTE
TYPE	15 ~ 50 65 ~ 300 65 ~ 300 15 ~ 50 15 ~ 50 15 ~ 50 65 ~ 150 65 ~ 150 15 ~ 50	MATERIAL A105 A216 WCB A216 WCB A105 A105 A105 A216 WCB A216 WCB A216 WCB	ASME 600#, SW, ASME 300#, BW, ASME 300#, RF, E ASME 600#, SW, ASME 600#, RF, E ASME 300#, RF, E ASME 300#, RF, E ASME 600#, SW,	BB, OS & Y BC, Lift BC, Swing	OS & Y		NOTE
TYPE GATE GLOBE	15 ~ 50 65 ~ 300 65 ~ 300 15 ~ 50 15 ~ 50 15 ~ 50 65 ~ 150 15 ~ 50 65 ~ 300	MATERIAL A105 A216 WCB A216 WCB A105 A105 A105 A216 WCB A216 WCB A216 WCB A216 WCB A105	ASME 600#, SW, ASME 300#, BW, ASME 300#, RF, E ASME 600#, SW, ASME 600#, RF, E ASME 300#, BW, ASME 300#, RF, E ASME 300#, RF, E ASME 300#, BW, ASME 300#, BW, ASME 300#, BW,	BB, OS & Y BB, OS & Y BB, OS & Y SCRD, BB, BB, OS & Y BB, OS & Y BB, OS & Y BB, OS & Y BC, Lift BC, Swing BC, Swing	OS & Y		NOTE
TYPE GATE GLOBE CHECK	15 ~ 50 65 ~ 300 65 ~ 300 15 ~ 50 15 ~ 50 15 ~ 50 65 ~ 150 65 ~ 150 15 ~ 50 65 ~ 300	MATERIAL A105 A216 WCB A216 WCB A105 A105 A105 A216 WCB A216 WCB A216 WCB A216 WCB A216 WCB A216 WCB	ASME 600#, SW, ASME 300#, RF, EASME 600#, RF, EASME 600#, RF, EASME 600#, RF, EASME 300#, RF,	BB, OS & Y BB, OS & Y BB, OS & Y SCRD, BB, BB, OS & Y BB, OS & Y BB, OS & Y BB, OS & Y BC, Lift BC, Swing Nipple), FB,	OS & Y		NOTE
TYPE GATE GLOBE	15 ~ 50 65 ~ 300 65 ~ 300 15 ~ 50 15 ~ 50 15 ~ 50 65 ~ 150 65 ~ 150 15 ~ 50 65 ~ 300 65 ~ 300 15 ~ 50	MATERIAL A105 A216 WCB A216 WCB A105 A105 A105 A216 WCB A216 WCB A216 WCB A216 WCB A105 A216 WCB A105 A216 WCB A105	ASME 600#, SW, ASME 300#, BW, ASME 600#, SW, ASME 600#, SW, ASME 600#, RF, EASME 300#, RF, EASME 600#, SW, ASME 300#, RF, EASME 300#, BW, ASME 300#, BW, ASME 300#, RF, EASME 600#, SW, ASME 300#, RF, EASME 600#, SW, ASME 300#, RF, EASME 600#, SW, ASME 300#, RF, EASME 600#, SW(N)	BB, OS & Y BC, Lift BC, Swing Nipple), FB, Pup-Piece),	OS & Y		NOTE



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PIPING C	CLASS – 6	600C2A					
SERVICE		TILLOO.		TEMP. (°C)	Flange Rating	ASME 600#	
HPS2			41.0	390.0	Base Material	CARBON	STEEL
LFW			80.0	163.0	Design Code	ASME B31	.1
LFW			55.0	163.0	Corrosion Allowance	1.6 mm	
					Branch Table	BR-1	
PIPE AND F	ITTINGS		I				I
ITEM	SIZE (DN)	SCHEDULE/ RATING	MATERIAL	DESCRI	PTION		NOTE
DIDE	15 ~ 50	SCH.80	A106 Gr. B	SMLS PI	E		
PIPE	65 ~ 150	STD WT	A106 Gr. B	SMLS BI	E		
ELBOW REDUCER TEE	15 ~ 50	CL 3000	A105	SW			
CAP / SWAGE	65 ~ 150	Acc. to pipe	A234 WPB	SMLS B	W		
UNION CPLG	15 ~ 50	CL 3000	A105	SW			
O'LET / BOSS	65 & OVER	Acc. to pipe	A105	BW			
EL ANCE	15 ~ 50	CL.600	A105	SWRF, A	ASME B16.5		
FLANGE	65 ~ 150	CL.600	A105	WNRF, A	NNRF, ASME B16.5		
GASKET	15 ~ 150	CL.600	304SS Strip with Graphite filler Spiral Wound Gasket, C/S Outer Ring 4.5mm Thk, RF, ASME B16.20				
BOLTING	All		A193 B7 / A194 2H	Stud Bo Galvaniz	olt /Heavy Hex Nuts w ed.	rith Hot-Dip	
VALVES							
TYPE	SIZE (inch)	BODY MATERIAL	DESCRIPTION				NOTE
GATE	15 ~ 50	A105	ASME 600#, SW,	BB, OS & Y	,		
	65 ~ 150	A216 WCB	ASME 600#, BW,	PSB , OS 8	Υ		
	65 ~ 150	A216 WCB	ASME 600#, RF, PSB , OS & Y				
	15 ~ 50	A105	ASME 600#, SW,	BB, OS & Y	,		
01.00=	15 ~ 50	A105	ASME 600#, SWx	SCRD, BB,	OS & Y		
GLOBE	15 ~ 50	A105	ASME 600#, RF, E	3B, OS & Y			
	65 ~ 150	A216 WCB	ASME 600#, BW, PSB, OS & Y				
CUECK	15 ~ 50	A105	ASME 600#, SW, BC, Lift				
CHECK 65 ~ 150 A216 WCB ASME 600#, BW, PSC, Swing							
<u>NOTE</u>							





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PIPING C	CLASS – 3	300A2H					
SERVICE			PRESS. TEMP. (°C)		Flange Rating	ASME 300#	
HPS (Reducing V/V Downstream)			20.0	370.0	Base Material	LOW ALLO)Y(P22)
BSC (Reducing Valve Drain to Trench)		5.0	310.0	Design Code	ASME B31	.1	
					Corrosion Allowance	0.25 mm	
					Branch Table	BR-1	
PIPE AND F	ITTINGS		I				
ITEM	SIZE (DN)	SCHEDULE/ RATING	MATERIAL	DESCRI	IPTION		NOTE
	15 ~ 50	SCH.80	SA335 Gr. P22	SMLS P	E		
PIPE	65 ~ 250	STD WT	SA335 Gr. P22	SMLS B	E		
	300 ~ 300	STD WT	SA335 Gr. P22	SMLS B	E		
ELBOW REDUCER TEE	15 ~ 50	CL 3000	SA182 F22 CL.3	sw			
CAP / SWAGE	65 ~ 300	Acc. to pipe	SA234WP22CL.1	SMLS B	W		
UNION CPLG	15 ~ 50	CL 3000	SA182 F22 CL.3	SW			
O'LET / BOSS	65 & OVER	Acc. to pipe	SA182 F22 CL.3	BW	BW		
EL ANCE	15 ~ 50	CL.300	SA182 F22 CL.3	SWRF, A	ASME B16.5		
FLANGE	65 ~ 300	CL.300	SA182 F22 CL.3		RF, ASME B16.5		
GASKET	15 ~ 300	CL.300	304SS Strip with Thermiculite filler	Spiral Wound Gasket, 304SS Outer Ring 4.5mm Thk, RF, ASME B16.20			
BOLTING	All		SA193-B16/ SA194-3	Stud Bol	It /Heavy Hex Nuts		
VALVES							
TYPE	SIZE (inch)	BODY MATERIAL	DESCRIPTION				NOTE
	15 ~ 50	A182 F22 CL3	ASME 600#, SW,	BB, OS & Y	1		
GATE	65 ~ 250	A217 WC9	ASME 300#, BW,	BB, OS & Y	′		
	300 ~ 300	A217 WC9	ASME 300#, BW, BB, OS & Y, GO				
01.00=	15 ~ 50	A182 F22 CL3	ASME 600#, SW,	BB, OS & Y	<u></u>		
GLOBE	65 ~ 150	A217 WC9	ASME 300#, BW,	BB, OS & Y			
15 ~ 50 A182 F22 CL3		ASME 600#, SW, BC, Lift					
CHECK	65 ~ 300	A216 WC9	ASME 300#, BW, BC, Swing				
NOTE							





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SERVICE			PRESS. (barg)	TEMP. (°C)	Flange Rating	ASME 600	#
HHS3 (HP Ste	eam to S-Oil)		43.2	413.0	Base Material	LOW ALLC	Y(P22)
BSC (Main Steam Drain)		50.0	480.0	Design Code	ASME B31		
BSC (Reducing Valve Drain to Trench)			5.0	330.0	Corrosion Allowance	0.25 mm	
					Branch Table	BR-1	
PIPE AND F	ITTINGS						
ITEM	SIZE (DN)	SCHEDULE/ RATING	MATERIAL	DESCRI	PTION		NOTE
PIPE	15 ~ 50	SCH.80	SA335 Gr. P22	SMLS P	E		
FI FE	65 ~ 200	STD WT	SA335 Gr. P22	SMLS B	E		
ELBOW REDUCER TEE	15 ~ 50	CL 3000	SA182 F22 CL.3	SW			
CAP /SWAGE	65 ~ 200	Acc. to pipe	SA234WP22CL.1	SMLS B	W		
UNION CPLG	15 ~ 50	CL 3000	SA182 F22 CL.3	SW			
O'LET / BOSS	65 & OVER	Acc. to pipe	SA182 F22 CL.3	BW	BW		
FLANGE	15 ~ 50	CL.600	SA182 F22 CL.3	SWRF, A	SWRF, ASME B16.5		
FLANGE	65 ~ 200	CL.600	SA182 F22 CL.3	WNRF, ASME B16.5			
GASKET	15 ~ 200	CL.600	304SS Strip with Spiral Wound Gasket, 304SS Outer Ring 4.5mm Thk, RF, ASME B16.20				
BOLTING	All		SA193-B16/ SA194-3	Stud Bol	t /Heavy Hex Nuts		
VALVES							
TYPE	SIZE (inch)	BODY MATERIAL	DESCRIPTION				NOTE
	15 ~ 50	A182 F22 CL3	ASME 600#, SW,	BB, OS & Y	,		
GATE	65 ~ 200	A217 WC9	ASME 600#, BW,	PSB, OS &	Υ		
	15 ~ 50	A182 F22 CL3	ASME 600#, SW,	BB, OS & Y	,		
GLOBE	65 ~ 150	A217 WC9	ASME 600#, BW, PSB, OS & Y				
	15 ~ 50	A182 F22 CL3	ASME 600#, SW,	BC, Lift			
CHECK	65 ~ 200	A216 WC9	ASME 600#, BW,	PSC, Swing	g		
<u>NOTE</u>	•	•					





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SERVICE	PIPING (JLA33 - 3	JUUAIA	I I		T	1	
Design Code	SERVICE			PRESS. (barg)	TEMP. (°C)	Flange Rating	ASME 900	#
Corrosion Allowance D.25 mm	HHS (Main St	eam from #1PE	Boiler)C	75.0	470.0	Base Material	LOW ALLO	Y(P22)
PIPE AND FITTINGS						Design Code	ASME B31	.1
PIPE AND FITTINGS						Corrosion Allowance	0.25 mm	
ITEM						Branch Table	BR-1	
TEM	PIPE AND F	ITTINGS		I	1			I
PIPE 65 ~ 100 STD WT SA335 Gr. P22 SMLS BE 150 ~ 200 SCH.80 SA335 Gr. P22 SMLS BE ELBOW REDUCER TEE CAP / SWAGE 15 ~ 50 CL 3000 SA182 F22 CL.3 SW UNION CPLG O'LET / BOSS 65 ~ 200 Acc. to pipe SA234WP22CL.1 SMLS BW FLANGE 15 ~ 50 CL 3000 SA182 F22 CL.3 SW 65 & OVER Acc. to pipe SA182 F22 CL.3 BW FLANGE 15 ~ 50 CL.900 SA182 F22 CL.3 SWRF, ASME B16.5 65 ~ 200 CL.900 SA182 F22 CL.3 WNRF, ASME B16.5 GASKET 15 ~ 200 CL.900 SA182 F22 CL.3 Spiral Wound Gasket, 304SS Outer Ring 4.5mm Thk, RF, ASME B16.20 TYPE SIZE (inch) BODY MATERIAL SA194-3 Stud Bolt /Heavy Hex Nuts TYPE SIZE (inch) BODY MATERIAL SA194-3 DESCRIPTION NOT GATE 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WB, OS & Y GLOBE 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WB, OS &	ITEM	SIZE (DN)		MATERIAL	DESCRI	PTION		NOTE
150 ~ 200 SCH.80 SA335 Gr. P22 SMLS BE		15 ~ 50	SCH.80	SA335 Gr. P22	SMLS P	E		
15 ~ 50	PIPE	65 ~ 100	STD WT	SA335 Gr. P22	SMLS B	E		
REDUCER TEE CAP / SWAGE CAP / SWAGE		150 ~ 200	SCH.80	SA335 Gr. P22	SMLS B	E		
CAP / SWAGE 65 ~ 200 Acc. to pipe SA234WP22CL.1 SMLS BW UNION CPLG O'LET / BOSS 15 ~ 50 CL 3000 SA182 F22 CL.3 SW 65 & OVER Acc. to pipe SA182 F22 CL.3 BW FLANGE 15 ~ 50 CL.900 SA182 F22 CL.3 SWRF, ASME B16.5 GASKET 15 ~ 200 CL.900 SA182 F22 CL.3 WNRF, ASME B16.5 SOLTING All SA193-B16/ SA193-B16/ SA194-3 Spiral Wound Gasket, 304SS Outer Ring 4.5mm Thk, RF, ASME B16.20 VALVES TYPE SIZE (inch) BODY MATERIAL DESCRIPTION NOT GATE 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WB, OS & Y NOT GLOBE 15 ~ 50 A182 F22 CL3 ASME 900#, BW, PSB, OS & Y CHECK 15 ~ 50 A182 F22 CL3 ASME 900#, BW, PSB, OS & Y CHECK 15 ~ 50 A182 F22 CL3 ASME 900#, BW, PSB, OS & Y CHECK 15 ~ 50 A182 F22 CL3 ASME 900#, BW, PSB, OS & Y		15 ~ 50	CL 3000	SA182 F22 CL.3	sw			
CPLG O'LET / BOSS 65 & OVER Acc. to pipe SA182 F22 CL.3 BW FLANGE 15 ~ 50 CL.900 SA182 F22 CL.3 SWRF, ASME B16.5 GASKET 15 ~ 200 CL.900 SA182 F22 CL.3 WNRF, ASME B16.5 GASKET 15 ~ 200 CL.900 SA182 F22 CL.3 WNRF, ASME B16.5 BOLTING All SA193-B16/ SA193-B16/ SA194-3 Stud Bolt /Heavy Hex Nuts VALVES TYPE SIZE (inch) BODY MATERIAL MATERIAL SAME 900#, SW, WB, OS & Y NOT GATE 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WB, OS & Y GLOBE 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WB, OS & Y GLOBE 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WB, OS & Y CHECK 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WC, Y-Lift CHECK 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WC, Y-Lift CHECK 65 ~ 200 A216 WC9 ASME 900#, BW, PSC, Tilting		65 ~ 200	Acc. to pipe	SA234WP22CL.1	SMLS B	W		
O'LET / BOSS 65 & OVER Acc. to pipe SA182 F22 CL.3 BW FLANGE 15 ~ 50 CL.900 SA182 F22 CL.3 SWRF, ASME B16.5 GASKET 15 ~ 200 CL.900 SA182 F22 CL.3 WNRF, ASME B16.5 GASKET 15 ~ 200 CL.900 SA182 Strip with Thermiculite filler Thermiculite filler Spiral Wound Gasket, 304SS Outer Ring 4.5mm Thk, RF, ASME B16.20 VALVES TYPE SIZE (inch) BODY MATERIAL DESCRIPTION NOT GATE 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WB, OS & Y ASME 900#, BW, PSB, OS & Y GLOBE 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WB, OS & Y CHECK 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WC, Y-Lift 65 ~ 200 A216 WC9 ASME 900#, BW, PSC, Tilting		15 ~ 50	CL 3000	SA182 F22 CL.3	SW			
FLANGE 65 ~ 200 CL.900 SA182 F22 CL.3 WNRF, ASME B16.5 GASKET 15 ~ 200 CL.900 304SS Strip with Thermiculite filler A.5mm Thk, RF, ASME B16.20 BOLTING All SA193-B16/SA194-3 Stud Bolt /Heavy Hex Nuts VALVES TYPE SIZE (inch) BODY MATERIAL DESCRIPTION NOT GATE 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WB, OS & Y GEOBE 15 ~ 50 A182 F22 CL3 ASME 900#, BW, PSB, OS & Y GLOBE 15 ~ 50 A182 F22 CL3 ASME 900#, BW, PSB, OS & Y CHECK 15 ~ 50 A182 F22 CL3 ASME 900#, BW, PSB, OS & Y CHECK 15 ~ 200 A216 WC9 ASME 900#, BW, PSC, Tilting		65 & OVER	Acc. to pipe	SA182 F22 CL.3	BW	BW		
G5 ~ 200 CL.900 SA182 F22 CL.3 WNRF, ASME B16.5 GASKET 15 ~ 200 CL.900 304SS Strip with Thermiculite filler Spiral Wound Gasket, 304SS Outer Ring 4.5mm Thk, RF, ASME B16.20 BOLTING All	EL ANCE	15 ~ 50	CL.900	SA182 F22 CL.3	SWRF, A	ASME B16.5		
GASKET 15 ~ 200 CL.900 Thermiculite filler 4.5mm Thk, RF, ASME B16.20 BOLTING All SA193-B16/SA194-3 Stud Bolt /Heavy Hex Nuts VALVES TYPE SIZE (inch) BODY MATERIAL DESCRIPTION NOT GATE 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WB, OS & Y GLOBE 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WB, OS & Y CHECK 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WC, Y-Lift CHECK 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WC, Y-Lift CHECK 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WC, Y-Lift CHECK 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WC, Y-Lift CHECK 15 ~ 200 A216 WC9 ASME 900#, BW, PSC, Tilting	FLANGE	65 ~ 200	CL.900	SA182 F22 CL.3		•		
BOLTING All SA194-3 Stud Bolt / Heavy Hex Nuts VALVES TYPE SIZE (inch) BODY MATERIAL DESCRIPTION NOT GATE 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WB, OS & Y GLOBE 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WB, OS & Y CHECK 15 ~ 50 A182 F22 CL3 ASME 900#, BW, PSB, OS & Y CHECK 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WC, Y-Lift CHECK 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WC, Y-Lift CHECK 15 ~ 50 A182 F22 CL3 ASME 900#, BW, PSC, Tilting	GASKET	15 ~ 200	CL.900	Thermiculite filler				
TYPE SIZE (inch) BODY MATERIAL DESCRIPTION NOT GATE 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WB, OS & Y ASME 900#, SW, PSB, OS & Y GLOBE 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WB, OS & Y GHECK 15 ~ 50 A217 WC9 ASME 900#, BW, PSB, OS & Y CHECK 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WC, Y-Lift 65 ~ 200 A216 WC9 ASME 900#, BW, PSC, Tilting	BOLTING	All		Stud Bolt /Hoovy Hoy Nute				
TYPE SIZE (inch) MATERIAL DESCRIPTION NOT GATE 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WB, OS & Y ASME 900#, BW, PSB, OS & Y GLOBE 15 ~ 50 A182 F22 CL3 ASME 900#, BW, PSB, OS & Y CHECK 15 ~ 50 A182 F22 CL3 ASME 900#, BW, PSB, OS & Y CHECK 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WC, Y-Lift 65 ~ 200 A216 WC9 ASME 900#, BW, PSC, Tilting	VALVES							
GATE 65 ~ 200 A217 WC9 ASME 900#, BW, PSB, OS & Y GLOBE 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WB, OS & Y 65 ~ 150 A217 WC9 ASME 900#, BW, PSB, OS & Y CHECK 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WC, Y-Lift 65 ~ 200 A216 WC9 ASME 900#, BW, PSC, Tilting	TYPE	SIZE (inch)	_	DESCRIPTION				NOTE
65 ~ 200 A217 WC9 ASME 900#, BW, PSB, OS & Y 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WB, OS & Y 65 ~ 150 A217 WC9 ASME 900#, BW, PSB, OS & Y CHECK 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WC, Y-Lift 65 ~ 200 A216 WC9 ASME 900#, BW, PSC, Tilting	0.475	15 ~ 50	A182 F22 CL3	ASME 900#, SW,	WB, OS &	Υ		
GLOBE 65 ~ 150 A217 WC9 ASME 900#, BW, PSB, OS & Y CHECK 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WC, Y-Lift 65 ~ 200 A216 WC9 ASME 900#, BW, PSC, Tilting	GAIE	65 ~ 200	A217 WC9	ASME 900#, BW,	PSB, OS &	Υ		
65 ~ 150 A217 WC9 ASME 900#, BW, PSB, OS & Y CHECK 15 ~ 50 A182 F22 CL3 ASME 900#, SW, WC, Y-Lift 65 ~ 200 A216 WC9 ASME 900#, BW, PSC, Tilting		15 ~ 50	A182 F22 CL3	ASME 900#, SW,	WB, OS &	Υ		
65 ~ 200 A216 WC9 ASME 900#, BW, PSC, Tilting	GLOBE	65 ~ 150	A217 WC9					
65 ~ 200 A216 WC9 ASME 900#, BW, PSC, Tilting		15 ~ 50	A182 F22 CL3	ASME 900#, SW,	WC, Y-Lift			
	CHECK	65 ~ 200	A216 WC9]		
<u>NOTE</u>	NOTE							





Job No.	MSPP
Doc. No.	SGC-3100-LEZ-002
Rev. No.	В
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SERVICE			PRESS. TEMP. (°C)		Flange Rating	ASME 1500#			
HHS2 (Main S	Steam from #RI	33 Boiler)	101.0	505.0	Base Material	Y(P22)			
					Design Code ASME B3		1.1		
					Corrosion Allowance	0.25 mm			
					Branch Table	BR-1			
PIPE AND F	ITTINGS		1						
ITEM	SIZE (DN)	SCHEDULE/ RATING	MATERIAL	DESCRI	ESCRIPTION				
	15 ~ 50	SCH.80	SA335 Gr. P22	SMLS PI	E				
PIPE	65 ~ 100	SCH.80	SA335 Gr. P22	SMLS BI	SMLS BE				
	150 ~ 200	SCH.120	SA335 Gr. P22	SMLS BI	E				
ELBOW REDUCER TEE	15~ 50	CL 3000	SA182 F22 CL.3	SW					
CAP / SWAGE	65 ~ 200	Acc. to pipe	SA234WP22CL.1	SMLS B	SMLS BW				
UNION CPLG	15~ 50	CL 3000	SA182 F22 CL.3	SW	SW				
O'LET / BOSS	65 & OVER	Acc. to pipe	SA182 F22 CL.3	BW	BW				
FLANCE	15~ 50	CL.1500	SA182 F22 CL.3	SWRF, ASME B16.5					
LANGE	65 ~ 200	CL.1500	SA182 F22 CL.3	WNRF, A	WNRF, ASME B16.5				
GASKET	15 ~ 200	CL.1500	304SS Strip with Thermiculite filler		Spiral Wound Gasket, 304SS Outer Ring 4.5mm Thk, RF, ASME B16.20				
BOLTING	All		SA193-B16/ SA194-3	Stud Bol	t /Heavy Hex Nuts				
VALVES									
TYPE	SIZE (inch)	BODY MATERIAL	DESCRIPTION				NOTE		
	15 ~ 50	A182 F22 CL3	ASME 1500#, SW, WB, OS & Y						
GATE	65 ~ 100	A217 WC9	ASME 1500#, BW, PSB, OS & Y						
	150 ~ 200	A217 WC9	ASME 1500#, BW, PSB, OS & Y, GO						
CLORE	15 ~ 50	A182 F22 CL3	ASME 1500#, SW, WB, OS & Y						
GLOBE	65 ~ 100	A217 WC9	ASME 1500#, BW, PSB, OS & Y						
CUECK	15 ~ 50	A182 F22 CL3	ASME 1500#, SW, WC, Y-Lift						
CHECK	65 ~ 200	A216 WC9	ASME 1500#, BW	0#, BW, PSC, Tilting					
<u>NOTE</u>									





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SERVICE			PRESS. (barg)	TEMP.	Flange Rating	ASME 15	0#
DMW			15.0	70.0	Base Material	STAINLESS	
INA			9.7	70.0	Design Code	ASME B31.1	
LSC			9.7	130.0	Corrosion	0.0 mm	
					Branch Table	BR-1	
PIPE AND F	ITTINGS	I	I	1			ı
ITEM	SIZE (DN)	SCHEDULE/ RATING	MATERIAL	DESCRIPTION			NOTE
PIPE	10 ~ 50	SCH.40S	A312-TP304	SMLS PE	SMLS PE		
	65 ~ 150	SCH.40S	A312-TP304	WLD BE			
ELBOW REDUCER TEE	10 ~ 50	CL 3000	A182 F304or304L	SW			
CAP / SWAGE	65 ~ 150	Acc. to pipe	A403-WP304	WLD BE			
UNION CPLG	10 ~ 50	CL 3000	A182 F304	SW			
O'LET / BOSS	65 & OVER	Acc. to pipe	A182 F304	BW			
EL ANCE	15 ~ 50	CL.150	A182 F304	SWRF, ASME B16.5			
FLANGE	65 ~ 150	CL.150	A182 F304	WNRF, ASME B16.5			
GASKET	15 ~ 150	CL.150	304SS Strip with Graphite filler	Spiral Wound Gasket, S/S Outer Ring 4.5mm Thk, RF, ASME B16.20			
BOLTING	All		A193-B8CL.2/ A194- 8	Stud Bolt /Heavy Hex Nuts			
VALVES							
TYPE	SIZE (inch)	BODY MATERIAL	DESCRIPTION				NOTE
0.475	15 ~ 50	A182 F304	ASME 600#, SW, BB, 0	OS & Y			
GATE	65 ~ 150	A351 CF8	ASME 150#, RF, BB , 0	ASME 150#, RF, BB , OS & Y			
	15 ~ 50	A182 F304	ASME 600#, SW, BB, OS & Y				
GLOBE	65 ~ 150	A351 CF8	ASME 150#, RF, BB , OS & Y				
	15 ~ 50	A182 F304	ASME 600#, SW, BC, Lift				
OLIE OLI	65 ~ 150	A351 CF8	ASME 150#, RF, BC, S	ASME 150#, RF, BC, Swing			
CHECK			ASME 600#, SW(NiPP), FB, Floating				
CHECK	15 ~ 50	A182 F304		ASME 150#, RF, FB, Floating			
BALL	15 ~ 50 15 ~ 50	A182 F304 A182 F304		loating			





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SERVICE			PRESS. (barg)	TEMP. (°C)	Flange Rating	ASME 300#		
HPS (MP Stea	m Sampling)		20.4	300.0	Base Material STAII		NLESS	
,					Design Code	ASME B3	31.1	
					Corrosion	0.0 mm		
					Branch Table	BR-1		
PIPE AND F	ITTINGS							
ITEM	SIZE (DN)	SCHEDULE/ RATING	MATERIAL	DESCRIPTION			NOTE	
PIPE	15 ~ 50	SCH.40S	A312-TP304or304L	SMLS PE				
ELBOW REDUCER TEE CAP / SWAGE	15 ~ 50	CL 3000	A182 F304or304L	SW				
UNION CPLG O'LET / BOSS	15 ~ 50	CL 3000	A182 F304or304L	sw				
FLANGE	15 ~ 50	CL.300	A182 F304or304L	SWRF, ASME B16.5				
GASKET	15 ~ 50	CL.300	304SS Strip with Graphite filler	Graphite filler 4.5mm Thk, RF, ASME B16.20				
BOLTING	All		A193-B8CL.2/ A194- 8 Stud Bolt /Heavy Hex Nuts					
VALVES								
TYPE	SIZE (inch)	BODY MATERIAL	DESCRIPTION			NOTE		
GATE	15 ~ 50	A182 F304	ASME 600#, SW, BB, OS & Y					
GLOBE	15 ~ 50	A182 F304	ASME 600#, SW, BB, OS & Y					
CHECK	15 ~ 50	A182 F304	ASME 600#, SW, BC, Lift					
	15 ~ 50 A182 F304 ASME 600#, SW(Nipple), FB, Floating			RPTFE SEAT				
BALL	15 ~ 50	A182 F304	ASME 600#, SW(Nipple)xSCRD, FB, Floating				RPTFE SEAT	
NOTE			1					

