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<div style="text-align: center;"> <p>보령 LNG 터미널 신규 주배관(BLT~대천 G/S)</p> <p>EPC 건설공사</p> </div>							
<div style="text-align: center;"> <p>Piping Material Specification</p> </div>							
SCALE	JOB NO.	PHASE	DOCUMENT NO.			REV.	
NONE	BLTA12	-	BLTA12-S-L-809			2	
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RECORD OF REVISION

REV.	PAGE NO.	REVISION DESCRIPTION	REMARKS
A	-	Issue for Approval	-
B	-	Material Class C85A 삭제, C95A 추가 Owner's Comment 반영 (자세한 사항은 Comment Log Sheet 참조)	-
0	-	Issued For Construction - D91A Class에 16" Ball Valve(BW/RJ) 추가 - REV.B에 대한 발주처 Comment 반영 (Comment Log Sheet 참조)	-
1	-	Issued For Construction (Revised As Marked) - D91A1 Class(U/G) 추가 - Attachment #1에 Max. Operating Pressure 추가 - C95A, C95A1의 Design Pressure 7.552MPa추가 - C95A1 3D Bend 두께 변경, 30" Tee 추가 - C85A1 PIPE, 3D Bend 두께 변경 - C95A 3D Bend 삭제	-
2	-	Issued For Construction (Revised As Marked) - Rev.1에 대한 발주처 Comment 반영 (Comment Log Sheet 참조) - IA(A21F) Class 및 Branch Table추가	-

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1. GENERAL

1.1 Intended Scope

This specification applies to piping materials to be used in Boryeong natural gas piping system..

This specification shall be applied to piping materials indicated on Piping & Instrument Diagrams (P&ID). However, piping materials which are furnished as a regular part of proprietary or standardized equipment (or package facility) shall be in accordance with equipment manufacturer's standards considering specific design condition.

1.2 Definition of terms

The following words and expressions shall have the respective meanings as hereby defined, except where the context otherwise requires.

- Owner : Boryeong LNG Terminal Co.,Ltd(BLT).
- EPC Contractor : Korea Gas Technology Corporation(Kogas-tech)
- G/S : Governor Station
- B/V : Block Valve

2. CODES AND STANDARDS

2.1 CODES AND STANDARD

2.1.1 Application codes and standards are as follow:

- ASME (The American Society of Mechanical Engineering)
- ASTM (American Society for Testing and Material)
- API (American Petroleum Institute)
- MSS (Manufacturers Standardization Society)


2.1.2 Unless otherwise specified, all piping shall be designed, fabricated, welded, heat treated (as required), and tested in accordance with the requirement of ASME B31.3/B31.8 and in accordance with all other applicable codes & standards of ASME, ASTM, API and etc.

2.1.3 ASME B31.3/B31.8 shall be of latest issue at the time of letter of intent and other code & standards shall use a version that is specified at latest B31.3/B31.8.

2.1.4 Pipe NPS 1-1/4", 2-1/2", 3-1/2" and 5" shall not be used unless otherwise specified on P&ID. Equipment supplied with connections for these sizes shall be adjusted to a standard size immediately adjacent to equipment by means of a suitable reducing fitting.

2.2 PROJECT SPECIFICATION AND STANDARD

- BLTA12-S-L-803 Specification for Pipe

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- BLTA12-S-L-804 Specification for 3D Bend
- BLTA12-S-L-805 Specification for Fitting
- BLTA12-S-L-806 Specification for Flange
- BLTA12-S-L-807 Specification for Gasket
- BLTA12-S-L-808 Specification for Bolt/Nut
- BLTA12-S-L-809 Specification Ball Valve
- BLTA12-S-L-810 Specification for Ball Valve(Buried Type)
- BLTA12-S-L-825 Specification for Cast Steel Globe Valve

2.3 LOCAL REGULATION

- Urban Gas Business Act(도시가스사업법, 2020)
- Safety Control and Business Regulation of Liquefied Petroleum Gas Act(액화석유가스의 안전관리 및 사업법, 2019)
- High-Pressure Gas Safety Control Act(고압가스안전관리법, 2019)
- Industrial Safety and Health Act(산업안전보건법, 2020)


3. MATERIAL

3.1 GENERAL

- 3.1.1 This specification is based on the ASME ASME B31.3 and B31.8
- 3.1.2 Materials shall generally be in accordance with ASTM and API standards, and those not covered in ASTM and API shall conform to other nationally accepted codes or standards such as KS, JIS, BS and DIN generally will be accepted. When materials are not covered by official standards, those shall be in accordance with manufacturer's standards.

3.2 POLYETHYLENE (PE) COATED MATERIAL

- 3.2.1 Unless otherwise specified, polyethylene coated pipes and fittings for underground piping and coating size to pipe component shall be as follows:
- Pipe All size PE Coating
 - Fitting 6 inch and larger – PE Coating
4 inch and smaller – Wrapping after welding
- 3.2.2 "PIPING MATERIAL CLASSIFICATION" contains piping material specifications as classified according to pressure, temperature and corrosion allowance in process and utility piping systems.

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4. PIPING COMPONENT

4.1 GENERAL

- 4.1.1 The specified minimum pipe wall thickness and material specifications of all component of piping systems shall meet requirements of design pressure, design temperature and corrosion allowance.
- 4.1.2 Unless otherwise specified, Metric, Celsius, and Pascal units shall be applied as the measurement system for the drawing and documents to be submitted. However, nominal size of piping components shall be shown by INCH system.

4.2 PIPE


- 4.2.1 Pipe and fitting wall thickness shall be calculated in accordance with ASME B31.3, B31.8 and API 5L for Process Piping.
- 4.2.2 Dimension of pipes shall be in accordance with the following standards:
- ASME B36.10M Welded and Seamless Wrought Steel Pipe
 - ASME B36.19M Stainless Steel Pipe
- 4.2.3 Welded pipes shall have longitudinal weld.
- 4.2.4 Pipe shall be provided in accordance with “Specification for Pipe” (Doc No. BLTA12-S-L-803) and latest version of existing BLT specification for pipe.
- 4.2.5 API 5L Grade X70 shall be non-destructively examined with 100% radiographic examination in lieu of UT as per Table E.1 of API 5L.

4.3 FITTING

- 4.3.1 Code and Standards of fittings shall be as follows:

- ASME B16.9 Factory-Made Wrought Buttwelding Fittings
- ASME B16.11 Forged Fittings, Socket-Welding and Threaded
- ASME B16.25 Buttwelding Ends
- MSS SP-43 Wrought Stainless Steel Butt-Welding Fittings
- MSS SP-75 Specification for High Test Wrought Butt Welding Fittings
- MSS SP-97 Integrally Reinforced Forged Branch Outlet Fittings–Socket Welding, Threaded and Buttwelding Ends
- Manufacturer’s Standard

- 4.3.2 Fitting construction shall follow attached “Piping Material Classification”.
- 4.3.3 All screwed connections shall have taper threads in accordance with ASME B1.20.1.
- 4.3.4 Long radius elbows shall be generally used for all piping, unless otherwise noted.
- 4.3.5 Dimensions shall be as follows:
- ASME B16.3 Malleable Iron Threaded Fittings (Classes 150 and 300)

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- ASME B16.9 Factory-Made Wrought Buttwelding Fitting
- ASME B16.11 Forged Fittings, Socket Welding and Threaded
- ASME B16.25 Butt Welding Ends

4.3.6 Crotch area for the equal and reducing tees used in process service shall be 1.5 time thicker than nominal thickness of fittings.

4.3.7 Fittings for general and cryogenic service shall be provided in accordance with “Specification for Fitting” (Doc No. BLTA12-S-L-805) and latest version of existing BLT specification for Fitting.

4.4 FLANGE

4.4.1 The dimension of flange shall be as follows:

- NPS 1/2 to NPS 24 ASME B16.5 (Classes 150 through 1500)
- NPS 26 to NPS 60 ASME B16.47 Series A

4.4.2 The construction of flange shall be followed attached “Piping Material Classification”.

4.4.3 Inside diameters of welding neck type flanges shall generally be equal to those of connected pipes and fittings.

4.4.5 Unless otherwise specified, butt welding end preparation of flange shall be accordance with ASME B16.5 Fig.8 and Fig.9. (or ASME B16.25 Fig.2 (a), Fig.3 (a), Fig.4)

4.4.6 The roughness of flange face shall be designed in accordance with ASME B16.5.

4.4.7 Flange shall be provided in accordance with “Specification for Flange” (Doc No. BLTA12-S-L-806) and latest version of existing BLT specification for flange.

4.5 LINE BLANK


4.5.1 Line blank dimensions shall be as follows:

- ASME B16.48 NPS 1/2 to NPS 24
- ASME B16.47 Series A NPS 26 and over

4.5.2 Spacer thickness shall be calculated per ASME B31.3 with ASME B16.5 pressure limit unless otherwise specified to NPS 26 and larger size.

4.5.3 Spectacle blind (Figure-8) and spacer & blanks shall be provided for following size range and class rating.

Rating	Spectacle Blind (Figure-8)	Spacer & Blank
Class 150	NPS 12 and smaller	NPS 14 and larger
Class 300	NPS 10 and smaller	NPS 12 and larger
Class 600	NPS 8 and smaller	NPS 10 and larger
Class 900	NPS 6 and smaller	NPS 8 and larger

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Class 1500	NPS 4 and smaller	NPS 6 and larger
Class 2500	NPS 4 and smaller	NPS 6 and larger

4.6 GASKET

4.6.1 Gasket dimensions shall be as follows:

- ASME B16.20 Metallic Flat Gaskets for Pipe Flange
- ASME B16.21 Nonmetallic Flat Gaskets for Pipe Flange
- ASME B16.5 NPS 1/2 to NPS 24
- ASME B16.47 Series A NPS 26 to NPS 60
- Manufacturer's Standard

4.7 BOLT AND NUTS

4.7.1 Dimensional requirements of bolts and nuts for flange connection shall be in accordance with ASME B16.5 and ASME B16.47 Series A.

4.7.2 Thread for bolts/nuts shall be as follows:

- ASME B18.2.1 Square, Hex, Heavy Hex Bolts and Screw (Inch Series)
- ASME B18.2.2 Square and Heavy Hex Nuts (Inch Series)

4.7.3 Stud bolt shall be threaded in their total length.

4.7.4 Stud blot shall be galvanized (ASTM A153).

4.8 VALVES (General)

4.8.1 All valves pressure-rating shall be in accordance with ASME B16.34 unless otherwise specified.

4.8.2 Flange face and roughness of valve shall be same as flange in corresponding piping class.

4.8.3 Flanged end type valves shall be applied to ASME B16.47 series A in NPS 26 and 60.

4.8.4 Flanged end type valves shall be applied to ASME B16.5 in NPS 1/2 and 24.

4.9 BALL VALVES


4.9.1 Ball valves shall be selected to long pattern as per ASME B16.10.

4.9.2 Unless otherwise specified, Design of ball valve shall be accordance with API 6D(C95A) and ASME B16.34(D91A), and material for seat shall be PTFE or equivalent material.

4.9.3 Where specified as "FB" in P&ID, valves shall be full bore and fire safety test shall be in accordance with API 607.

4.9.4 Unless otherwise specified, Ball support type shall be provide as following:

- NPS 1.1/2 and smaller Floating Ball
- NPS 2 and over Trunnion Mounted Ball

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4.9.5 In case of marking on P&ID and purchase description, double block and bleed function shall be supplied.

4.9.6 Ball valve shall be provided in accordance with “Specification for Ball Valve” (Doc No. BLTA12-S-L-809) and latest version of existing specification for ball valve.

4.10 GLOBE VALVES

4.10.1 The standard of globe valves shall be follows:

- API 602 Steel Gate, Globe and Check Valves For Size DN100 and Smaller For the Petroleum and Natural Gas Industries
- ASME B16.11 Forged Fittings, Socket-Welding and Threaded
- ASME B16.9 Factory-Made Wrought Buttwelding Fitting
- ASME B16.10 Face to Face and End to End Dimensions of Valves
- ASME B16.34 Valves-Flanged, Threaded, and Welding End
- BS 1873 Steel Globe and Globe Stop and Check Valve(Flanged and Butt-Welding ends) For The Petroleum, Petrochemical and allied Industries

4.10.2 Unless otherwise specified, construction of globe valve shall be as follow:

- NPS 1.1/2 and smaller Butt weld / Socket weld / Screwed
- NPS 2 and over Flanged or Butt weld

4.10.3 Bonnet bolts and gaskets for valve shall be equal to, or better than the connecting line material.

4.10.4 Casting steel globe valve for NG service shall provided in accordance with “Specification for Cast Steel Globe Valve” (Doc No. BLTA12-S-L-825).

5 END PREPARATION

5.1 BUTT WELDING ENDS


5.1.1 Unless otherwise specified, butt welding ends shall conform to ASME B16.25.

5.1.2 When the difference in wall thickness between the piping components exceeds 1.6mm, taper boring shall be performed having heavier wall per ASME B31.3.

5.2 SOCKET AND THREADED ENDS


5.2.1 All socket weld ends of fittings and valve shall be ASME B16.11.

5.2.2 All screwed pipes, fittings and valves shall be ASME B1.20.1 pipe threads (NPT).


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6 ABBREVIATION TABLE


TYPE	ABBREVIATION	DESCRIPTION
MATERIAL	AS	ALLOY STEEL
	AL	ALUMINIUM
	ASB	ASBESTOS
	AS.P.C	ASPHALT COATING (OUTSIDE)
	BC	COPPER AND COPPER ALLOY
	BU-N	BUNA-A
	CI	CAST IRON
	COMP. ASBESTOS	COMP. COMPRESSED ASBESTOS
	CR	NEOPRENE
	CS	CARBON STEEL
	EC	EXTERNAL COATING
	EPDM	ETHYLENE PROPYLENE
	EP.L	EPOXY LINING(INSIDE)
	GALV	GALVANIZED STEEL
	GI	GRAY CAST IRON
	GRAP	GRAPHITE
	HAST	HASTELLOY
	I:	INNERING MATERIAL OF SPIRALWOUND GASKET
	IIR	BUTYLE RUBBER
	IO:	INNERING & OUTERING MATERIAL OF SPIRALWOUND GASKET
	LLDPE.L	LINEAR LOW DENSITY POLYETHYLENE LINING(INSIDE)
	LLDPE.L & C	LINEAR LOW DENSITY POLYETHYLENE LINING(INSIDE) & COATING(OUTSIDE)
	NASB	NON-ASBESTOS
	NI	NICKEL ALLOY
	NR	NATURAL RUBBER
	NBR	NITRILE BUTADIENE

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TYPE	ABBREVIATION	DESCRIPTION
	O:	OUTERING MATERIAL OF SPIRALWOUND GASKET
	PE.C	POLY-ETHYLENE COATING (OUTSIDE)
	PE.L	POLY-ETHYLENE LINING (INSIDE)
	PE.C+PE.L	POLY-ETHYLENE COATING AND LINING (INSIDE+OUTSIDE)
	.C	COATING (OUTSIDE)
	.L	LINING (INSIDE)
	SBR	STYRENE BUTADIENE RUBBER
	SI	SILICON
	SS	STAINLESS STEEL
	TI	TITANIUM
	U	URETHANE
	GRP	GLASS-FIBER REINFORCED PIPE
PRODUCT	A	ARCWELDED
	A-C	ARCWELDED (COLD FINISHED)
	A-H	ARCWELDED (HOT FINISHED)
	B	FURNACE BUTTWELDED
	E-C	ELECTRIC RESISTANCE WELDED (COLD FINISHED)
	E-G	ELECTRIC RESISTANCE WELDED
	E-H	ELECTRIC RESISTANCE WELDED (HOT FINISHED)
	EFW	ELECTRIC FUSION WELDED
	FRW	ELECTRIC RESISTANCE WELDED
	S	SEAMLESS
	S-C	SEAMLESS (COLD FINISHED)
	S-H	SEAMLESS (HOT FINISHED)
	SAW	SUBMERGED ARC WELDED
	SMLS	SEAMLESS
	W	WELDED
	WELD	WELDED

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TYPE	ABBREVIATION	DESCRIPTION
DIAMETER & THICKNESS	CALC	CALC CALCULATION THICKNESS
	DN	DIAMETER NOMINAL (METRIC)
	DIA	DIAMETER
	ID	INSIDE DIAMETER
	NPS	NOMINAL PIPE SIZE (INCH)
	OD	OUTSIDE DIAMETER
	STD	STANDARD
	PN	NOMINAL PRESSURE
	XS	EXTRA STRONG
	XXS	DOUBLE EXTRA STRONG
	SCH	SCHEDULE
END TYPE & FACE	BE	BEVEL END
	BLE/PSE	BEVEL LARGE END, PLAIN SMALL END
	BLE/TSE	BEVEL LARGE END, THREAD SMALL END
	B&S	BELL(FEMALE) AND SPIGOT(PLAIN END)
	BW	BUTTWELD
	BW/SW	BUTTWELD END, SOCKET WELD END
	FF	FLANGED FLAT FACE OR FLAT FULL FACE GASKET
	LFF	LARGE FEMALE FACE
	LGF	LARGE GROOVED FACE
	LMF	LARGE MALE FACE
	LTF	LARGE TONGUE FACE
	M&F	LARGE MALE & FEMALE FACE
	NPT	NATIONAL TAPER PIPE THREAD END (ANSI)
	NPT/SW	SOCKET WELD END, NPT THREAD END
	PBE	PLAIN BOTH ENDS
	PE	PLAIN END
	PLE/TSE	PLAIN LARGE END, THREAD SMALL END

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TYPE	ABBREVIATION	DESCRIPTION
	POE/TOE	PLAIN ONE END, THREAD ONE END
	PT	PIPE THREAD END
	PT/SW	SOCKET WELD END, PT THREAD END
	RF	FLANGED RAISED FACE
	RTJ	RING TYPE JOINT FACE
	SW	SOCKET WELD END OR SPIRALWOUND TYPE GASKET
	TBE	THREAD BOTH ENDS
	T&C	THREADED CAP
	TE	THREAD END
	THRD	THREAD END
	T&G	LARGE TONGUE & GROOVE FACE
	TLE/PSE	THREAD LARGE END, PLAIN SMALL END
FLANGE & OTHERS	TOE/POE	THREAD ONE END, PLAIN ONE END
	TS	TAPER SOCKET
	BLIND	BLIND FLANGE
	C.DOUBLE.J	CORRUGATED DOUBLE JACKETED TYPE
	CORR.	CORROSION
	CSC	CAR SEAL CLOSE
	CSO	CAR SEAL OPEN
	CWP	COLD WORKING PRESSURE (AT AMBIENT TEMPERATURE)
	DOUBLE.J	DOUBLE JACKETED TYPE
	D&V	DRAIN AND VENT
	ELL	ELBOW
	FLG	FLANGE
	FTTG	FITTING
	H.HEX	HEAVY HEXAGONAL NUT (HEIGHT=BOLT DIA.)
	HEX	HEXAGONAL NUT (HEIGHT= BOLT DIA x 0.8)
	INST. TEE	INSTRUMENT TEE

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TYPE	ABBREVIATION	DESCRIPTION
	LC	LOCK CLOSE
	LO	LOCK OPEN
	LJ	LAP JOINT
	PL	PLATE
	PTFE. EN	TEFLON ENVELOPED
	SO	SLIP-ON WELD
	WN	WELDING NECK
VALVE TYPE	3-PIECES	3 PIECES TYPE
	304 FOOT	304 SCREEN FOOT
	LIFT	LIFT TYPE CHECK
	BB ISNRS	BOLTED BONNET INSIDE SCREW NON-RISING STEM
	BB ISRS	BOLTED BONNET INSIDE SCREW RISING STEM
	BB ISRS SOLID	BOLTED BONNET INSIDE SCREW RISING STEM SOLIDWEDGE
	BB OS&Y	BOLTED BONNET OUTSIDE SCREW AND YORK
	BB OS&Y FLX	BOLTED BONNET OUTSIDE SCREW AND YORK FLEXIBLE WEDGE
	BB OS&Y GEAR	BOLTED BONNET OUTSIDE SCREW AND GEAR OPERATING
	BB OS&Y SOLID	BOLTED BONNET OUTSIDE SCREW AND YORK
	BB OS&Y SPLIT	BOLTED BONNET OUTSIDE SCREW AND YORK SPLITWEDGE
	BC BALL	BOLTED COVER BALL
	BC LIFT	BOLTED COVER LIFT
	BC PISTON	BOLTED COVER PISTON
	BC SWNG	BOLTED COVER SWING
	BFV	BUTTERFLY VALVE
	CRES	CORROSION RESISTANT STEEL (API 603)
	DUAL L. WAFER	DUAL PLATE WAFER
	EXT.	EXTENDED BONNET OR STEM
	FLGD	FLANGED

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TYPE	ABBREVIATION	DESCRIPTION
	FLGD GEAR	FLANGED GEAR OPERATING
	FULL	FULL BORE (LONG PATTERN)
	FULL GEAR	FULL BORE (LONG PATTERN) GEAR OPERATING
	IBBM	IRON BODY BRONZE MOUNTED
	LUG GEAR	LUG GEAR OPERATING
	NRS	NON-RISING STEM
	MAV	MOTOR ACTUATED VALVE
	MOV	MOTOR ACTUATED VALVE
	OS&Y	OUTSIDE SCREW AND YORK
	PISTON	PISTON CHECK (A TYPE OF LIFT CHECK VALVE)
	PRES. SEAL	PRESSURE SEAL JOINT
	RED.	REDUCING BORE (LONG PATTERN)
	RED. BORE	REDUCING BORE (LONG PATTERN)
	RED. GEAR	REDUCING BORE (LONG PATTERN) GEAR OPERATING
	REGULAR	REGULAR PATTERN
	REGULAR GEAR	REGULAR PATTERN GEAR OPERATING
	SC BALL	THREADED COVER BALL
	SC LIFT	THREADED COVER LIFT
	SC PISTON	THREADED COVER PISTON
	SC SWNG	THREADED COVER SWING
	SB	THREADED BONNET
	SHORT	SHORT PATTERN
	SHORT GEAR	SHORT PATTERN GEAR OPERATING
	SING. PL. WAFER	SINGLE PLATE WAFER
	SPR-LOAD	SPRING LOADED
	SPRING	SPRING LOADED
	SWNG	SWING CHECK
	UB ISRS	UNION BONNET INSIDE SCREW RISING STEM

	보령 LNG 터미널 신규 주배관(BLT~대천 G/S) EPC 건설공사	2020.06.16
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TYPE	ABBREVIATION	DESCRIPTION
	UB ISRS SOLID	UNION BONNET INSIDE SCREW RISING STEM SOLID WEDGE
	UB OS&Y	UNION BONNET OUTSIDE SCREW AND YORK
	UB OS&Y SOLID	UNION BONNET OUTSIDE SCREW AND YORK SOLID WEDGE
	UC BALL	UNION COVER BALL
	UC LIFT	UNION COVER LIFT
	UC PISTON	UNION COVER PISTON
	UC SWNG	UNION COVER SWING
	VENTURI	VENTURI PATTERN
	VENTURI GEAR	VENTURI PATTERN GEAR OPERATING
	WAFER GEAR	WAFER GEAR OPERATING
	WB ISRS	WELDED BONNET INSIDE SCREW RISING STEM
	WB ISRS SOLID	WELDED BONNET INSIDE SCREW RISING STEM SOLID WEDGE
	WB OS&Y	WELDED BONNET OUTSIDE SCREW AND YORK
	WB OS&Y DD	WELDED BONNET OUTSIDE SCREW AND YORK DOUBLE DISK WEDGE
	WB OS&Y FLX	WELDED BONNET OUTSIDE SCREW AND YORK FLEXIBLE WEDGE
	WB OS&Y GEAR	WELDED BONNET OUTSIDE SCREW AND YORK GEAR OPERATING
	WB OS&Y SOLID	WELDED BONNET OUTSIDE SCREW AND YORK SOLID WEDGE
	WB OS&Y SPLIT	WELDED BONNET OUTSIDE SCREW AND YORK SPLIT WEDGE
	13CR	TRIM : 13CR
	13CR+BU-N	DISC : 13CR, SEAT : BUNA-A
	13CR+EPDM	DISC : 13CR, SEAT : EPDM
	13CR+GRAP	DISC : 13CR, SEAT : GRAPHITE
	13CR+PTFE	DISC : 13CR, SEAT : TEFLON
	13CR+RTFE	DISC : 13CR, SEAT : REINFORCED TEFLON
	304	BODY/DISC SEAT : 304
	304+BU-N	DISC : 304, SEAT : BUNA-A

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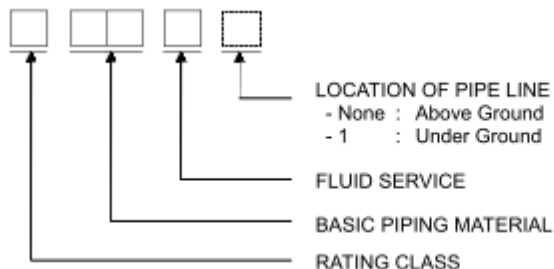
TYPE	ABBREVIATION	DESCRIPTION
VALVE TRIM	304+EPDM	DISC : 304, SEAT : EPDM
	304+GRAP	DISC : 304, SEAT : GRAPHITE
	304+PTFE	DISC : 304, SEAT : TEFLON
	304+RTFE	DISC : 304, SEAT : REINFORCED TEFLON
	304L	BODY/DISC SEAT : 304L
	304L+BU-N	DISC : 304L, SEAT : BUNA-N
	304L+EPDM	DISC : 304L, SEAT : EPDM
	304L+GRAP	DISC : 304L, SEAT : GRAPHITE
	304L+PTFE	DISC : 304L, SEAT : TEFLON
	304L+RTFE	DISC : 304L, SEAT : REINFORCED TEFLON
	316	BODY/DISC SEAT : 316
	316&HF	BODY SEAT : 316, DISC SEAT : STELLITE
	316+BU-N	DISC : 316, SEAT : BUNA-N
	316+EPDM	DISC : 316, SEAT : EPDM
	316+GRAP	DISC : 316, SEAT : GRAPHITE
	316+PTFE	DISC : 316, SEAT : TEFLON
	316+RTFE	DISC : 316, SEAT : REINFORCED TEFLON
	347H	BODY/DISC SEAT : 347H
	ALLOY20	BODY/DISC SEAT : ALLOY20
	ALLOY20&HF	BODY SEAT : ALLOY20, DISC SEAT : STELLITE
	BRONZE	TRIM : BRONZE
	BRONZE + BU-N	DISC : BRONZE, SEAT : BUNA-N
	BRONZE + EPDM	DISC : BRONZE, SEAT : EPDM
	CI	TRIM : CAST IRON
	CI+BU-N N	DISC : CAST-IRON, SEAT : BUNA-N
	CI+EPDM	DISC : CAST-IRON, SEAT : EPDM
	CPVC	TRIM : CPVC
	CS	TRIM : CARBON STEEL

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TYPE	ABBREVIATION	DESCRIPTION
	CS+BU-N	DISC : CARBON STEEL, SEAT : BUNA-N
	CS+EPDM	DISC : CARBON STEEL, SEAT : EPDM
	DI	TRIM : DUCTILE IRON
	DI+BU-N	DISC : DUCTILE IRON, SEAT : BUNA-N
	DI+EPDM	DISC : DUCTILE IRON, SEAT : EPDM
	HF	BODY/DISC : STELLITE
	MI	TRIM : MALLEABLE IRON
	MI+BU-N	DISC : MALLEABLE IRON, SEAT : BUNA-N
	MI+EPDM	DISC : MALLEABLE IRON, SEAT : EPDM
	MONEL	BODY/DISC SEAT : MONEL
	MONEL&HF	BODY SEAT : MONEL, DISC SEAT : STELLITE
	MONEL+GRAP	DISC : MONEL, SEAT : GRAPHITE
	MONEL+RTFE	DISC : MONEL, SEAT : REINFORCED TEFLON
	PVC	TRIM : PVC
	TI	BODY/DISC SEAT : TITANIUM
	TI+GRAP	DISC : TITANIUM, SEAT : GRAPHITE
	TI+RTFE	DISC : TITANIUM, SEAT : REINFORCED TEFLON
REMARK	100% RT	100% RADIOGRAPHIC TEST
	HB 120	BRINELL HARDNESS 120
	HB 90	BRINELL HARDNESS 90
	ASME B16.47-A	DIMENSION STANDARD : ASME B16.47 SERISE A

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7 NUMBERING OF PIPING SPECIFICATION



RATING CLASS		FLUID SERVICE	
Identification Letters	Rating Class	Identification Letters	Fluid Service
N	125#	A	LNG,NG,LN2, PG
A	150#	B	LPG,PG, NG
B	300#	C	SW, SS
C	600#	D	IW, PW
D	900#	E	FW
E	1500#	F	IA, PA
F	2500#	G	N(HP)
		H	OD
		J	FG, NI(LOW), DO, NG
		K	LS, LC
		L	EM
		M	DRY CHEMICAL

BASIC PIPING MATERIAL			
Identification Letters	Material	Identification Letters	Material
11	A106-B	27	A358-TP304
12	A106-B + A312-TP304	91	A53-B , A106-B, API 5L X70 or API 5L X70 + PE Coat
13	A106-B + PE Lined	93	A312-TP316L, A53-B or A285-C
14	A106-B + Jacket Piping	94	A106-B
15	A106-B BASIC		A106-B or A285-C
16	A285-C	96	RTRP Reinforced Vinylester Resin Pipe
17	A333-6	95	High Pressure NG for Trunkline
18	API 5L X65	97	A106-B + Galv. A106-B + Glass Flake Lined
19	API 5L X65 + PE Coat	85	High Pressure NG for Trunkline (Pipe Thickness Optimized for UG Pipeline)
21	A312-TP304 or A358-304		
22	A312-TP304L		
23	A312-TP316		
24	A312-TP316L		
25	A312-TP321		
26	A312-TP347		

Note : Underground pipe should be coated in accordance with BLTA12-S-L-813 "Specification for Pipe Coating"

Attachment #1
Piping Service Classes

Attachment #1 PIPING SERVICE CLASSES

N O	SPEC	SERVICE	RATING FACE	DESIGN TEMP. (°C)	MAX. OPE. PRESSURE	DESIGN PRESSURE	PIPE MATERIAL	CORROSION ALLOWANCE (mm)	REMARKS
					MPa	MPa			
1	D91A	NG(A/G)	900# RTJ	-29/180	6.865	12.10	A53-B, API5L X70	1.5	BLT Area
2	C95A1	High Pressure NG (U/G)	600# RTJ	-29/65	6.865	7.85 / 7.552	API 5L X42 (PE.C), API 5L X70 (PE.C)	1.2	BLT Area B/V
3	C85A1	High Pressure NG (U/G)	600# RTJ	-29/65	6.865	7.552	API 5L X70 (PE.C)	-	Pipeline
4	C95A	High Pressure NG (A/G)	600# RTJ	-29/65	6.865	7.85 / 7.552	API 5L X42 API 5L X70	1.2	BLT Area, B/V
5	D91A1	NG(U/G)	900# RTJ	-29/180	6.865	12.10	API 5L X70 (PE.C)	1.5	BLT Area
6	A21F	IA	150# RF	-29/65	0.65	1.9	A312 TP304	0	BLT Area

Note : 1. Piping Class **A21F**, D91A, C95A and C95A1 shall be used existing BLT Piping Material.

2. Piping Class C85A1 shall be used underground pipeline (pipe thickness is optimized) from BLT to B/V.

3. In JOB NO. BLTA12, the design pressure of Class C95A and C95A1 shall be 7.552MPa

Attachment #2

Piping Material Classification

GENERAL NOTE

1. Piping Class D91A, C95A and C95A1 shall be used existing BLT Piping Material.
2. 3D Bend Specification shall be in accordance with the following "Piping Material Classification".

Piping Material Classification	Class	Page	1 of 6
	D91A	Project No	121380F
		Rev. No.	0

Service NG	Base Material	Carbon Steel
	Design Code	ASME B31.3
	Rating	CL900, ASME B16.5
	Corrosion Allow.	1.5mm
	PWHT	NPS 16 & Over
	Service Requirement	No

Condition	Unit	Size	Pressure / Temperature Limits
Temperature	Deg.C	-	-29 ~ 180
Pressure	Barg	1/2" to 30"	121

Table of Schedule (Plain /Beveled)

Rev.	Size (NPS)	Schedule
	1/2"	S-80
	3/4"	S-80
	1"	S-80
	1-1/2"	S-80
	2"	S-80
	3"	S-80
	4"	S-80
	6"	S-80
	8"	S-80
	10"	S-80
	12"	S-80
	14"	S-80
	16"	S-80
	18"	S-80
	20"	S-80
	22"	S-80
	24"	S-80
	26"	28.58mm
	28"	30.18mm
	30"	31.75mm

Table of Schedule (Threaded)

Rev.	Size (NPS)	Schedule
	1/2"	S-160
	3/4"	S-160
	1"	S-160
	1-1/2"	S-160

Fitting Selection Tables

Rev.	Table Name	Type
	Branch	BRANCH TABLE 1
	Reducing	REDUCING TABLE 1

Notes

Rev.	No.	Description
	P102	API 5L Grade X70 shall be 100% radiographic tested in lieu of UT.
	V501	All ball bevel ended valves shall be provided with pup piece welded on each end as following :
		Under and 2 NPS : 100mm
		NPS 3 ~ NPS 8 : 150mm
		NPS 10 and over : 200mm
	V503	All offered valves shall be inspected and stamped by KGSC.

Table of Schedule for Tee (Plain /Beveled)

Rev.	Size (NPS)	Schedule
	1/2"	S-80
	3/4"	S-80
	1"	S-80
	1-1/2"	S-80
	2"	S-80
	3"	S-80
	4"	S-80
	6"	S-80
	8"	S-80
	10"	S-80
	12"	S-80
	14"	S-80
	16"	S-80

Ball Valve Specification for D91A Material Class

Rev	Short Code	Option Code	Sizes	Description	Commodity Code	Notes
	VBAL		16"	Ball Valve Long Pattern Full Bore, API 6D, Class 900, BE/RJ, Top Entry Trunnion Mounted Ball, Gear Operator, ASTM A216 Grade WCB, Trim 316SS w/PTFE Seats, w/Pup Piece, Fire Safe, KGSC Stamp		V503

Piping Material Classification					Class D91A	Page Project No. Rev. No.	2 of 6 121380F 0
Rev.	Short Code	Option Code	Sizes	Description	Commodity Code	Notes	
	PIP	1	1/2" to 1-1/2"	Pipe, ASME B36.10M, Plain End, ASTM A53 Grade B, Seamless	PPPABQPEADLX11	P102	
		1	2" to 6"	Pipe, ASME B36.10M, Bevel End, ASTM A53 Grade B, Seamless	PPPABQBEADLX11		
		1	8" to 30"	Pipe, API 5L, Bevel End, API 5L Grade X70 PSL 1, SAWL	PPPAABEAEMXA1		
	NIPL	1	1/2" to 1-1/2"	Nipple, ASME B36.10M, Plain Both Ends, ASTM A53 Grade B, Seamless, 100mm Long	ONIPABQPEADLX21		
		212	1/2" to 1-1/2"	Nipple, ASME B36.10M, Plain End x Male Threaded End, ASTM A53 Grade B, Seamless, 100mm Long	ONIPABQPMADLX21		
		221	1/2" to 1-1/2"	Nipple, ASME B36.10M, Plain Both Ends, ASTM A53 Grade B, Seamless, 150mm Long	ONIPABQPEADLX41		
		224	1/2" to 1-1/2"	Nipple, ASME B36.10M, Plain End x Male Threaded End, ASTM A53 Grade B, Seamless, 150mm Long	ONIPABQPMADLX41		
	FLG	1	1/2" to 1-1/2"	Flange SW, ASME B16.5, Class 1500, Ring Type Joint, ASTM A105	FSWA11PJTAGZZZ		
		1	2"	Flange WN, ASME B16.5, Class 1500, Ring Type Joint, ASTM A105	FWNA11PJTAGZZZ		
		1	3" to 24"	Flange WN, ASME B16.5, Class 900, Ring Type Joint, ASTM A105	FWNA11NJTAGZZZ		
		1	26" to 30"	Flange WN, ASME B16.47 Series A, Class 900, Ring Type Joint, ASTM A105	FWNA13NJTAGZZZ		
		116	3" to 24"	Flange WN, ASME B16.5, Class 1500, Ring Type Joint, ASTM A105	FWNA11PJTAGZZZ		
	FBL	1	1/2" to 2"	Blind Flange, ASME B16.5, Class 1500, Ring Type Joint, ASTM A105	FBLA11PJTAGZZZ		
		1	3" to 24"	Blind Flange, ASME B16.5, Class 900, Ring Type Joint, ASTM A105	FBLA11NJTAGZZZ		
		1	26" to 30"	Blind Flange, ASME B16.47 Series A, Class 900, Ring Type Joint, ASTM A105	FBLA13NJTAGZZZ		
	F8	1	1/2" to 6"	Figure-8 Blank, ASME B16.48, Class 900, Ring Type Joint, ASTM A516 Grade 70	DF8A12NJTAF1ZZZ		
		1	8" to 24"	Paddle Spacer & Blank, ASME B16.48, Class 900, Ring Type Joint, ASTM A516 Grade 70	D88A12NJTAF1ZZZ		
		1	26" to 30"	Paddle Spacer & Blank, ASME B16.47 Series A, Class 900, Ring Type Joint, ASTM A516 Grade 70	D88A13NJTAF1ZZZ		
	GSK	1	1/2" to 1-1/2" (mm)	Gasket Octagonal Ring Joint, ASME B16.20, Class 1500, Ring Type Joint, Low Carbon Steel, ASME B16.5	GR8AB6PJAK6X1A		
		1	2"	Gasket Octagonal Ring Joint, ASME B16.20, Class 1500, Ring Type Joint, Soft Iron, ASME B16.5	GR8AB6PJAK1X1A		

Piping Material Classification					Class D91A	Page Project No. Rev. No.	3 of 6 121380F 0
Rev.	Short Code	Option Code	Sizes	Description	Commodity Code	Notes	
	GSK	1	3" to 24" (mm)	Gasket Octagonal Ring Joint, ASME B16.20, Class 900, Ring Type Joint, Soft Iron, ASME B16.5	GR8AB6NJTA1X1A		
		1	26" to 30" (mm)	Gasket Octagonal Ring Joint, ASME B16.20, Class 900, Ring Type Joint, Soft Iron, ASME B16.47 Series A	GR8AB6NJTA1X71		
		116	3" to 24" (mm)	Gasket Octagonal Ring Joint, ASME B16.20, Class 1500, Ring Type Joint, Soft Iron, ASME B16.5	GR8AB6PJTA1X1A		
	BLT	1	U1/2 to U2 (60 to 370mm)	Stud Bolt W/2 Heavy Hex Nuts, ASME B18.2.2, ASTM A193 B7 / A194 2H	L22ABPABIZZZ		
		1	U2-1/2 to U2-1/2 (470 to 470mm)	Stud Bolt W/2 Heavy Hex Nuts, ASME B18.2.2, ASTM A193 B7 / A194 2H	L22ABPABIZZZ		
		1	U2-1/2 to U2-1/2 (540 to 540mm)	Stud Bolt W/2 Heavy Hex Nuts, ASME B18.2.2, ASTM A193 B7 / A194 2H	L22ABPABIZZZ		
		1	U3 to U3 (535 to 555mm)	Stud Bolt W/2 Heavy Hex Nuts, ASME B18.2.2, ASTM A193 B7 / A194 2H	L22ABPABIZZZ		
		1	U3 to U3 (650 to 650mm)	Stud Bolt W/2 Heavy Hex Nuts, ASME B18.2.2, ASTM A193 B7 / A194 2H	L22ABPABIZZZ		
	E45	1	1/2" to 1-1/2"	Elbow 45 Deg., ASME B16.11, Class 3000, Socket Weld End, ASTM A105	OE45AB2SSWACGZZZ		
		1	2" to 6"	Elbow 45 Deg. R=1.5D, ASME B16.9, Bevel End, ASTM A234 Grade WPB, Seamless	BE4LABMBEACKX11		
		1	8" to 18"	Elbow 45 Deg. R=1.5D, ASME B16.9, Bevel End, ASTM A234 Grade WPB, Welded, 100% Radiography	BE4LABMBEACKX3A		
		1	20" to 24"	Elbow 45 Deg. R=1.5D, ASME B16.9, Bevel End, ASTM A234 Grade WPB, Welded, 100% Radiography, PWHT	BE4LABMBEACKX3C		
		1	26" to 30"	Elbow 45 Deg. R=1.5D, ASME B16.9, Bevel End, ASTM A860 Grade WPHY70, Welded	BE4LABMBEA76X31		
	E90	1	1/2" to 1-1/2"	Elbow 90 Deg., ASME B16.11, Class 3000, Socket Weld End, ASTM A105	OE90AB2SSWACGZZZ		
		1	2" to 6"	Elbow 90 Deg. LR R=1.5D, ASME B16.9, Bevel End, ASTM A234 Grade WPB, Seamless	BE9LABMBEACKX11		
		1	8" to 18"	Elbow 90 Deg. LR R=1.5D, ASME B16.9, Bevel End, ASTM A234 Grade WPB, Welded, 100% Radiography	BE9LABMBEACKX3A		
		1	20" to 24"	Elbow 90 Deg. LR R=1.5D, ASME B16.9, Bevel End, ASTM A234 Grade WPB, Welded, 100% Radiography, PWHT	BE9LABMBEACKX3C		
		1	26" to 30"	Elbow 90 Deg. LR R=1.5D, ASME B16.9, Bevel End, ASTM A860 Grade WPHY70, Welded	BE9LABMBEA76X31		
	CAP	1	1/2" to 1-1/2"	Cap, ASME B16.11, Class 3000, Socket Weld End, ASTM A105	OCAPAB2SSWACGZZZ		
		1	2" to 30"	Cap, ASME B16.9, Bevel End, ASTM A234 Grade WPB, Seamless	BCAPABMBEACKX11		

Piping Material Classification					Class D91A	Page Project No. Rev. No.	4 of 6 121380F 0
Rev.	Short Code	Option Code	Sizes	Description	Commodity Code	Notes	
	CAP	406	1/2" to 1-1/2"	Cap, ASME B16.11, Class 3000, Female Threaded End, ASTM A105	OCAPAB2STFACGZZ		
	90TEE	1	1/2" to 1-1/2"	Tee Equal, ASME B16.11, Class 3000, Socket Weld End, ASTM A105	OETEAB2SSWACGZZ		
		1	2" to 6"	Tee Equal, ASME B16.9, Bevel End, ASTM A234 Grade WPB, Seamless, Crotch Thk more than 150% of Nominal Wall Thk	BTEEABMBEACKX2T		
		1	8" to 18"	Tee Equal, ASME B16.9, Bevel End, ASTM A234 Grade WPB, Welded, 100% Radiography, Crotch Thk more than 150% of Nominal Wall Thk	BTEEABMBEACKXWQ		
		1	20" to 24"	Tee Equal, ASME B16.9, Bevel End, ASTM A234 Grade WPB, Welded, 100% Radiography, PWHT, Crotch Thk more than 150% of Nominal Wall Thk	BTEEABMBEACKXWW		
		1	26" to 30"	Tee Equal, MSS SP-75, Bevel End, ASTM A860 Grade WPHY70, Welded, Crotch Thk more than 150% of Nominal Wall Thk	BTEEM5BEA76X3T		
	90TRE	1	3/4" to 1-1/2" (1/2" to 1")	Tee Reducing, ASME B16.11, Class 3000, Socket Weld End, ASTM A105	ORTEAB2SSWACGZZ		
		1	3" to 6" (2" to 4")	Tee Reducing, ASME B16.9, Bevel End, ASTM A234 Grade WPB, Seamless, Crotch Thk more than 150% of Nominal Wall Thk	BTERABMBEACKX2T		
		1	8" to 18" (4" to 16")	Tee Reducing, ASME B16.9, Bevel End, ASTM A234 Grade WPB, Welded, 100% Radiography, Crotch Thk more than 150% of Nominal Wall Thk	BTERABMBEACKXWQ		
		1	20" to 24" (8" to 20")	Tee Reducing, ASME B16.9, Bevel End, ASTM A234 Grade WPB, Welded, 100% Radiography, PWHT, Crotch Thk more than 150% of Nominal Wall Thk	BTERABMBEACKXWW		
		1	26" to 30" (12" to 28")	Tee Reducing, ASME B16.9, Bevel End, ASTM A860 Grade WPHY70, Welded, Crotch Thk more than 150% of Nominal Wall Thk	BTERABMBEA76X3T		
	SWGC	1	3/4" to 1-1/2" (1/2" to 1")	Swage Con., MSS SP-95, Plain Both Ends, ASTM A234 Grade WPB, Seamless	OSGCAM8PEACKX11		
		1	2" (1/2" to 1-1/2")	Swage Con., MSS SP-95, Bevel Large End x Plain Small End, ASTM A234 Grade WPB, Seamless	OSGCAM8BPACKX11		
	REDC	1	3" to 6" (2" to 4")	Reducer Con., ASME B16.9, Bevel End, ASTM A234 Grade WPB, Seamless	BRECABMBEACKX11		
		1	8" to 18" (4" to 16")	Reducer Con., ASME B16.9, Bevel End, ASTM A234 Grade WPB, Welded, 100% Radiography	BRECABMBEACKX3A		
		1	20" to 24" (12" to 22")	Reducer Con., ASME B16.9, Bevel End, ASTM A234 Grade WPB, Welded, 100% Radiography, PWHT	BRECABMBEACKX3C		
		1	26" to 30" (18" to 28")	Reducer Con., MSS SP-75, Bevel End, ASTM A860 Grade WPHY70, Welded	BRECAM5BEA76X31		
	SWGE	1	3/4" to 1-1/2" (1/2" to 1")	Swage Ecc., MSS SP-95, Plain Both Ends, ASTM A234 Grade WPB, Seamless	OSGEAM8PEACKX11		
		1	2" (1/2" to 1-1/2")	Swage Ecc., MSS SP-95, Bevel Large End x Plain Small End, ASTM A234 Grade WPB, Seamless	OSGEAM8BPACKX11		
	REDE	1	3" to 6" (2" to 4")	Reducer Ecc., ASME B16.9, Bevel End, ASTM A234 Grade WPB, Seamless	BREEABMBEACKX11		

Piping Material Classification					Class D91A	Page Project No. Rev. No.	5 of 6 121380F 0
Rev.	Short Code	Option Code	Sizes	Description	Commodity Code	Notes	
	REDE	1	8" to 18" (4" to 16")	Reducer Ecc., ASME B16.9, Bevel End, ASTM A234 Grade WPB, Welded, 100% Radiography	BREEABMBEACKX3A		
		1	20" to 24" (12" to 22")	Reducer Ecc., ASME B16.9, Bevel End, ASTM A234 Grade WPB, Welded, 100% Radiography, PWHT	BREEABMBEACKX3C		
		1	26" to 30" (18" to 28")	Reducer Ecc., MSS SP-75, Bevel End, ASTM A860 Grade WPHY70, Welded	BREEAM5BEA76X31		
	NOL	1	1/2" to 1-1/2" (2" to 30")	Nipolet, Manf. Std., Class 3000, Plain End, ASTM A105, L=75mm	ONPLAP2SPEACGX01		
	NPFL	1	1/2" to 1-1/2" (2" to 30")	Nipoflange, Manf. Std., Class 1500, Ring Type Joint, ASTM A105, L=150mm, ASME B16.5	ONPFAP2PJTAGCXF1		
	90SOL	1	1/2" to 1-1/2" (2" to 30")	Socketlet, MSS SP-97, Class 3000, Socket Weld End, ASTM A105	OSOCAM9SSWACGZZ		
	CPL	1	1/2" to 1-1/2"	Full Coupling, ASME B16.11, Class 3000, Socket Weld End, ASTM A105	OCPLAB2SSWACGZZZ		
	VGLB	1	1/2" to 1-1/2"	Globe Valve, API 602, Class 1500, Socket Weld End, Bolted Bonnet OS&Y, Handwheel Operator, ASTM A105, Trim 13Cr w/Stellite Seats, Plug Disc, KGSC Stamp	VLRA11PSW21ACGX12XAY	V503	
		1	2"	Globe Valve, BS 1873, Class 1500, Bevel End, Bolted Bonnet OS&Y, Handwheel Operator, ASTM A216 Grade WCB, Trim 13Cr w/Stellite Seats, Plug Disc, KGSC Stamp	VLRA21PBE21ACDX12XAY	V503	
		1	3"	Globe Valve, BS 1873, Class 900, Bevel End, Bolted Bonnet OS&Y, Handwheel Operator, ASTM A216 Grade WCB, Trim 13Cr w/Stellite Seats, Plug Disc, KGSC Stamp	VLRA21NBE21ACDX12XAY	V503	
		1	4" to 8"	Globe Valve, BS 1873, Class 900, Bevel End, Bolted Bonnet OS&Y, Gear Operator, ASTM A216 Grade WCB, Trim 13Cr w/Stellite Seats, Plug Disc, KGSC Stamp	VLRA21NBE23ACDX12XAY	V503	
	VCHK	1	1/2" to 1-1/2"	Lift Check Valve Piston Type, API 602, Class 1500, Socket Weld End, Bolted Cover, ASTM A105, Trim 13Cr w/Stellite Seats	VCPA11PSW5ACGX12ZZZ		
		1	2"	Swing Check Valve, API 594 Type B, Class 1500, Bevel End, Bolted Cover, ASTM A216 Grade WCB, Trim 13Cr w/Stellite Seats	VCSCAA3PBE5ACDX12ZZZ		
		1	3" to 24"	Swing Check Valve, API 594 Type B, Class 900, Bevel End, Bolted Cover, ASTM A216 Grade WCB, Trim 13Cr w/Stellite Seats	VCSCAA3NBE5ACDX12ZZZ		
	VBAL	1	1/2" to 1-1/2"	Ball Valve Reduced Bore, ASME B16.34, Class 1500, Socket Weld End, Split Body Floating Ball, Lever Operator, ASTM A105, Trim 316SS w/PTFE Seats, w/S-80 Nipple Plain End L=100mm, Fire Safe, KGSC Stamp	VB1AACPSWO2ACGX31YQ1	V503	

Piping Material Classification				Class D91A	Page Project No. Rev. No.	6 of 6 121380F 0
Rev.	Short Code	Option Code	Sizes	Description	Commodity Code	Notes

	VBAL	1	2" to 3"	Ball Valve Long Pattern Reduced Bore, API 6D, Class 900, Bevel End, Top Entry Trunnion Mounted Ball, Lever Operator, ASTM A216 Grade WCB, Trim 13Cr w/PTFE Seats, w/Pup Piece, Fire Safe, KGSC Stamp	VBMAA9NBEW2ACDX 11YPB	V503
		1	4" to 6"	Ball Valve Long Pattern Reduced Bore, API 6D, Class 900, Bevel End, Top Entry Trunnion Mounted Ball, Gear Operator, ASTM A216 Grade WCB, Trim 13Cr w/PTFE Seats, w/Pup Piece, Fire Safe, KGSC Stamp	VBMAA9NBEW3ACDX 11YPB	V503
		1	10" to 24"	Ball Valve Long Pattern Reduced Bore, API 6D, Class 900, Bevel End, Top Entry Trunnion Mounted Ball, Gear Operator, ASTM A216 Grade WCB, Trim 316SS w/PTFE Seats, w/Pup Piece, Fire Safe, KGSC Stamp	VBMAA9NBEW3ACDX 31YPB	V503
		1	30"	Ball Valve Long Pattern Reduced Bore, API 6D, Class 900, Bevel End, Top Entry Trunnion Mounted Ball, Gear Operator, ASTM A216 Grade WCB, Trim 13Cr w/PTFE Seats, w/Pup Piece, Fire Safe, KGSC Stamp	VBMAA9NBEW3ACDX 11YPB	V503
		403	1/2" to 1-1/2"	Ball Valve Reduced Bore, ASME B16.34, Class 1500, Socket Weld End, Split Body Floating Ball, Lever Operator, ASTM A105, Trim 316SS w/PTFE Seats, w/S-160 Nipple Plain End x Male Threaded End L=100mm, Fire Safe, KGSC Stamp	VB1AACPSWO2ACGX 31YA8	V503
		484	1/2" to 1-1/2"	Ball Valve Full Bore, ASME B16.34, Class 1500, Socket Weld End, Split Body Floating Ball, Lever Operator, ASTM A105, Trim 316SS w/PTFE Seats, w/S-80 Nipple Plain End L=100mm, Fire Safe, KGSC Stamp	VB2AACPSWO2ACGX 31YQ1	V503
		484	2" to 3"	Ball Valve Long Pattern Full Bore, API 6D, Class 900, Bevel End, Top Entry Trunnion Mounted Ball, Lever Operator, ASTM A216 Grade WCB, Trim 13Cr w/PTFE Seats, w/Pup Piece, Fire Safe, KGSC Stamp	VBMAA9NBEW2ACDX 11YPB	V503
		484	4" to 6"	Ball Valve Long Pattern Full Bore, API 6D, Class 900, Bevel End, Top Entry Trunnion Mounted Ball, Gear Operator, ASTM A216 Grade WCB, Trim 13Cr w/PTFE Seats, w/Pup Piece, Fire Safe, KGSC Stamp	VBMAA9NBEW3ACDX 11YPB	V503
		484	10" to 24"	Ball Valve Long Pattern Full Bore, API 6D, Class 900, Bevel End, Top Entry Trunnion Mounted Ball, Gear Operator, ASTM A216 Grade WCB, Trim 316SS w/PTFE Seats, w/Pup Piece, Fire Safe, KGSC Stamp	VBMAA9NBEW3ACDX 31YPB	V503
		484	30"	Ball Valve Long Pattern Full Bore, API 6D, Class 900, Bevel End, Top Entry Trunnion Mounted Ball, Gear Operator, ASTM A216 Grade WCB, Trim 13Cr w/PTFE Seats, w/Pup Piece, Fire Safe, KGSC Stamp	VBMAA9NBEW3ACDX 11YPB	V503

—End Of Report—

Piping Material Classification	Class	Page	1 of 4
	C95A1	Project No	121380F
		Rev. No.	0

Service High Pressure Natural Gas (U/G)	Base Material	Carbon Steel w/PE Coated
	Design Code	ASME B31.8
	Rating	CL600, ASME B16.5
	Corrosion Allow.	1.2mm
	PWHT	No
	Service Requirement	No

Condition	Unit	Size	Pressure / Temperature Limits
Temperature	Deg.C	-	-29 ~ 65
Pressure	Barg	1/2" to 30"	78.5 / 75.52

Table of Schedule (Plain /Beveled)

Rev.	Size (NPS)	Schedule
	1/2"	S-80
	3/4"	S-80
	1"	S-80
	1-1/2"	S-80
	2"	S-80
	3"	S-40
	4"	S-40
	6"	S-40
	8"	9.53mm
	10"	12.70mm
	12"	14.27mm
	14"	7.92mm
	16"	9.53mm
	18"	10.31mm
	20"	11.91mm
	24"	12.70mm
	26"	14.27mm
	30"	15.88mm

Table of Schedule (Threaded)

Rev.	Size (NPS)	Schedule
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Fitting Selection Tables

Rev.	Table Name	Type
	Branch	N/A
	Reducing	N/A

Notes

Rev.	No.	Description
	V501	All ball bevel ended valves shall be provided with pup piece welded on each end as following :
		Under and 2 NPS : 100mm
		NPS 3 ~ NPS 8 : 150mm
		NPS 10 and over : 200mm
	999	Use for API 5L Grade X65 Material Only

Table of Schedule for Elbow (Plain /Beveled)

Rev.	Size (NPS)	Schedule
	1/2"	S-80
	3/4"	S-80
	1"	S-80
	1-1/2"	S-80
	2"	S-80
	3"	S-40
	4"	S-40
	6"	7.9mm
	8"	9.53mm
	10"	12.70mm
	12"	14.27mm
	14"	9.53mm
	16"	11.10mm
	18"	11.91mm
	20"	14.27mm
	24"	15.88mm
	26"	17.48mm
	30"	20.62mm

Table of Schedule for Cap (Plain /Beveled)

Rev.	Size (NPS)	Schedule
	1/2"	S-80
	3/4"	S-80
	1"	S-80
	1-1/2"	S-80
	2"	S-80
	3"	S-40
	4"	S-40
	6"	7.9mm
	8"	9.53mm
	10"	12.70mm
	12"	S-60
	14"	10.31mm
	16"	11.10mm
	18"	12.70mm
	20"	14.27mm
	24"	17.48mm
	26"	19.05mm
	30"	20.62mm

Piping Material Classification	Class	Page	2 of 4
	C95A1	Project No	121380F
		Rev. No.	0

Table of Schedule for Elbow (Plain /Beveled) for X85

<u>Rev.</u>	<u>Size (NPS)</u>	<u>Schedule</u>
	30"	22.23mm

▣ Added Specification for C95A1 Material Class

Rev	Short Code	Option Code	Sizes	Description	Commodity Code	Notes
	3DBEND	1	30"	3D Bend, API 5L, Bevel End, API 5L Grade X70 PSL 1, SAWL, PE Coated		
	90TEE	1	30"	Tee Equal, MSS SP-75, Bevel End, ASTM A860 Grade WPHY70, Welded, Crotch Thk more than 150% of Nominal Wall Thk, PE Coated		

Table of Schedule for 3D Bend for X70

<u>Rev.</u>	<u>Size(NPS)</u>	<u>Schedule</u>
	30"	15.9mm

Table of Schedule for **TEE** for X70

<u>Rev.</u>	<u>Size(NPS)</u>	<u>Schedule</u>
	30"	31.8mm

Note V503 : All offered valves shall be inspected and stamped by KGSC.

Piping Material Classification					Class C95A1	Page Project No. Rev. No.	3 of 4 121380F 0
Rev.	Short Code	Option Code	Sizes	Description	Commodity Code	Notes	
	PIP	1	1/2" to 2"	Pipe, API 5L, Plain End, API 5L Grade X42 PSL 1, Seamless	PPPAAPAEAFX11		
		1	6" to 12"	Pipe, API 5L, Bevel End, API 5L Grade X42 PSL 2, ERW, PE Coated	PPPAABEAXBX2P		
		1	14" to 30"	Pipe, API 5L, Bevel End, API 5L Grade X70 PSL 1, SAWL, PE Coated	PPPAABEAEMXA2		
	FLG	1	1/2" to 12"	Flange WN, ASME B16.5, Class 600, Ring Type Joint, ASTM A105	FWNA11LJTACGZZZ		
		1	14" to 24"	Flange WN, ASME B16.5, Class 600, Ring Type Joint, ASTM A694 Grade F70	FWNA11LJTA38ZZZ		
		1	26" to 30"	Flange WN, ASME B16.47 Series A, Class 600, Ring Type Joint, ASTM A694 Grade F70	FWNA13LJTA38ZZZ		
	FBL	1	1/2" to 1-1/2"	Blind Flange, ASME B16.5, Class 600, Ring Type Joint, ASTM A105	FBLA11LJTACGZZZ		
		1	2" to 12"	Blind Flange, ASME B16.5, Class 600, Ring Type Joint, ASTM A105	FBLA11LJTACGZZZ		
		1	14" to 24"	Blind Flange, ASME B16.5, Class 600, Ring Type Joint, ASTM A694 Grade F65	FBLA11LJTA37ZZZ		
		1	26" to 30"	Blind Flange, ASME B16.47 Series A, Class 600, Ring Type Joint, ASTM A694 Grade F65	FBLA13LJTA37ZZZ		
	GSK	1	1/2" to 24" (mm)	Gasket Oval Ring Joint, ASME B16.20, Class 600, Ring Type Joint, Soft Iron, ASME B16.5	GRTAB6LJTAK1X1A		
		1	26" to 30" (mm)	Gasket Oval Ring Joint, ASME B16.20, Class 600, Ring Type Joint, Soft Iron, ASME B16.47 Series A	GRTAB6LJTAK1X71		
	BLT	1	U1/2 to U1-1/2 (60 to 560mm)	Stud Bolt W/2 Heavy Hex Nuts, ASME B18.2.2, ASTM A193 B7 / A194 2H, Galvanized	L22ABPABIX21		
	E45	1	1/2" to 1-1/2"	Elbow 45 Deg. R=1.5D, MSS SP-75, Bevel End, ASTM A860 Grade WPHY42, Seamless	BE4LAM5BEA71X11		
		1	2" to 4"	Elbow 45 Deg. R=1.5D, MSS SP-75, Bevel End, ASTM A860 Grade WPHY42, Seamless, PE Coated	BE4LAM5BEA71X1P		
		1	6" to 12"	Elbow 45 Deg. R=1.5D, MSS SP-75, Bevel End, ASTM A860 Grade WPHY42, Welded, PE Coated	BE4LAM5BEA71X3P		
		1	14" to 30"	Elbow 45 Deg. R=1.5D, MSS SP-75, Bevel End, ASTM A860 Grade WPHY70, Welded, PE Coated	BE4LAM5BEA76X3P		
		999	30"	Elbow 45 Deg. R=1.5D, MSS SP-75, Bevel End, ASTM A860 Grade WPHY65, Welded, PE Coated	BE4LAM5BEA75X3P	999	
	E90	1	1/2" to 1-1/2"	Elbow 90 Deg. LR R=1.5D, MSS SP-75, Bevel End, ASTM A860 Grade WPHY42, Seamless	BE9LAM5BEA71X11		

Piping Material Classification					Class C95A1	Page Project No. Rev. No.	4 of 4 121380F 0
Rev.	Short Code	Option Code	Sizes	Description	Commodity Code	Notes	
	E90	1	2" to 4"	Elbow 90 Deg. LR R=1.5D, MSS SP-75, Bevel End, ASTM A860 Grade WPHY42, Seamless, PE Coated	BE9LAM5BEA71X1P		
		1	6" to 12"	Elbow 90 Deg. LR R=1.5D, MSS SP-75, Bevel End, ASTM A860 Grade WPHY42, Welded, PE Coated	BE9LAM5BEA71X3P		
		1	14" to 30"	Elbow 90 Deg. LR R=1.5D, MSS SP-75, Bevel End, ASTM A860 Grade WPHY70, Welded, PE Coated	BE9LAM5BEA76X3P		
		999	30"	Elbow 90 Deg. LR R=1.5D, MSS SP-75, Bevel End, ASTM A860 Grade WPHY65, Welded, PE Coated	BE9LAM5BEA75X3P	999	
	CAP	1	1/2" to 1-1/2"	Cap, MSS SP-75, Bevel End, ASTM A860 Grade WPHY42, Seamless	BCAPAM5BEA71X11		
		1	2" to 12"	Cap, MSS SP-75, Bevel End, ASTM A860 Grade WPHY42, Seamless, PE Coated	BCAPAM5BEA71X1P		
		1	14" to 30"	Cap, MSS SP-75, Bevel End, ASTM A860 Grade WPHY70, Seamless, PE Coated	BCAPAM5BEA76X1P		
	VBAL	1	3" to 30"	Ball Valve Long Pattern Full Bore, API 6D, Class 600, Bevel End, Top Entry Trunnion Mounted Ball, Gear Operator, ASTM A352 Grade LCB, Trim 316SS w/RTFE Seats, w/Pup Piece, Fire Safe, KGSC Stamp	VBALAA9LBW3ACFX3 2YPB	V501, V503	

—End Of Report—

Piping Material Classification	Class C85A1	Page 1 of 1 Project No Rev. No. 0
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Service High Pressure Natural Gas for underground pipeline from BLT to B/V (optimized pipe thickness)	Base Material Carbon Steel w/PE Coated Design Code ASME B31.8 / API 5L Rating CL600, ASME B16.5 Corrosion Allow. Note2 PWHT No Service Requirement No
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Condition	Unit	Size	Pressure / Temperature Limits
Temperature	Deg.C		-29 ~ 65
Pressure	Barg	30"	75.52

Table of schedule for Pipe (Bevel)

<u>Rev.</u>	<u>Size(NPS)</u>	<u>Schedule</u>
	30"	12.7mm
	30"	14.3mm(Note1)

Table of schedule for 3D Bend

<u>Rev.</u>	<u>Size(NPS)</u>	<u>Schedule</u>
	30"	15.9mm
	30"	19.1mm(Note1)

Rev	Short Code	Option Code	Sizes	Description	Commodity Code	Notes
	PIPE	1	30"	Pipe, API 5L, Bevel End, API 5L Grade X70 PSL 1, SAWL, PE Coated		
	3DBEND	1	30"	3D Bend, API 5L, Bevel End, API 5L Grade X70 PSL 1, SAWL, PE Coated		

Note : 1. 14.3mm Pipe and 19.1mm 3D Bend shall be used only for 700m urgent construction section.
2. Corrosion Allow. Is applied to Wall Thickness Calculation Equation of the KGS FS451 2.5.4

Piping Material Classification	Class	Page 1 of 4
	C95A	Project No 121380F
		Rev. No. 0

Service High Pressure Natural Gas	Base Material	Carbon Steel
	Design Code	ASME B31.8
	Rating	CL600, ASME B16.5
	Corrosion Allow.	1.2mm
	PWHT	No
	Service Requirement	No

Condition	Unit	Size	Pressure / Temperature Limits
Temperature	Deg.C	-	-29 ~ 65
Pressure	Barg	1/2" to 30"	78.5 / 75.52

Table of Schedule (Plain /Beveled)

Rev.	Size (NPS)	Schedule
	1/2"	S-80
	3/4"	S-80
	1"	S-80
	1-1/2"	S-80
	2"	S-80
	3"	S-40
	4"	S-40
	6"	S-40
	8"	9.53mm
	10"	12.70mm
	12"	14.27mm
	14"	7.92mm
	16"	9.53mm
	18"	10.31mm
	20"	11.91mm
	24"	12.70mm
	26"	14.27mm
	30"	15.88mm

Table of Schedule (Threaded)

Rev.	Size (NPS)	Schedule
	1/2"	S-80
	3/4"	S-80
	1"	S-80
	1-1/2"	S-80
	2"	S-80
	3"	S-40
	4"	S-40
	6"	S-40
	8"	9.53mm
	10"	12.70mm
	12"	14.27mm
	14"	7.92mm
	16"	9.53mm
	18"	10.31mm
	20"	11.91mm
	24"	12.70mm
	26"	14.27mm
	30"	15.88mm

Fitting Selection Tables

Rev.	Table Name	Type
	Branch	N/A
	Reducing	N/A

Notes

Rev.	No.	Description
	V501	All ball bevel ended valves shall be provided with pup piece welded on each end as following : Under and 2 NPS : 100mm NPS 3 ~ NPS 8 : 150mm NPS 10 and over : 200mm
	V503	All offered valves shall be inspected and stamped by KGSC.
	483	Reduced Bore Ball Valves shall be prohibited in Trukline(To be passed The Pigs).
	999	Use for API 5L Grade X65 Material Only

Table of Schedule for Elbow (Plain /Beveled) for X79

Rev.	Size (NPS)	Schedule
	1/2"	S-80
	3/4"	S-80
	1"	S-80
	1-1/2"	S-80
	2"	S-80
	3"	S-40
	4"	S-40
	6"	7.9mm
	8"	9.53mm
	10"	12.70mm
	12"	14.27mm
	14"	9.53mm
	16"	11.10mm
	18"	11.91mm
	20"	14.27mm
	24"	15.88mm
	26"	17.48mm
	30"	20.62mm

Table of Schedule for Cap (Plain /Beveled) for X79

Rev.	Size (NPS)	Schedule
	1/2"	S-80
	3/4"	S-80
	1"	S-80
	1-1/2"	S-80
	2"	S-80
	3"	S-40
	4"	S-40
	6"	7.9mm
	8"	9.53mm
	10"	12.70mm
	12"	S-60
	14"	10.31mm
	16"	11.10mm
	18"	12.70mm
	20"	14.27mm
	24"	17.48mm
	26"	19.05mm
	30"	20.62mm

Piping Material Classification	Class	Page	2 of 4
	C95A	Project No	121380F
		Rev. No.	0

Table of Schedule (Plain /Beveled) for X65

Rev.	Size (NPS)	Schedule
	1/2"	S-80
	3/4"	S-80
	1"	S-80
	1-1/2"	S-80
	2"	S-80
	3"	S-80
	4"	S-80
	30"	17.48mm

Table of Schedule for Cap (Plain /Beveled) for X65

Rev.	Size (NPS)	Schedule
	30"	22.23mm

Table of Schedule for Tee (Plain /Beveled) for X65

Rev.	Size (NPS)	Schedule
	10"	12.70mm
	20"	23.83mm
	30"	33.32mm

Table of Schedule for Elbow (Plain /Beveled) for X65

Rev.	Size (NPS)	Schedule
	30"	22.23mm

Piping Material Classification					Class	Page	3 of 4
					C95A	Project No.	121380F
						Rev. No.	0
Rev.	Short Code	Option Code	Sizes	Description	Commodity Code	Notes	
	PIP	1	1/2" to 4"	Pipe, API 5L, Plain End, API 5L Grade X42 PSL 1, Seamless	PPPAABEAEX11		
		1	6" to 12"	Pipe, API 5L, Bevel End, API 5L Grade X42 PSL 1, ERW	PPPAABEAEX21		
		1	14" to 30"	Pipe, API 5L, Bevel End, API 5L Grade X70 PSL 1, SAWL	PPPAABEAEMX1		
		999	1/2" to 4"	Pipe, API 5L, Bevel End, API 5L Grade X42 PSL 1, Seamless	PPPAABEAEX11		
		999	14" to 30"	Pipe, API 5L, Bevel End, API 5L Grade X65 PSL 1, SAWL	PPPAABEAELX1		
	FLG	1	1/2" to 12"	Flange WN, ASME B16.5, Class 600, Ring Type Joint, ASTM A105	FWNA11LJTACGZZ		
		1	14" to 24"	Flange WN, ASME B16.5, Class 600, Ring Type Joint, ASTM A694 Grade F70	FWNA11LJTA38ZZZ		
		1	26" to 30"	Flange WN, ASME B16.47 Series A, Class 600, Ring Type Joint, ASTM A694 Grade F70	FWNA13LJTA38ZZZ		
	FBL	1	1/2" to 12"	Blind Flange, ASME B16.5, Class 600, Ring Type Joint, ASTM A105	FBLA11LJTACGZZZ		
		1	14" to 24"	Blind Flange, ASME B16.5, Class 600, Ring Type Joint, ASTM A694 Grade F65	FBLA11LJTA37ZZZ		
		1	26" to 30"	Blind Flange, ASME B16.47 Series A, Class 600, Ring Type Joint, ASTM A694 Grade F65	FBLA13LJTA37ZZZ		
	GSK	1	1/2" to 24" (mm)	Gasket Octagonal Ring Joint, ASME B16.20, Class 600, Ring Type Joint, Soft Iron, ASME B16.5	GR8AB6LJTA1X1A		
		1	26" to 30" (mm)	Gasket Octagonal Ring Joint, ASME B16.20, Class 600, Ring Type Joint, Soft Iron, ASME B16.47 Series A	GR8AB6LJTA1X71		
	BLT	1	U1/2 to U2 (60 to 560mm)	Stud Bolt W/2 Heavy Hex Nuts, ASME B18.2.2, ASTM A193 B7 / A194 2H, Galvanized	L22ABPABIX21		
	E45	1	1/2" to 4"	Elbow 45 Deg. R=1.5D, MSS SP-75, Bevel End, ASTM A860 Grade WPHY42, Seamless	BE4LAM5BEA71X11		
		1	6" to 12"	Elbow 45 Deg. R=1.5D, MSS SP-75, Bevel End, ASTM A860 Grade WPHY42, Welded	BE4LAM5BEA71X31		
		1	14" to 30"	Elbow 45 Deg. R=1.5D, MSS SP-75, Bevel End, ASTM A860 Grade WPHY70, Welded	BE4LAM5BEA76X31		
		999	30"	Elbow 45 Deg. R=1.5D, MSS SP-75, Bevel End, ASTM A860 Grade WPHY65, Welded	BE4LAM5BEA75X31	999	
	E90	1	1/2" to 4"	Elbow 90 Deg. LR R=1.5D, MSS SP-75, Bevel End, ASTM A860 Grade WPHY42, Seamless	BE9LAM5BEA71X11		

Piping Material Classification					Class C95A	Page Project No. Rev. No.	4 of 4 121380F 0
Rev.	Short Code	Option Code	Sizes	Description	Commodity Code	Notes	
	E90	1	6" to 12"	Elbow 90 Deg. LR R=1.5D, MSS SP-75, Bevel End, ASTM A860 Grade WPHY42, Welded	BE9LAM5BEA71X31		
		1	14" to 30"	Elbow 90 Deg. LR R=1.5D, MSS SP-75, Bevel End, ASTM A860 Grade WPHY70, Welded	BE9LAM5BEA76X31		
		999	30"	Elbow 90 Deg. LR R=1.5D, MSS SP-75, Bevel End, ASTM A860 Grade WPHY65, Welded	BE9LAM5BEA75X31	999	
	CAP	1	1/2" to 12"	Cap, MSS SP-75, Bevel End, ASTM A860 Grade WPHY42, Seamless	BCAPAM5BEA71X11		
		1	14" to 30"	Cap, MSS SP-75, Bevel End, ASTM A860 Grade WPHY70, Seamless	BCAPAM5BEA76X11		
		999	30"	Cap, MSS SP-75, Bevel End, ASTM A860 Grade WPHY65, Seamless	BCAPAM5BEA75X11	999	
	90TEE	1	14" to 30"	Tee Equal, MSS SP-75, Bevel End, ASTM A860 Grade WPHY70, Welded, Crotch Thk more than 150% of Nominal Wall Thk	BTEEAM5BEA76X3T		
		999	14" to 30"	Tee Equal, MSS SP-75, Bevel End, ASTM A860 Grade WPHY65, Welded, Crotch Thk more than 150% of Nominal Wall Thk	BTEEAM5BEA75X3T		
	90TRE	999	30" (14" to 20")	Tee Reducing, MSS SP-75, Bevel End, ASTM A860 Grade WPHY65, Welded, Crotch Thk more than 150% of Nominal Wall Thk	BTERAM5BEA75X3T		
	90WOL	1	1/2" to 10" (3" to 30")	Weldolet, MSS SP-97, Bevel End, ASTM A105	BWELAM9BEACGZZZ		
		911	1" to 4" (30")	Weldolet, MSS SP-97, Bevel End, ASTM A105	BWELAM9BEACGZZZ		
	VBAL	1	1/2" to 2"	Ball Valve Long Pattern Full Bore, API 6D, Class 600, Bevel End, Top Entry Floating Ball, Lever Operator, ASTM A352 Grade LCB, Trim 316SS w/RTFE Seats, w/Pup Piece, Fire Safe, KGSC Stamp	VBALAA9LBEV2ACFX3 2YPB	V501, V503	
		1	3" to 4"	Ball Valve Long Pattern Full Bore, API 6D, Class 600, Bevel End, Top Entry Trunnion Mounted Ball, Lever Operator, ASTM A352 Grade LCB, Trim 316SS w/RTFE Seats, w/Pup Piece, Fire Safe, KGSC Stamp	VBALAA9LBEW2ACFX3 2YPB	V501, V503	
		1	6" to 30"	Ball Valve Long Pattern Full Bore, API 6D, Class 600, Bevel End, Top Entry Trunnion Mounted Ball, Gear Operator, ASTM A352 Grade LCB, Trim 316SS w/RTFE Seats, w/Pup Piece, Fire Safe, KGSC Stamp	VBALAA9LBEW3ACFX3 2YPB	V501, V503	
		483	6" to 30"	Ball Valve Long Pattern Reduced Bore, API 6D, Class 600, Bevel End, Top Entry Trunnion Mounted Ball, Gear Operator, ASTM A352 Grade LCB, Trim 316SS w/RTFE Seats, w/Pup Piece, Fire Safe, KGSC Stamp	VBMAA9LBEW3ACFX 32YPB	V501, V503, 483	
		463	1/2" to 1-1/2"	Ball Valve Reduced Bore, API 608, Class 800, Socket Weld End, Side Entry Floating Ball, Lever Operator, ASTM A350 Grade LF2 Class 1, Trim 316SS w/RTFE Seats, w/S-160 Nipple Plain End x Male Threaded End L=100mm, Fire Safe, KGSC Stamp	VB1AA7MSWD2ACRX 32YA8	V503	

—End Of Report—

Piping Material Classification	Class D91A1	Page 1 of 1 Project No Rev. No. 0
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Service NG(U/G)	Base Material Carbon Steel w/PE Coated Design Code ASME B31.3 Rating CL900, ASME B16.5 Corrosion Allow. 1.5mm PWHT NPS 16 & Over Service Requirement No
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Condition	Unit	Size	Pressure / Temperature Limits
Temperature	Deg.C	2	-29 ~ 65
Pressure	Barg	10" & 14"	121

Table of schedule for Pipe (Bevel)

<u>Rev.</u>	<u>Size(NPS)</u>	<u>Schedule</u>
	10"	S-80
	14"	S-80

Rev	Short Code	Option Code	Sizes	Description	Commodity Code	Notes
	PIPE	1	10" & 14"	Pipe, API 5L, Bevel End, API 5L Grade X70 PSL 1, SAWL, PE Coated		
	E90	1	10" & 14"	Elbow 90 Deg., LR=1.5D, ASME B16.9, Bevel End, ASTM A234 Grade WPB, Welded, 100% Radlography, PE Coated		
	E45	1	10" & 14"	Elbow 45 Deg., LR=1.5D, ASME B16.9, Bevel End, ASTM A234 Grade WPB, Welded, 100% Radlography, PE Coated		

Note : 1. API 5L Grade X70 Shall be 100% radiographic tested in lieu of UT.

Piping Material Classification			Class A21F	Page 1 of 4
			Project No 180320	
			Rev. No. 1	
Service IA : Instrument Air			Base Material 304SS	
			Design Code ASME B31.3	
			Rating CL150, ASME B16.5	
			Corrosion Allow. 0.0mm	
			PWHT No	
			Service Requirement No	
Condition	Unit	Size	Pressure / Temperature Limits	
Temperature	Deg.C	-	-29	38 50 65
Pressure	Mpa	1/2" to 6"	1.90 1.90 1.83 1.75	(P.T)
(P.T) : Flange or Valve Pressure-Temperature Rating of ASME B16.5				

Table of Schedule (Plain /Beveled)

Rev.	Size (NPS)	Schedule
	1/2"	S-40S
	3/4"	S-40S
	1"	S-40S
	1-1/2"	S-40S
	2"	S-10S
	3"	S-10S
	4"	S-10S
	6"	S-10S

Table of Schedule (Threaded)

Rev.	Size (NPS)	Schedule
	1/2"	S-80S
	3/4"	S-80S
	1"	S-80S
	1-1/2"	S-80S

Fitting Selection Tables

Rev.	Table Name	Type
	Branch	BRANCH TABLE 3
	Reducing	REDUCING TABLE 1

Notes

Rev.	No.	Description
	(C101)	Piston type check valves (1/2" to 1-1/2"), for horizontal mounting only.
	(P101)	Use only for underground

Piping Material Classification					Class A21F	Page Project No. Rev. No.	2 of 4 180320 1
Rev.	Short Code	Option Code	Sizes	Description	Commodity Code	Notes	
	PIP	1	1/2" to 1-1/2"	Pipe, ASME B36.19M, Plain End, ASTM A312 Grade TP304, Seamless	PPPABRPEAT1X11		
		1	2" to 6"	Pipe, ASME B36.19M, Bevel End, ASTM A312 Grade TP304, Seamless	PPPABRBEAT1X11		
		831	2" to 6"	Pipe, ASME B36.19M, Plain End, ASTM A312 Grade TP304, Seamless, PE Coated	PPPABRPEAT1X1P	(P101)	
	NIPL	1	1/2" to 1-1/2"	Nipple, ASME B36.19M, Plain Both Ends, ASTM A312 Grade TP304, Seamless, 100mm Long	ONIPABRPEAT1X21		
	FLG	1	1/2" to 1-1/2"	Flange SW, ASME B16.5, Class 150, Raised Face, ASTM A182 Grade F304	FSWA11DRFARLZZZ		
		1	2" to 6"	Flange WN, ASME B16.5, Class 150, Raised Face, ASTM A182 Grade F304	FWNA11DRFARLZZZ		
		131	1/2" to 1-1/2"	Flange SW, ASME B16.5, Class 150, Flat Face, ASTM A182 Grade F304	FSWA11DFFARLZZZ	(P101)	
		131	2" to 6"	Flange WN, ASME B16.5, Class 150, Flat Face, ASTM A182 Grade F304	FWNA11DFFARLZZZ	(P101)	
	FBL	1	1/2" to 6"	Blind Flange, ASME B16.5, Class 150, Raised Face, ASTM A182 Grade F304	FBLA11DRFARLZZZ		
	F8	1	1/2" to 6"	Paddle Spacer & Blank, ASME B16.48, Class 150, Flat Face, ASTM A182 Grade F304	D88A12DFFARLZZZ		
	GSK	1	1/2" to 12" (4.5mm)	Gasket Spiral Wound, ASME B16.20, Class 150, Raised Face, 316SS, Graphite Fill, 316SS CR & IR, ASME B16.5	GSWAB6DRFA1DX1A		
		131	1/2" to 6" (3.2mm)	Gasket Non Metallic Flat, ASME B16.21, Class 150, Flat Face, Natural Rubber w/Reinforced Cotton, ASME B16.5	GNMAB7DFFAXDX1A	(P101)	
		4901	1/2" to 24" (3.2mm)	Insulation Kit, ASME B16.21, Class 150, Flat Face, Phenolic w/Laminated Rubber Seal, ASME B16.5, w/Insulation Sleeve & Washer, Steel Washer, Bolt & Nut	GIGAB7DFFAT7XX1		
		4901	26" to 48" (3.2mm)	Insulation Kit, ASME B16.21, Class 150, Flat Face, Phenolic w/Laminated Rubber Seal, ASME B16.47 Series A, w/Insulation Sleeve & Washer, Steel Washer, Bolt & Nut	GIGAB7DFFAT7XX2		
	BLT	1	U1/2 to U1-1/2 (60 to 390mm)	Stud Bolt W/2 Heavy Hex Nuts, ASME B18.2.2, ASTM A193 B8 Class 2 / A194 8	L22ABPAGTZZZ		
	E45	1	1/2" to 1-1/2"	Elbow 45 Deg., ASME B16.11, Class 3000, Socket Weld End, ASTM A182 Grade F304	OE45AB2SSWARLZZZ		
		1	2" to 6"	Elbow 45 Deg. R=1.5D, ASME B16.9, Bevel End, ASTM A403 Grade WP304, Seamless	BE4LABMBEAS7X11		
	E90	1	1/2" to 1-1/2"	Elbow 90 Deg., ASME B16.11, Class 3000, Socket Weld End, ASTM A182 Grade F304	OE90AB2SSWARLZZZ		
		1	2" to 6"	Elbow 90 Deg. LR R=1.5D, ASME B16.9, Bevel End, ASTM A403 Grade WP304, Seamless	BE9LABMBEAS7X11		



Piping Material Classification					Class A21F	Page Project No. Rev. No.	3 of 4 180320 1
Rev.	Short Code	Option Code	Sizes	Description	Commodity Code	Notes	
	CAP	1	1/2" to 1-1/2"	Cap, ASME B16.11, Class 3000, Socket Weld End, ASTM A182 Grade F304	OCAPAB2SSWARLZZ		
		1	2" to 6"	Cap, ASME B16.9, Bevel End, ASTM A403 Grade WP304, Seamless	BCAPABMBEAS7X11		
		406	1/2" to 1-1/2"	Cap, ASME B16.11, Class 3000, Female Threaded End, ASTM A182 Grade F304	OCAPAB2STFARLZZ		
	90TEE	1	1/2" to 1-1/2"	Tee Equal, ASME B16.11, Class 3000, Socket Weld End, ASTM A182 Grade F304	OETEAB2SSWARLZZ		
		1	2" to 6"	Tee Equal, ASME B16.9, Bevel End, ASTM A403 Grade WP304, Seamless	BTEEABMBEAS7X11		
	90TRE	1	3/4" to 1-1/2" (1/2" to 1")	Tee Reducing, ASME B16.11, Class 3000, Socket Weld End, ASTM A182 Grade F304	ORTEAB2SSWARLZZ		
		1	3" to 6" (2" to 4")	Tee Reducing, ASME B16.9, Bevel End, ASTM A403 Grade WP304, Seamless	BTERABMBEAS7X11		
	SWGC	1	3/4" to 1-1/2" (1/2" to 1")	Swage Con., MSS SP-95, Plain Both Ends, ASTM A403 Grade WP304, Seamless	OSGCAM8PEAS7X11		
		1	2" (1/2" to 1-1/2")	Swage Con., MSS SP-95, Bevel Large End x Plain Small End, ASTM A403 Grade WP304, Seamless	OSGCAM8BPAS7X11		
	SWGE	1	3/4" to 1-1/2" (1/2" to 1")	Swage Ecc., MSS SP-95, Plain Both Ends, ASTM A403 Grade WP304, Seamless	OSGEAM8PEAS7X11		
		1	2" (1/2" to 1-1/2")	Swage Ecc., MSS SP-95, Bevel Large End x Plain Small End, ASTM A403 Grade WP304, Seamless	OSGEAM8BPAS7X11		
	REDC	1	2-1/2" to 6" (2" to 4")	Reducer Con., ASME B16.9, Bevel End, ASTM A403 Grade WP304, Seamless	BRECBMBEAS7X11		
	REDE	1	2-1/2" to 6" (2" to 4")	Reducer Ecc., ASME B16.9, Bevel End, ASTM A403 Grade WP304, Seamless	BREEABMBEAS7X11		
	NPFL	1	1/2" to 1-1/2" (2" to 6")	Nipoflange, Manf. Std., Class 150, Raised Face, ASTM A182 Grade F304, L=150mm, ASME B16.5	ONPFAP2DRFARLXF		
	CPLR	1	3/4" to 1-1/2" (1/2" to 1")	Reducing Coupling, Manf. Std., Class 3000, Socket Weld End, ASTM A182 Grade F304	OCPRAP2SSWARLZZ		
	CPL	1	1/2" to 1-1/2"	Full Coupling, ASME B16.11, Class 3000, Socket Weld End, ASTM A182 Grade F304	OCPLAB2SSWARLZZ		
	CPLH	1	1/2" to 1-1/2"	Half Coupling, ASME B16.11, Class 3000, Socket Weld End, ASTM A182 Grade F304	OCPHAB2SSWARLZZ		
	VGAT	1	1/2" to 1-1/2"	Gate Valve, API 602, Class 800, Socket Weld End, Bolted Bonnet OS&Y, Handwheel Operator, ASTM A182 Grade F304, Trim 304SS w/Stellite Seats, Solid Wedge	VGRAASMSW21ARLX		

Piping Material Classification					Class A21F	Page Project No. Rev. No.	4 of 4 180320 1
Rev.	Short Code	Option Code	Sizes	Description	Commodity Code	Notes	
	VGAT	1	2" to 4"	Gate Valve, API 603, Class 150, Raised Face, Bolted Bonnet OS&Y, Handwheel Operator, ASTM A351 Grade CF8, Trim 304SS w/Stellite Seats, Flexible Wedge, ASME B16.5	VGRAA6DRF21AR6X2 2X11		
		1	6"	Gate Valve, API 603, Class 150, Raised Face, Bolted Bonnet OS&Y, Gear Operator, ASTM A351 Grade CF8, Trim 304SS w/Stellite Seats, Flexible Wedge, ASME B16.5	VGRAA6DRF23AR6X2 2X11		
		403	1/2" to 1-1/2"	Gate Valve, API 602, Class 800, Socket Weld End x Female Threaded End, Bolted Bonnet OS&Y, Handwheel Operator, ASTM A182 Grade F304, Trim 304SS w/Stellite Seats, Solid Wedge	VGRAA5MSF21ARLX2 2XA1		
	VGLB	1	1/2" to 1-1/2"	Globe Valve, API 602, Class 800, Socket Weld End, Bolted Bonnet OS&Y, Handwheel Operator, ASTM A182 Grade F304, Trim 304SS w/Stellite Seats, Plug Disc	VLRA11MSW21ARLX 22XA1		
		1	2" to 4"	Globe Valve, BS 1873, Class 150, Raised Face, Bolted Bonnet OS&Y, Handwheel Operator, ASTM A351 Grade CF8, Trim 304SS w/Stellite Seats, Plug Disc, ASME B16.5	VLRA21DRF21AR6X2 2X11		
		1	6"	Globe Valve, BS 1873, Class 150, Raised Face, Bolted Bonnet OS&Y, Gear Operator, ASTM A351 Grade CF8, Trim 304SS w/Stellite Seats, Plug Disc, ASME B16.5	VLRA21DRF23AR6X2 2X11		
	VCHK	1	1/2" to 1-1/2"	Lift Check Valve Piston Type, API 602, Class 800, Socket Weld End, Bolted Cover, ASTM A182 Grade F304, Trim 304SS w/Stellite Seats	VCPCA11MSW5ARLX 22ZZZ	(C101)	
		1	2" to 6"	Swing Check Valve, API 594 Type B, Class 150, Raised Face, Bolted Cover, ASTM A351 Grade CF8, Trim 304SS w/Stellite Seats, ASME B16.5	VCSCAA3DRF5AR6X2 2X11		
	VBAL	1	1/2" to 1-1/2"	Ball Valve Reduced Bore, API 608, Class 800, Socket Weld End, Split Body Floating Ball, Lever Operator, ASTM A182 Grade F304, Trim 304SS w/PTFE Seats, w/S-80S Nipple Plain End L=100mm, Fire Safe	VB1AA7MSWO2ARLX 21XB1		
		1	2" to 4"	Ball Valve Long Pattern Reduced Bore, API 608, Class 150, Raised Face, Split Body Floating Ball, Lever Operator, ASTM A351 Grade CF8, Trim 304SS w/PTFE Seats, ASME B16.5, Fire Safe	VBMAA7DRF02AR6X 21X12		
		1	6"	Ball Valve Long Pattern Reduced Bore, API 608, Class 150, Raised Face, Split Body Trunnion Mounted Ball, Gear Operator, ASTM A351 Grade CF8, Trim 304SS w/PTFE Seats, ASME B16.5, Fire Safe	VBMAA7DRFP3AR6X 21X12		
		403	1/2" to 1-1/2"	Ball Valve Reduced Bore, API 608, Class 800, Socket Weld End, Split Body Floating Ball, Lever Operator, ASTM A182 Grade F304, Trim 304SS w/PTFE Seats, w/S-80S Nipple Plain End x Male Threaded End L=100mm, Fire Safe	VB1AA7MSWO2ARLX 21YA6		
		484	1/2" to 1-1/2"	Ball Valve Full Bore, API 608, Class 800, Socket Weld End, Split Body Floating Ball, Lever Operator, ASTM A182 Grade F304, Trim 304SS w/PTFE Seats, w/S-80S Nipple Plain End L=100mm, Fire Safe	VB2AA7MSWO2ARLX 21XB1		

Attachment #3
Branch and Reducing Table

1. Branch Table

■ **BRANCH TABLE 1**

PIPING SERVICE CLASS : A11J, A11J1, A15B, A17B, A21A, B21A, D15B, D17B, D21A, D91A

1/2	F
3/4	F F
1	F F F
1-1/2	F F F F
2	S S S S B
3	S S S S B B
4	S S S S S B B B
6	S S S S S P B B B
8	S S S S S P P B B B
10	S S S S S P P B B B B
12	S S S S S P P P B B B B
14	S S S S S P P P B B B B B
16	S S S S S P P P B B B B B B
18	S S S S S P P P P B B B B B B
20	S S S S S P P P P B B B B B B B
22	S S S S S P P P P P B B B B B B B
24	S S S S S P P P P P B B B B B B B B
30	S S S S S P P P P P P P B B B B B B B
48	S S S S S P P P P P P P P P P B B B B
Run Branch	1/2 3/4 1 1-1/2 2 3 4 6 8 10 12 14 16 18 20 22 24 30 48

LEGEND

C : Half Coupling (SW)

S : Reinforced Socket Outlet

W : Reinforced Welded Outlet

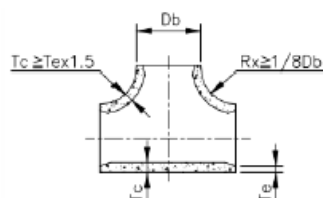
F : Forged Tee

B : Tee (Butt Weld)

N : Pipe to Pipe (Without Pad)

P : Pipe to Pipe (With Pad)

- Note : Tee or Reducing tee is used to the welding tee accordance with to ASME B31.3 Appendix D



- 1) Te is determined to the pipe schedule of piping material specification.
- 2) The part of B.W is beveled in accordance with ASME B16.9.

LEGEND
C : Half Coupling(SWorTHR S : Reinforced Outlet(SWorTHR W : Reinforced Welded Outlet F : Forged Tee
B : Tee (Butt Weld) N : Pipe to Pipe (Without Pad) P : Pipe to Pipe (With Pad)

2. Reducing Table

■ REDUCING TABLE 1
PIPING SERVICE CLASS : ALL PIPING CLASSES

[illegible]