



						
0	'18.03.14	FOR CONSTRUCTION	HOL	YHDK	KMK	
A	'18.01.31	FOR APPROVAL	HOL	YHDK	KMK	
REV. NO.	DATE	DESCRIPTION	DGN	CHK	APP	CL.APP
 <b>한국조선해양기자재연구원</b> Korea Marine Equipment Research Institute						
LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계						
PIPING MATERIAL SPECIFICATION						
SCALE	JOB NO.	PHASE	DOCUMENT NO.		REV.	
NONE			LTB-P-SPC-1000		0	
 <b>한국가스기술공사</b> KOREA GAS TECHNOLOGY CORPORATION						

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 2 OF 49


## 목 차

1. ABBREVIATION TABLE
2. INDEX OF PIPING MATERIAL CLASSES
3. PIPING MATERIAL SPECIFICATIONS
4. BRANCH TABLE
5. PRESSURE TAP INSTALLATION DWG.
6. THERMOWELL INSTALLATION DWG.
7. DRAIN/VENT INSTALLATION DWG.
8. LT INSTALLATION DWG.
9. IA INSTALLATION DWG.
10. VALVE DESCRIPTION

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 3 OF 49


## 1. ABBREVIATION TABLE

ABBREVIATION	DESCRIPTION	ABBREVIATION	DESCRIPTION
ASB	ASBESTOS	PBE	PLAIN BOTH ENDS
B&S	BALL & STEM	PE	PLAIN END
BE	BEVEL END	PLE/TSE	PLAIN LARGE END, THREAD SMALL END
BBE	BEVEL BOTH END	POE/TOE	PLAIN ONE END, THREAD ONE END
BLE/TSE	BEVEL LARGE END/ THREAD SMALL END	PWHT	POST WELDED HEAT TREATMENT
BW	BUTT WELD	RF	FLANGED RAISED FACE
C	COATING (OUTSIDE)	RT	RADIOGRAPHY TEST
CALC	CALCULATION THICKNESS	RTJ	RING TYPE JOINT FACE
CI	CAST IRON	SAW	SUBMERGED ARC WELDED
CON	CONCENTRIC	SCH	SCHEDULE
CS	CARBON STEEL	SMLS	SEAMLESS
D&V	DRAIN AND VENT	SS	STAINLESS STEEL
DUAL PL.WAFER	DUAL PLATE WAFER	ST	SEAT
ECC	ECCENTRIC	STD	STANDARD WEIGHT
EFW	ELECTRIC FUSION WELDED	STEL	STELLITE
ELL	ELBOW	SW	SOCKET WELD END or SPIRAL WOUND GASKET
ERW	ELECTRIC RESISTANCE WELDED	T/SW	THREAD/SOCKET WELDING
F.P	FULL PORT	TBE	THREAD BOTH ENDS
FAB	FABRICATION	TE	THREAD END
FF	FLANGED FLATE FACE	THRD	THREAD END
FIN	FINISHED	TOE/POE	THREAD ONE END, PLAIN ONE END
G.O	GEAR OPERATING	H OR V	HORIZONTAL OR VERTICAL
GALV	GALVANIZED	IN	INNER
GRAP	GRAPHITE	INST	INSTRUMENT
L	LINING (INSIDE)	INT	INTERNAL
M-M	METAL TO METAL	NR	NATURAL RUBBER
NPS	NOMINAL PIPE SIZE (INCH)	W/	WITH
NPT	NATIONAL TAPER PIPE THREAD END (ANSI)	XS	EXTRA STRONG WEIGHT
PLT	PLATE	XXS	DOUBLE EXTRA STRONG WEIGHT

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 4 OF 49

## 2. INDEX OF PIPING MATERIAL CLASSES


Spec.	Service	Rating, Face	Temperature, °C		Pressure, MPa (kg/cm <sup>2</sup> )		Pipe Material	Corr. All. (mm)
			Normal Max. Operation	Design	Normal Max. Operation	Design		
1P1	NG, NI, PA HWR/S	150# RF	70	-29 / 100	0.69 (7)	1.77 (18)	A53-B	1.2
3P1	NG	300# RF	50	-29 / 75	1.96 (20)	2.6 (26)	A53-B	1.2
25P1	NG	2500# RTJ	50	-29 / 75	31.38 (320)	34.2 (342)	A106-B	1.2
1R1J	LNG, NG, LN2	150# RF	-162 / 60	-196 / 65	1.35 (13.8)	1.77 (18)	A312-TP304	0
3R1J	LNG, NG, LN2,	300# RF	-162 / 60	-196 / 65	2.35 (24)	2.6 (26)	A312-TP304	0
25R1J	LNG, NG	2500# RTJ	-162 / 60	-196 / 65	31.38 (320)	34.2 (342)	A312-TP304	0
Z1	IA	150# RF	15	-29 / 65	0.69 (7)	1.2 (12)	A312-TP304	0


	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	PIPING MATERIAL SPECIFICATION	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 5 OF 49

### 3. PIPING MATERIAL SPECIFICATIONS

SERVICE FG,NI(LOW),HWS/R		DESIGN TEMPERATURE -29 ° C TO 100 ° C MAX		DESIGN PRESSURE(gauge) : MPa (kg/cm <sup>2</sup> ) 1.77 (18)		CLASS 1P1		
RATING ASME CLASS 150, RF		CORROSION ALLOWANCE 1.2 MM		MATERIAL CS				
ITEM		SIZE(NPS)		SCH/ CLASS	ENDS	DESCRIPTION	REMARK	
PIPE		1/2	-1 1/2	XS	PE	A53-B, SMLS		
		2	-6	STD	BE	A53-B, SMLS		
		8	-16	STD	BE	A53-B,ERW, W/100% RT		
NIPPLES								
NIPPLE		1/2	-1 1/2	160	PBE	A53-B,SMLS, 100MM		
NIPPLE		1/2	-1 1/2	160	POE/TOE	A53-B,SMLS, 100MM		
SWAGE (CON,ECC)		1/2	-2	XS	BLE/PSE	A234-WPB-S, MSS SP-95		
FITTINGS								
90 ELL		1/2	-1 1/2	3000 LB	SW	A105, ASME B16.11		
45ELL		1/2	-1 1/2	3000 LB	SW	A105, ASME B16.11		
TEE		1/2	-1 1/2	3000 LB	SW	A105, ASME B16.11		
PLUG		1/4	-1/4		THRD	A105, ROUND HEAD, ASME B16.11		
FULL COUPLING		1/2	-1 1/2	3000 LB	SW	A105, ASME B16.11		
SOCKOLET		1/2	-1 1/2	3000 LB	SW	A105, MSS SP-97		
SPECIAL COUPLING		1/2	-1 1/2	3000 LB	SW	A105, ASME B16.11,FOR THERMOWELL		
CAP		1/2	-1 1/2	3000 LB	SW	A105, ASME B16.11		
CAP		1/2	-1 1/2	3000 LB	THRD	A105, ASME B16.11		
REDUCING INSERT		1/2	-1 1/2	3000 LB	SW	A105, MSS SP-79		
UNION (GJ)		1/2	-1 1/2	3000 LB	SW	A105, INTEGRAL SEAT, MSS SP-83		
90 ELL		2	-14	SAME AS PIPE	BW	A234-WPB-S, ASME B16.9		
45 ELL		2	-14	"	BW	A234-WPB-S, ASME B16.9		
TEE		2	-14	"	BW	A234-WPB-S, ASME B16.9		
REDUCER (CON)		2	-14	"	BW	A234-WPB-S, ASME B16.9		
REDUCER (ECC)		2	-14	"	BW	A234-WPB-S, ASME B16.9		
CAP		2	-16	"	BW	A234-WPB-S, ASME B16.9		
90 ELL		16	-16	"	BW	A234-WPB-W, ASME B16.9, W/100% RT		
45 ELL		16	-16	"	BW	A234-WPB-W, ASME B16.9, W/100% RT		
TEE		16	-16	"	BW	A234-WPB-W, ASME B16.9, W/100% RT		
REDUCER (CON)		16	-16	"	BW	A234-WPB-W, ASME B16.9, W/100% RT		
REDUCER (ECC)		16	-16	SAME AS PIPE	BW	A234-WPB-W, ASME B16.9, W/100% RT		
VALVES								
GATE		1/2	-1 1/2	800 LB	SW	CS BODY W/ F6 (13 CR) TRIM		FOR PA
GATE		1/2	-1 1/2	800 LB	T/SW	CS BODY W/ F6 (13 CR) TRIM		
GATE		2	-4	150 LB	RF	CS BODY W/ F6 (13 CR) TRIM		
GATE		6	-16	150 LB	RF	CS BODY W/ F6 (13 CR) TRIM, G.O.		FOR NI,FG INST,D&V
GLOBE		1/2	-1 1/2	800 LB	SW	CS BODY W/ F6 (13 CR) TRIM		
GLOBE		2	-4	150 LB	RF	CS BODY W/ F6 (13 CR) TRIM		
GLOBE		6	-16	150 LB	RF	CS BODY W/ F6 (13 CR) TRIM, G.O		
PISTON CHECK		1/2	-1 1/2	800 LB	SW	CS BODY W/ F6 (13 CR) TRIM, H OR V		
WAFER CHECK		2	-16	150 LB	RF	CS BODY W/ 410 SS DISC/ST, DUAL PLT, H OR V		
BALL		1/2	-1 1/2	800 LB	SW	CS BODY W/ 316 SS B&S PTFE ST W/2 PBE NIPPLES		
BALL		1/2	-1 1/2	800 LB	SW	CS BODY W/ 316 SS B&S PTFE ST W/PBE,POE/TOE NIPPLES		
BALL		2	-4	150 LB	RF	CS BODY W/ 316 SS B&S PTFE ST		
BALL		6	-16	150 LB	RF	CS BODY W/ 316 SS B&S PTFE ST, G.O.		
FLANGES								
SOCKET WELD		1/2	-1 1/2	150 LB	RF	A105, ASME B16.5, STD FIN	NOTE 1	
BLIND		1/2	-16	150 LB	RF	A105, ASME B16.5, STD FIN		
WELD NECK		2	-16	150 LB	RF	A105, ASME B16.5, STD FIN		
SOCKET WELD		1/2	-1 1/2	300 LB	RF	A105, ASME B16.5, STD FIN		
WELD NECK		2	-16	300 LB	RF	A105, ASME B16.5, STD FIN		
GASKETS		1/2	-16	150 LB	RF	SW(304+NON-ASB),CENTER RING: CS,4.5MM		
BOLTING								
STUD BOLTS		1/2	-16	150 LB	RF	A193-B7/A194-2H		
MISCELLANEOUS								
FIGURE 8		2	-12	150 LB	RF	A516-70, STD FIN,API-590		
SPACER		14	-16	150 LB	RF	A516-70, STD FIN,API-590		
CIRCULAR BLANK		14	-16	150 LB	RF	A516-70, STD FIN,API-590		


NOTE: 1. 300 LB RF FLANGES SHALL BE USED ONLY FOR SPEC BREAK POINTS WITH 3P1 OR 1R1J CLASS AND IN THIS CASE, GASKETS & BOLT/NUTS OF 3P1 OR 1R1J CLASS SHALL BE APPLIE TO THE SPEC BREAK POINTS.

<div></div>		LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계			2018.03.14				
		PIPING MATERIAL SPECIFICATION			REVISION : 0				
		Document No : LTB-P-SPC-1000			PAGE : 6 OF 49				
SERVICE NG,		DESIGN TEMPERATURE -29 ° C TO 75 ° C MAX		DESIGN PRESSURE(gauge) : MPa (kg/cm <sup>2</sup> ) 2.6 (26)		CLASS 3P1			
RATING ASME CLASS 300, RF		CORROSION ALLOWANCE 1.2 MM		MATERIAL CS					
ITEM		SIZE(NPS)		SCH/CLASS		ENDS	DESCRIPTION		REMARK
PIPE		1/2 -1 1/2 2 -6 8 -14		XS STD STD		PE BE BE	A53-B,SMLS A53-B,SMLS A53-B,ERW,W/100% RT		
NIPPLES									
NIPPLE		1/2 -1 1/2		160		PBE	A53-B,SMLS, 100MM		
NIPPLE		1/2 -1 1/2		160		POE/TOE	A53-B,SMLS, 100MM		
SWAGE (CON,ECC)		1/2 -2		XS		BLE/PSE	A234-WPB-S, MSS SP-95		
FITTINGS									
90 ELL		1/2 -1 1/2		3000 LB		SW	A105, ASME B16.11		
45 ELL		1/2 -1 1/2		3000 LB		SW	A105, ASME B16.11		
TEE		1/2 -1 1/2		3000 LB		SW	A105, ASME B16.11		
PLUG		1/4 -1/4				THRD	A105, ROUND HEAD, ASME B16.11		
FULL COUPLING		1/2 -1 1/2		3000 LB		SW	A105, ASME B16.11		
SOCKOLET		1/2 -1 1/2		3000 LB		SW	A105, MSS SP-97		
SPECIAL COUPLING		1/2 -1 1/2		3000 LB		SW	A105, ASME B16.11,FOR THERMOWELL		
CAP		1/2 -1 1/2		3000 LB		SW	A105, ASME B16.11		
CAP		1/2 -1 1/2		3000 LB		THRD	A105, ASME B16.11		
REDUCING INSERT		1/2 -1 1/2		3000 LB		SW	A105, MSS SP-79		
UNION (GJ)		1/2 -1 1/2		3000 LB		SW	A105, INTEGRAL SEAT, MSS SP-83		
90 ELL		2 -14		SAME AS PIPE		BW	A234-WPB-S, ASME B16.9		
45 ELL		2 -14		"		BW	A234-WPB-S, ASME B16.9		
TEE		2 -14		"		BW	A234-WPB-S, ASME B16.9		
REDUCER (CON)		2 -14		"		BW	A234-WPB-S, ASME B16.9		
REDUCER (ECC)		2 -14		"		BW	A234-WPB-S, ASME B16.9		
CAP		2 -14		SAME AS PIPE		BW	A234-WPB-S, ASME B16.9		
VALVES									
GATE		1/2 -1 1/2		800 LB		SW	CS BODY W/ F6 (13 CR) TRIM		
GATE		1/2 -1 1/2		800 LB		T/SW	CS BODY W/ F6 (13 CR) TRIM,		
GATE		2 -4		300 LB		RF	CS BODY W/ F6 (13 CR) TRIM		
GATE		6 -14		300 LB		RF	CS BODY W/ F6 (13 CR) TRIM, G.O.		
GLOBE		1/2 -1 1/2		800 LB		SW	CS BODY W/ F6 (13 CR) TRIM		
GLOBE		2 -4		300 LB		RF	CS BODY W/ F6 (13 CR) TRIM		
GLOBE		6 -14		300 LB		RF	CS BODY W/ F6 (13 CR) TRIM, G.O.		
PISTON CHECK		1/2 -1 1/2		800 LB		SW	CS BODY W/ F6 (13 CR) TRIM, H OR V		
WAFER CHECK		2 -14		300 LB		RF	CS BODY W/ 410 SS DISC/ST, DUAL PLT, H OR V		
BALL		1/2 -1 1/2		800 LB		SW	CS BODY W/ 316 SS B&S PTFE ST W/2 PBE NIPPLES		
BALL		1/2 -1 1/2		800 LB		SW	CS BODY W/ 316 SS B&S PTFE ST W/PBE&POE/TOE NIPPLE		FOR INST,D&V
BALL		2 -4		300 LB		RF	CS BODY W/ 316 SS B&S PTFE ST		
BALL		6 -14		300 LB		RF	CS BODY W/ 316 SS B&S PTFE ST,G.O		
FLANGES									
SOCKET WELD		1/2 -1 1/2		300 LB		RF	A105, ASME B16.5 STD FIN		
WELD NECK		2 -14		300 LB		RF	A105, ASME B16.5 STD FIN		
BLIND		1/2 -14		300 LB		RF	A105, ASME B16.5 STD FIN		
WELD NECK		2 -14		2500 LB		RTJ	A105, ASME B16.5 STD FIN		
GASKETS		1/2 -14		300 LB		RF	SW(304+NON-ASB),CENTER RING: CS,4.5MM		
BOLTING									
STUD BOLTS		1/2 -14		300 LB		RF	A193-B7/A194-2H		
MISCELLANEOUS									
FIGURE 8		2 -12		300 LB		RF	A516-70, STD FIN,API-590		
SPACER		14 -14		300 LB		RF	A516-70, STD FIN,API-590		
CIRCULAR BLANK		14 -14		300 LB		RF	A516-70, STD FIN,API-590		

 <b>KOGAS-Tech</b>	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 7 OF 49

SERVICE NG	DESIGN TEMPERATURE -29 ° C TO 75 ° C		DESIGN PRESSURE(gauge) : MPa(kg/cm²) 34.2 (342)		CLASS 25P1
RATING ASME CLASS 2500, RTJ	CORROSION ALLOWANCE 1.2 MM		MATERIAL CS		
ITEM	SIZE(NPS)	SCH/ CLASS	ENDS	DESCRIPTION	REMARK
PIPE	1/2 -3 4 6	XXS 20.3MM 28.6MM	BE BE BE	A106-B,SMLS A106-B,SMLS A106-B,SMLS	
FITTINGS					
90 ELL	1/2 -6	SAME AS PIPE	BW	A234-WPB-S, ASME B16.9	
45 ELL	1/2 -6	SAME AS PIPE	BW	A234-WPB-S, ASME B16.9	
TEE	1/2 -6	SAME AS PIPE	BW	A234-WPB-S, ASME B16.9	
REDUCER (CON,ECC)	1/2 -6	SAME AS PIPE	BW	A234-WPB-S, ASME B16.9	
CAP	1/2 -6	SAME AS PIPE	BW	A234-WPB-S, ASME B16.9	
WELDOLET	1/2 -6	SAME AS PIPE	BW	A234-WPB-S, MSS SP-97	
VALVES					
GLOBE	1/2 -1 1/2	2500 LB	BW	CS BODY W/UNIVERSAL TRIM	
GLOBE	2 -6	2500 LB	BW	CS BODY W/UNIVERSAL TRIM, G.O.	
PISTON CHECK	1/2 -2	2500 LB	BW	CS BODY W/ F6 (13CR) TRIM, H OR V	
SWING CHECK	3 -6	2500 LB	BW	CS BODY W/ F6 (13CR) TRIM, H OR V	
BALL	1/2 -1 1/2	2500 LB	BW	CS BODY W/ 316 SS B&S PTFE ST W/ 2 BBE NIPPLES	
BALL	2 -6	2500 LB	BW	CS BODY W/ F6 (13CR) TRIM, PTFE ST G.O	
FLANGES					
WELD NECK	2 -3	2500 LB	RTJ	A105, ASME B16.5,	
BLIND	1/2 -3	2500 LB	RTJ	A105, ASME B16.5,	
GASKETS	1/2 -6	2500 LB	RTJ	SOFT IRON HB90 OVAL RING ASME B16.20	
BOLTING					
STUD BOLTS	1/2 -3	2500 LB	RTJ	A193-B7/A194-2H	
MISCELLANEOUS					

NOTE: 1. IN CASE OF MORE THAN 19 mm IN THICKNESS, PWHT SHALL BE EXECUTED ACCORDING TO ASME B 31.3 TABLE 331.1.1.

 <b>KOGAS-Tech</b>	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 8 OF 49

SERVICE LNG,NG,LN2,IA,PA		DESIGN TEMPERATURE -196 ° C TO 65 ° C		DESIGN PRESSURE(gauge) : MPa(kg/cm <sup>2</sup> ) 1.77 (18 )	CLASS 1R1J
RATING ASME CLASS 150, RF		CORROSION ALLOWANCE 0.0 MM		MATERIAL 304SS	
ITEM	SIZE(NPS)	SCH/ CLASS	ENDS	DESCRIPTION	REMARK
PIPE	1/2 -1 1/2 2 -3 4 -6 8 -24	80S 40S 10S 10S	PE BE BE BE	A312-TP304, SMLS A312-TP304, SMLS A312-TP304, SMLS A312-TP304, EFW, W/100 % RT	
NIPPLES					
NIPPLE	1/2 -1 1/2	80 S	PBE	A312-TP304, SMLS, 100MM	
NIPPLE	1/2 -1 1/2	80 S	POE/TOE	A312-TP304, SMLS, 100MM	
SWAGE (CON,ECC)	1/2 -2	80 S	BLE/PSE	A403-WP304-S, MSS SP-95	
FITTINGS					
90 ELL	1/2 -1 1/2	3000LB	SW	A182-F304, ASME B16.11	
45 ELL	1/2 -1 1/2	3000LB	SW	A182-F304, ASME B16.11	
TEE	1/2 -1 1/2	3000LB	SW	A182-F304, ASME B16.11	
FULL COUPLING	1/2 -1 1/2	3000LB	SW	A182-F304, ASME B16.11	
SOCKOLET	1/2 -1 1/2	3000LB	SW	A182-F304, MSS SP-97	
SPECIAL COUPLING	1/2 -1 1/2	3000LB	SW	A182-F304, ASME B16.11, FOR THERMOWELL	
CAP	1/2 -1 1/2	3000LB	SW	A182-F304, ASME B16.11	
CAP	1/2 -1 1/2	3000LB	THRD	A182-F304, ASME B16.11	
PLUG	1/4 -1/4		THRD	A182-F304, ROUND HEAD, ASME B16.11	
REDUCING INSERT	1/2 -1 1/2	3000LB	SW	A182-F304, MSS-SP-79	
90 ELL	2 -12	SAME AS PIPE	BW	A403-WP304-S, ASME B16.9	
45 ELL	2 -12		BW	A403-WP304-S, ASME B16.9	
TEE	2 -12		BW	A403-WP304-S, ASME B16.9	
REDUCER (CON)	2 -12		BW	A403-WP304-S, ASME B16.9	
REDUCER (ECC)	2 -12		BW	A403-WP304-S, ASME B16.9	
CAP	2 -12		BW	A403-WP304-S, ASME B16.9	
VALVES					
GATE	2 -4	150LB	BW	SS BODY(CF3) 316 SS TRIM, STEL	
GATE	6 -12	150LB	BW	SS BODY(CF3) 316 SS TRIM, STEL, G.O	
GLOBE	1/2 -1 1/2	800LB	SW	SS BODY(A182-F304L) 316 SS TRIM, STEL	
GLOBE	2 -4	150LB	BW	SS BODY(CF3) 316 SS TRIM, STEL	
GLOBE	6 -10	150LB	BW	SS BODY(CF3) 316 SS TRIM, STEL G.O	
PISTON CHECK	1/2 -1 1/2	800LB	SW	SS BODY&COVER (A182-F304L), 316 SS TRIM, STEL, H OR V	
SWING CHECK	2 -12	150LB	BW	SS BODY&COVER (CF3) 316 SS TRIM, STEL H OR V	
NON SLAM CHECK	2 -12	300LB	RF	SS BODYW/ 316 SS TRIM, STEL H OR V	
WAFLER CHECK	2 -12	300LB	RF	SS BODYW/ 316 SS DISC/ST, DUAL PLT H OR V	
BUTTERFLY	8 -12	150LB	BW	SS BODY (CF3) TOP INSPECTION PORT, G.O	
BALL	1/2 -1 1/2	800LB	SW	SS BODY (A182-F304L), 316 SS TRIM, Kel-F ST W/ 2 PBE NIPPLES	
BALL	1/2 -1 1/2	800LB	SW	SS BODY (A182-F304L), 316 SS TRIM, Kel-F ST W/ PBE, POE/TOE NIPPLES	
BALL	2 -4	150LB	BW	SS BODY (CF3) 316 SS TRIM, Kel-F ST.	
BALL	6 -10	150LB	BW	SS BODY (CF3) 316 SS TRIM, Kel-F ST. G.O	
FLANGES					
SOCKET WELD	1/2 -1 1/2	300LB	RF	A182-F304, ASME B16.5, 125 AARH	
WELD NECK	2 -12	300LB	RF	A182-F304, ASME B16.5, 125 AARH	
BLIND	1/2 -12	300LB	RF	A182-F304, ASME B16.5, 125 AARH	
GASKETS					
GASKET	1/2 -12	300LB	RF	SW(316+GRAP), CENTER RING: 316SS, 4.5MM	
BOLTING					
STUD BOLTS	1/2 -12	300LB	RF	A320-B8M CL.2/A194-8MA	
MISCELLANEOUS					
FIGURE 8	1 -1 1/2	300LB	RF	A240-304, 125 AARH, API-590	
SPACER	1 -12	300LB	RF	A240-304, 125 AARH, API-590	
CIRCULAR BLANK	1 -12	300LB	RF	A240-304, 125 AARH, API-590	


NOTE : 1. FOR SPEC BREAK POINTS WITH 3PI CLASS AND IN THIS CASE, GASKETS & BOLT/NUTS OF 3PI CLASS SHALL BE APPLIED TO THE SPEC BREAK POINTS.

2. INSPECTION/EXAMINATION/TESTING SHALL BE EXECUTED IN SEVERE CYCLIC CONDITION ACCORDING TO CHAP.VI OF ASME B31.3.

NOTE 1

SAFTY SYSTEM 에서  
FIGURE 8 이용




 <b>KOGAS-Tech</b>	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 9 OF 49

SERVICE LNG,NG,LN2		DESIGN TEMPERATURE -196 ° C TO 65 ° C		DESIGN PRESSURE(gauge) : MPa(kg/cm <sup>2</sup> ) 2.6 (26)		CLASS 3R1J	
RATING ASME CLASS 300, RF		CORROSION ALLOWANCE 0.0 MM		MATERIAL 304SS			
ITEM		SIZE(NPS)	SCH/ CLASS	ENDS	DESCRIPTION		REMARK
PIPE		1/2 -1 1/2 2 -3 4 -6 8 -12	80S 40S 10S 10S	PE BE BE BE	A312-TP304, SMLS A312-TP304, SMLS A312-TP304, SMLS A312-TP304,EFW,W/100% RT		
NIPPLES							
NIPPLE		1/2 -1 1/2	80 S	PBE	A312-TP304, SMLS, 100MM		
NIPPLE		1/2 -1 1/2	80 S	POE/TOE	A312-TP304, SMLS, 100MM		
SWAGE (CON,ECC)		1/2 -2	80 S	BLE/PSE	A403-WP304-S, MSS SP-95		
FITTINGS							
90 ELL		1/2 -1 1/2	3000LB	SW	A182-F304, ASME B16.11		
45 ELL		1/2 -1 1/2	3000LB	SW	A182-F304, ASME B16.11		
TEE		1/2 -1 1/2	3000LB	SW	A182-F304, ASME B16.11		
PLUG		1/4 -1/4		THRD	A182-F304, ROUND HEAD,ASME B16.11		
FULL COUPLING		1/2 -1 1/2	3000LB	SW	A182-F304, ASME B16.11		
SOCKOLET		1/2 -1 1/2	3000LB	SW	A182-F304, MSS-SP-97		
SPECIAL COUPLING		1/2 -1 1/2	3000 LB	SW	A182-F304, ASME B16.11,FOR THERMOWELL		
CAP		1/2 -1 1/2	3000LB	SW	A182-F304, ASME B16.11		
CAP		1/2 -1 1/2	3000LB	THRD	A182-F304, ASME B16.11		
REDUCING INSERT		1/2 -1 1/2	3000LB	SW	A182-F304, MSS-SP-79		
UNION (GJ)		1/2 -1 1/2	3000LB	SW	A182-F304, INTEGRAL SEAT		
90 ELL		2 -12	SAME AS PIPE	BW	A403-WP304-S, ASME B16.9		
45 ELL		2 -12	"	BW	A403-WP304-S, ASME B16.9		
TEE		2 -12	"	BW	A403-WP304-S, ASME B16.9		
REDUCER (CON)		2 -12	"	BW	A403-WP304-S, ASME B16.9		
REDUCER (ECC)		2 -12	"	BW	A403-WP304-S, ASME B16.9		
CAP		2 -12	SAME AS PIPE	BW	A403-WP304-S, ASME B16.9		
VALVES							
GATE		2 -4	300 LB	BW	SS BODY(CF3) 316 SS TRIM, STEL		
GATE		6 -12	300 LB	BW	SS BODY(CF3) 316 SS TRIM, STEL, G.O		
GLOBE		1/2 -1 1/2	800 LB	SW	SS BODY(A182-F304L) 316 SS TRIM STEL		
GLOBE		2 -4	300 LB	BW	SS BODY(CF3) 316 SS TRIM, STEL		
GLOBE		6 -12	300 LB	BW	SS BODY(CF3) 316 SS TRIM, STEL G.O		
PISTON CHECK		1/2 -1 1/2	800 LB	SW	SS BODY&COVER (A182-F304L), SS 316 TRIM,STEL,H OR V		
SWING CHECK		2 -12	300 LB	BW	SS BODY&COVER (CF3) 316 SS TRIM, STEL H OR V		
BUTTERFLY		8 -12	300 LB	BW	SS BODY (CF3) TOP INSPECTION PORT,G.O		
BALL		1/2 -1 1/2	800 LB	SW	SS BODY (A182-F304L), 316 SS TRIM, Kel-F ST W/ 2 PBE NIPPLES		
BALL		1/2 -1 1/2	800 LB	SW	SS BODY (A182-F304L), 316 SS TRIM, Kel-F ST W/ PBE,POE/TOE NIPPLES		FOR INST
BALL		2 -4	300 LB	BW	SS BODY (CF3) 316 SS TRIM, Kel-F ST.		
BALL		6 -12	300 LB	BW	SS BODY (CF3) 316 SS TRIM, Kel-F ST. G.O		
FLANGES							
SOCKET WELD		1/2 -1 1/2	300 LB	RF	A182-F304, ASME B16.5, 125 AARH		
WELD NECK		2 -12	300 LB	RF	A182-F304, ASME B16.5, 125 AARH		
BLIND		1/2 -12	300 LB	RF	A182-F304, ASME B16.5, 125 AARH		
WELD NECK		2 -12	2500 LB	RTJ	A182-F304, ASME B16.5, 125 AARH		NOTE 1
GASKETS							
GASKET		1/2 -12	300LB	RF	SW(316+GRAP),CENTER RING: 316SS,4.5MM		
BOLTING							
STUD BOLTS		1/2 -12	300LB	RF	A320-B8M CL.2/A194-8MA		
MISCELLANEOUS							
FIGURE 8		1 -1 1/2	300LB	RF	A240-304, 125 AARH,API-590		SAFTY SYSTEM 에서 FIGURE 8 이용
SPACER		2 -12	300LB	RF	A240-304, 125 AARH,API-590		
CIRCULAR BLANK		2 -12	300LB	RF	A240-304, 125 AARH,API-590		


NOTE : 1. 2500 LB RTJ FLANGES SHALL BE USED ONLY FOR SPEC BREAK POINTS WITH 25R1J CLASS AND IN THIS CASE, GASKETS & BOLT/NUTS OF 25R1J CLASS SHALL BE APPLIE TO THE SPEC BREAK POINTS.

2. INSPECTION/EXAMINATION/TESTING SHALL BE EXECUTED IN SEVERE CYCLIC CONDITION ACCORDING TO CHAP.VI OF ASME B31


	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	PIPING MATERIAL SPECIFICATION	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 10 OF 49

SERVICE LNG, <span style="color: red;">NG</span> ,LN2	DESIGN TEMPERATURE -196 ° C TO 65 ° C		DESIGN PRESSURE(gauge) : MPa (kg/cm <sup>2</sup> ) 34.2(342)		CLASS 25R1J
RATING ASME CLASS 2500, RTJ	CORROSION ALLOWANCE 0.0 MM		MATERIAL 304SS		
ITEM	SIZE(NPS)	SCH/ CLASS	ENDS	DESCRIPTION	REMARK
PIPE	1/2 -4 6	XXS 28.88MM	BE BE	A312-TP304, SMLS A312-TP304, SMLS	
FITTINGS					
90 ELL	1/2 -6	SAME AS PIPE	BW	A403-WP304-S, ASME B16.9	
45 ELL	1/2 -6	SAME AS PIPE	BW	A403-WP304-S, ASME B16.9	
TEE	1/2 -6	SAME AS PIPE	BW	A403-WP304-S, ASME B16.9	
CAP	1/2 -6	SAME AS PIPE	BW	A403-WP304-S, ASME B16.9	
REDUCER(CON,ECC)	1/2 -6	SAME AS PIPE	BW	A403-WP304-S, ASME B16.9	
WELDOLET	1/2 -6	SAME AS PIPE	BW	A403-WP304-S, MSS SP-97	
VALVES					
BALL	1/2 -1 1/2	2500 LB	BW	SS BODY(A182-F304L) 316 SS TRIM STEL, Kel-F ST	
BALL	2 -6	2500 LB	BW	SS BODY(CF3) 316 SS TRIM, STEL, Kel-F ST G.O	
GLOBE	1/2 -1 1/2	2500 LB	BW	SS BODY(A182-F304L) 316 SS TRIM STEL	
GLOBE	2 -6	2500 LB	BW	SS BODY(CF3) 316 SS TRIM, STEL G.O	
PISTON CHECK	1/2 -1 1/2	2500 LB	BW	SS BODY(A182-F304L) 316 SS TRIM STEL	
SWING CHECK	2 -6	2500 LB	BW	SS BODY&COVER (CF3) 316 SS TRIM, STEL, H OR V	
FLANGES					
WELD NECK	1/2 -6	2500 LB	RTJ	A182-F304, ASME B16.5, 125 AARH	
BLIND	1/2 -6	2500 LB	RTJ	A182-F304, ASME B16.5, 125 AARH	
GASKETS					
GASKET	1/2 -6	2500 LB	RTJ	S304 OVAL RING ASME B16.20	
BOLTING					
STUD BOLTS	1/2 -6	2500 LB	RTJ	A320-B8M CL.2/A194-8MA	
MISCELLANEOUS					

NOTE: 1. INSPECTION/EXAMINATION/TESTING SHALL BE EXECUTED IN SEVERE CYCLIC CONDITION ACCORDING TO CHAP. VI OF ASME B31.3.

 <b>KOGAS-Tech</b>	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 11 OF 49

SERVICE IA	DESIGN TEMPERATURE -29 ° C TO 65 ° C		DESIGN 1.2(12)	PRESSURE(gauge) : MPa(kg/cm <sup>2</sup> )	CLASS Z1
RATING ASME CLASS 150, RF	CORROSION ALLOWANCE 0.0 MM		MATERIAL 304SS		
ITEM	SIZE(NPS)	SCH/ CLASS	ENDS	DESCRIPTION	REMARK
PIPE	1/2 -1 1/2 2 -6	40S 10S	PE BE	A312-TP304, SMLS A312-TP304, SMLS	TE OR BEND: SCH 40S MIN.
NIPPLES NIPPLE NIPPLE SWAGE (CON,ECC)	1/2 -1 1/2 1/2 -1 1/2 1/2 -2	80 S 80 S 40 S	PBE POE/TOE BLE/PSE	A312-TP304, SMLS, 100MM A312-TP304, SMLS, 100MM A403-WP304-S, MSS SP-95	TE OR BEND: SCH 40S MIN.
FITTINGS 90 ELL 45 ELL TEE FULL COUPLING HALF COUPLING CAP CAP REDUCING INSERT UNION (GJ) 90 ELL 45 ELL TEE REDUCER (CON) REDUCER (ECC) CAP	1/2 -1 1/2 1/2 -1 1/2 1/2 -1 1/2 1/2 -1 1/2 1/2 -1 1/2 1/2 -1 1/2 1/2 -1 1/2 1/2 -1 1/2 1/2 -1 1/2 2 -6 2 -6 2 -6 2 -6 2 -6 2 -6	3000 LB 3000 LB 3000 LB 3000 LB 3000 LB 3000 LB 3000 LB 3000 LB 3000 LB SAME AS PIPE " " " " " SAME AS PIPE	SW SW SW SW SW SW THRD SW BW BW BW BW BW BW BW	A182-F304, ASME B16.11 A182-F304, ASME B16.11 A182-F304, ASME B16.11 A182-F304, ASME B16.11 A182-F304, ASME B16.11 A182-F304, ASME B16.11 A182-F304, ASME B16.11 A182-F304, MSS SP-79 A182-F304, INTEGRAL SEAT,MSS-SP-83 A403-WP304-S, ASME B16.9 A403-WP304-S, ASME B16.9 A403-WP304-S, ASME B16.9 A403-WP304-S, ASME B16.9 A403-WP304-S, ASME B16.9 A403-WP304-S, ASME B16.9	
VALVES GATE GATE GLOBE SWING CHECK	1/2 -1 1/2 2 -4 1/2 -1 1/2 2 -4	800 LB 150 LB 800 LB 150 LB	SW RF SW BW	304 SS BODY W/ 316 SS TRIM 304 SS BODY W/ 316 SS TRIM 304S BODY W/ 316 SS TRIM 304 SS BODY W/ 316 SS TRIM, H OR V	FOR INST
FLANGES SOCKET WELD BLIND SLIP ON	1/2 -6 1/2 -6 2-6	150 LB 150 LB 150 LB	RF RF RF	A182-F304, ASME B16.5, STD FIN A182-F304, ASME B16.5, STD FIN A182-F304, ASME B16.5, STD FIN	
GASKETS GASKET	1/2 -6	150 LB	RF	1.6 mm, COMPRESSED GRAPHITE	
BOLTING STUD BOLTS	1/2 -6	150 LB	RF	A193-B8C CL1/A194-8MA	
MISCELLANEOUS FIGURE 8	2-6	150 LB	RF	A240-304, STD FIN, API-590	

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 12 OF 49

#### 4. BRANCH TABLE

##### 4.1 PIPING SERVICE CLASS : 1P1, 3P1, 1R1J, 3R1J

BRANCH TABLE

BRANCH SIZE (NPS)	14	T											
	12	E	T										
	10	P	E	T									
	8	P	P	E	T								
	6	P	P	P	E	T							
	4	P	P	P	P	E	T						
	3	P	P	P	P	P	E	T					
	2 1/2	P	P	P	P	P	P	E	T				
	2	P	P	P	P	P	P	P	E	T			
	1 1/2	S	S	S	S	S	S	S	S	S	T		
	1	S	S	S	S	S	S	S	S	S	E	T	
	3/4	S	S	S	S	S	S	S	S	S	E	E	T
	1/2	S	S	S	S	S	S	S	S	S	E	E	E
	14	12	10	8	6	4	3	2 1/2	2	1 1/2	1	3/4	1/2
HEADER SIZE (NPS)													

#### BRANCH CONNECTION LEGEND

#### LEGEND

H - HALF COUPLING (SW)

T - TEE

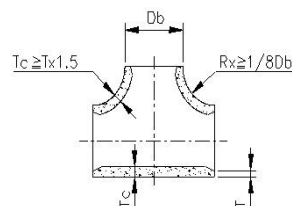
E - REDUCING TEE

B - STUB-IN

P - BRANCH WELD WITH REINFORCING PAD


S - SOCKOLET

NOTE : TEE 또는 REDUCING TEE 는 ASME B31.3 APPENDIX D 에 따른 WELDING TEE 를 사용한다.



비고) 1) T 는 배관 MATERIAL SPEC 의 PIPE SCHEDULE 을 기준한다.

2) BW 부위는 ASME B16.25 기준으로 BEVELING 한다.

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 13 OF 49

#### 4. BRANCH TABLE

##### 4.2 PIPING SERVICE CLASS : Z1

BRANCH TABLE

BRANCH SIZE (NPS)	6	T							
	4	E	T						
	3	E	E	T					
	2	B	E	E	T				
	1 1/2	H	H	H	E	T			
	1	H	H	H	H	E	T		
	3/4	H	H	H	H	E	E	T	
	1/2	H	H	H	H	E	E	E	T
		6	4	3	2	1 1/2	1	3/4	1/2
		HEADER SIZE (NPS)							

#### BRANCH CONNECTION LEGEND

##### LEGEND

H - HALF COUPLING (SW)

T - TEE

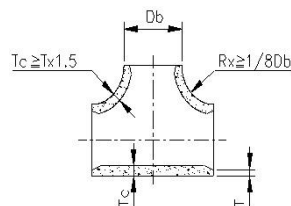
E - REDUCING TEE

B - STUB-IN

P - BRANCH WELD WITH REINFORCING PAD


S - SOCKOLET

NOTE : TEE 또는 REDUCING TEE 는 ASME B31.3 APPENDIX D 에 따른 WELDING TEE 를 사용한다.



비고) 1) T 는 배관 MATERIAL SPEC 의 PIPE SCHEDULE 을 기준한다.

2) BW 부위는 ASME B16.25 기준으로 BEVELING 한다.

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 14 OF 49

#### 4. BRANCH TABLE

4.3 PIPING SERVICE CLASS : 25P1, 25R1J

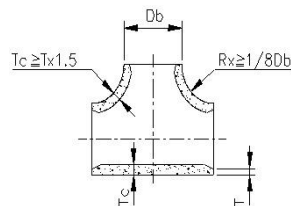
BRANCH TABLE

BRANCH SIZE (NPS)	6	T							
	4	E	T						
	3	E	E	T					
	2	E	E	E	T				
	1 1/2	W	W	E	E	T			
	1	W	W	W	E	E	T		
	3/4	W	W	W	E	E	E	T	
	1/2	W	W	W	W	E	E	E	T
		6	4	3	2	1 1/2	1	3/4	1/2
		HEADER SIZE (NPS)							

#### BRANCH CONNECTION LEGEND


LEGEND  
H - HALF COUPLING (SW)  
T - TEE  
E - REDUCING TEE  
W - WELDOLET

NOTE : TEE 또는 REDUCING TEE 는 ASME B31.3 APPENDIX D 에 따른 WELDING TEE 를 사용한다.



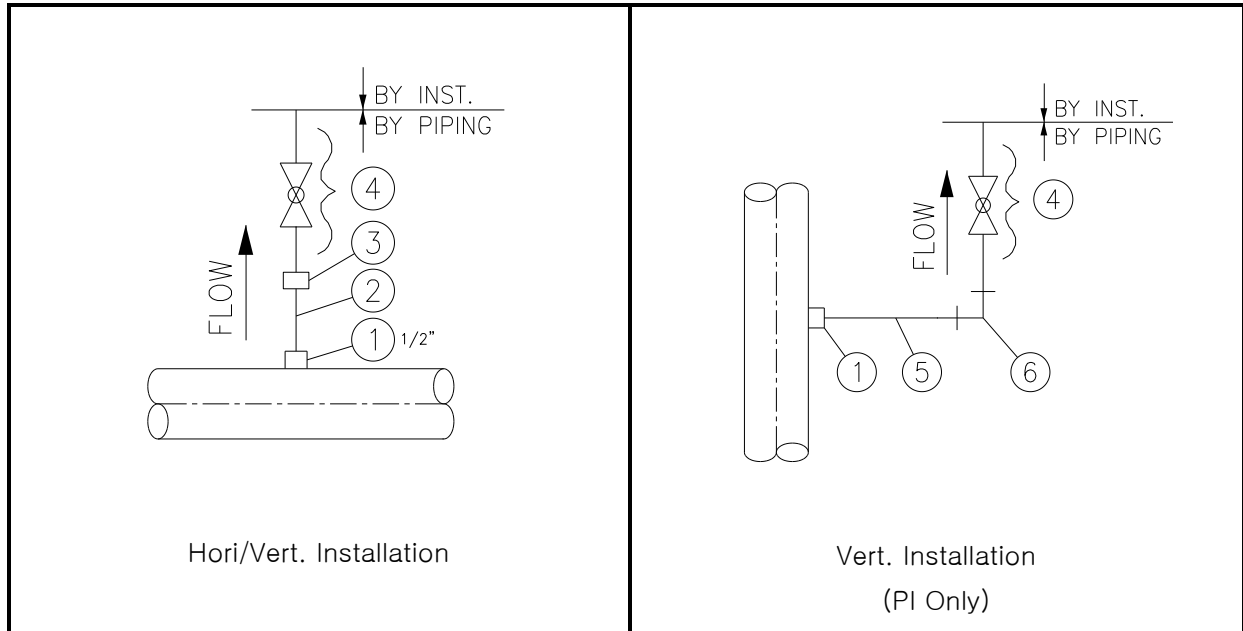
비고) 1) T 는 배관 MATERIAL SPEC 의 PIPE SCHEDULE 을 기준한다.

2) BW 부위는 ASME B16.25 기준으로 BEVELING 한다.

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 15 OF 49

## 5. PRESSURE TAP INSTALLATION DWG (PI, PT, PA 등)


### 5.1 Piping Material Spec. : 1R1J, 3R1J



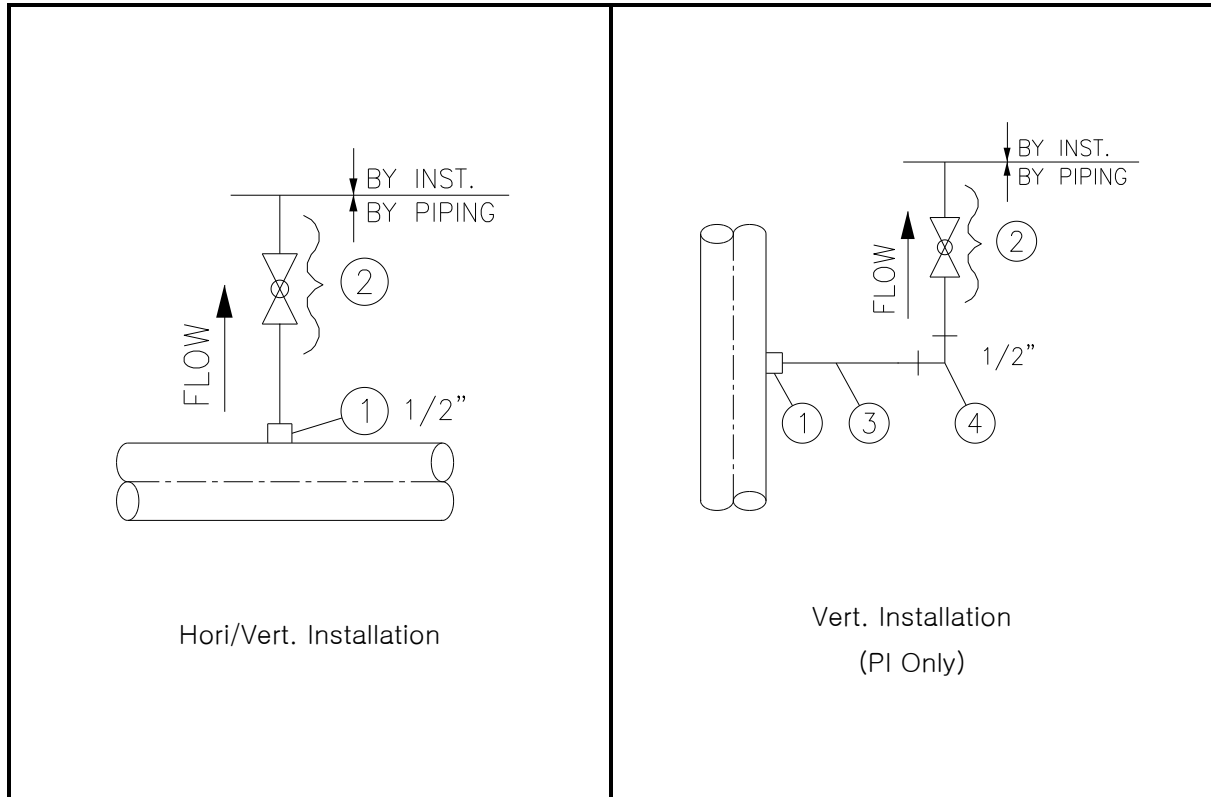
No.	Item	Description	Remark
1	Sockolet	SW (MSS SP-97)	Note 1
2	Nipple	PBE, L=150 mm	
3	Full Coupling	SW (ASME B16.11)	
4	SW Ball Valve With Nipple	Nipple : 100 mm TOE/POE Nipple : 100 mm PBE	Note 2
5	Nipple	PBE, L=350 mm	
6	90 ° Elbow	SW (ASME B16.11)	

Note :

1. Branch 연결 Type 은 Main 배관이 3/4"~1½" 이면 R.Tee 사용, ½"이면 S.Tee 사용, 이외에는 Sockolet 을 사용한다.
2. Ball Valve 양쪽에 Nipple 이 부착된 상태로서 Extended Stem Type 이다.
3. 각 Item 의 재질 및 사양은 각각의 Piping Material Spec 을 따른다.
4. 시공후 Instrument 와 연결부위는 빗물 등 이물질이 들어가지 않도록 한다.

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	PIPING MATERIAL SPECIFICATION	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 16 OF 49

## 5.2 Piping Material Spec. : 1P1, 3P1




No.	Item	Description	Remark
1	Sockolet	SW (MSS SP-97)	
2	SW Ball Valve With Nipple	Nipple : 100 mm TOE/POE Nipple : 100 mm PBE	Note 1,2
3	Nipple	PBE, L=150 mm	
4	90 ° Elbow	SW (ASME B16.11)	

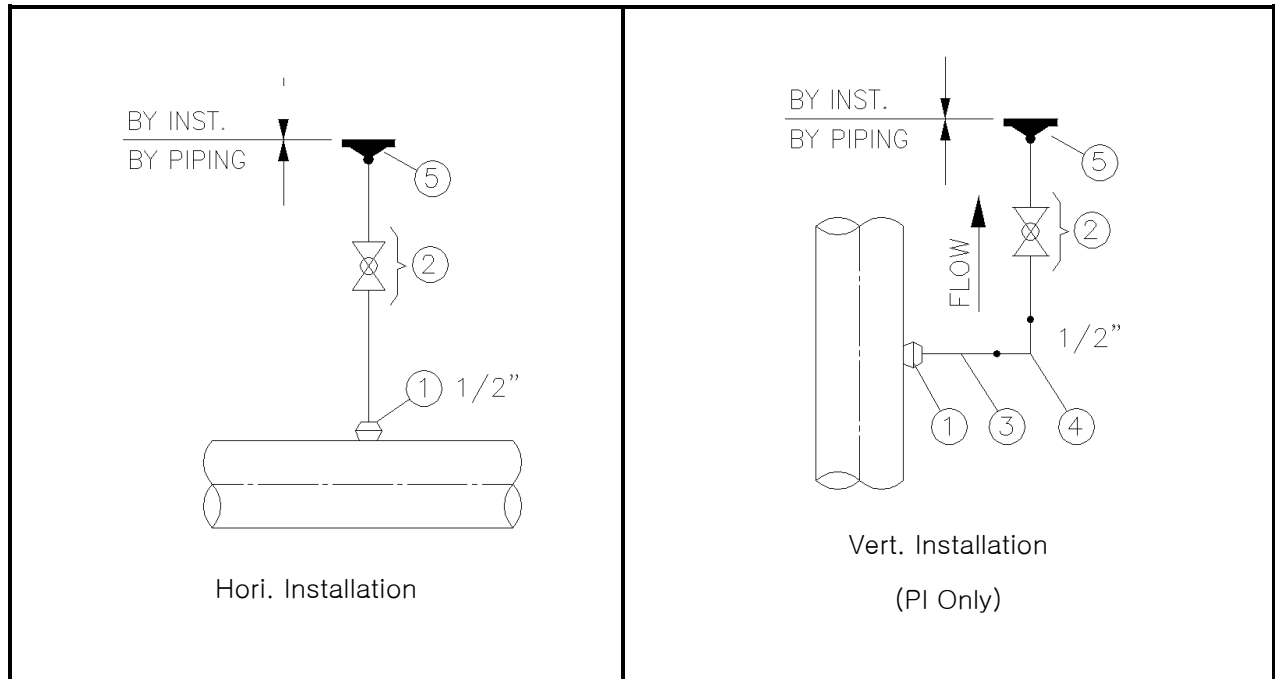
Note :

1. Branch 연결 Type 은 Main 배관이 3/4"~1½" 이면 R.Tee 사용, ½"이면 S.Tee 사용, 이외에는 Sockolet 을 사용한다.
2. Ball Valve 양쪽에 Nipple 이 부착된 상태로서 Without Extended Stem Type 이다.
3. 각 Item 의 재질 및 사양은 각각의 Piping Material Spec.을 따른다.
4. 시공 후 Instrument 와 연결부위는 빗물 등 이물질이 들어가지 않도록 한다.



	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 17 OF 49


### 5.3 Piping Material Spec. : 25P1



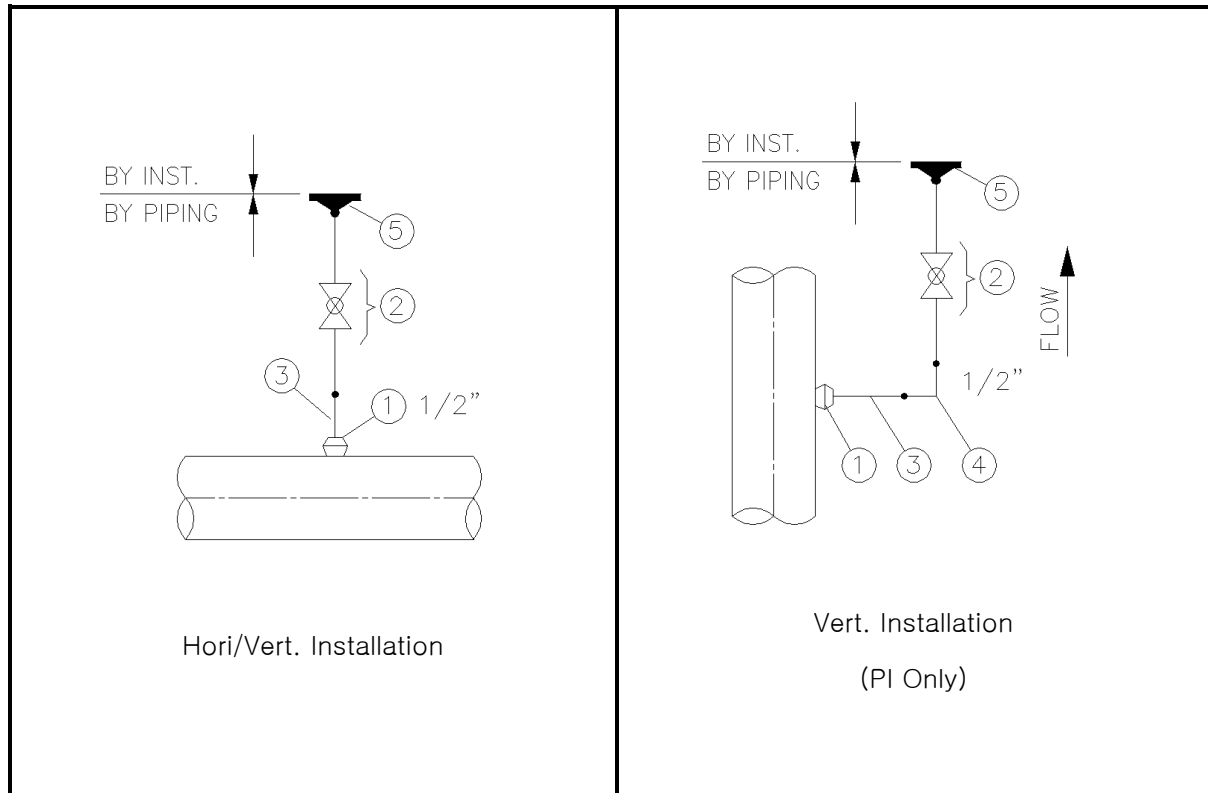
No.	Item	Description	Remark
1	Weldolet	1/2" BW (MSS-SP-97)	
2	BW Ball Valve With Transition Piece	Transition Piece : 100 mm Both Bevel End	Note 1
3	Nipple	BBE, L=150 mm	
4	90 ° Elbow	BW (ASME B16.9)	
5	WN Flange	RTJ (ASME B16.5)	

Note :

1. Ball Valve 양쪽에 Transition Piece 가 부착된 상태로서 Without Extended Stem Type 이다.
2. Size 및 Type 을 P&ID 에서 별도 명기시는 P&ID 를 기준으로 한다.
3. 각 Item 의 재질 및 사양은 각각의 Piping Material Spec.을 따른다.

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 18 OF 49


#### 5.4 Piping Material Spec. : 25R1J



No.	Item	Description	Remark
1	Weldolet	1/2" BW (MSS-SP-97)	
2	BW Ball Valve With Transition Piece	Transition Piece : 100 mm Both Bevel End	Note 1
3	Nipple	BBE, L=150 mm	
4	90 ° Elbow	BW (ASME B16.9)	
5	WN Flange	RTJ (ASME B16.5)	

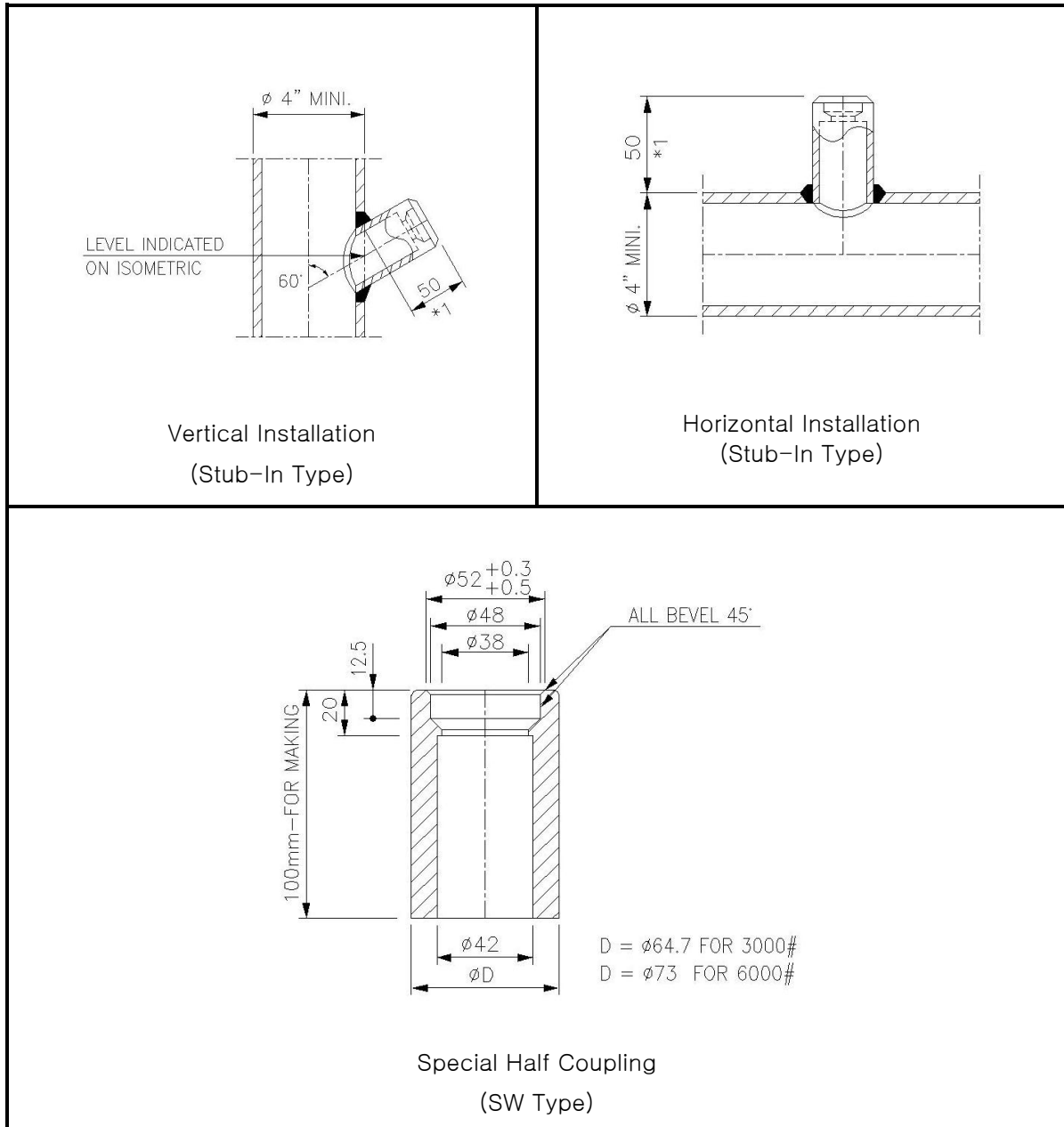
Note :

1. Ball Valve 양쪽에 Transition Piece 가 부착된 상태로서 Extended Stem Type 이다.
2. Size 및 Type 을 P&ID 에서 별도 명기시는 P&ID 를 기준으로 한다.
3. 각 Item 의 재질 및 사양은 각각의 Piping Material Spec.을 따른다.

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 19 OF 49


## 6. THERMOWELL INSTALLATION TI, TR, TG, TW 등) : 1-1/2" SW TYPE

### 6.1 Piping Material Spec. : 1R1J, 3R1J, 1P1, 3P1,

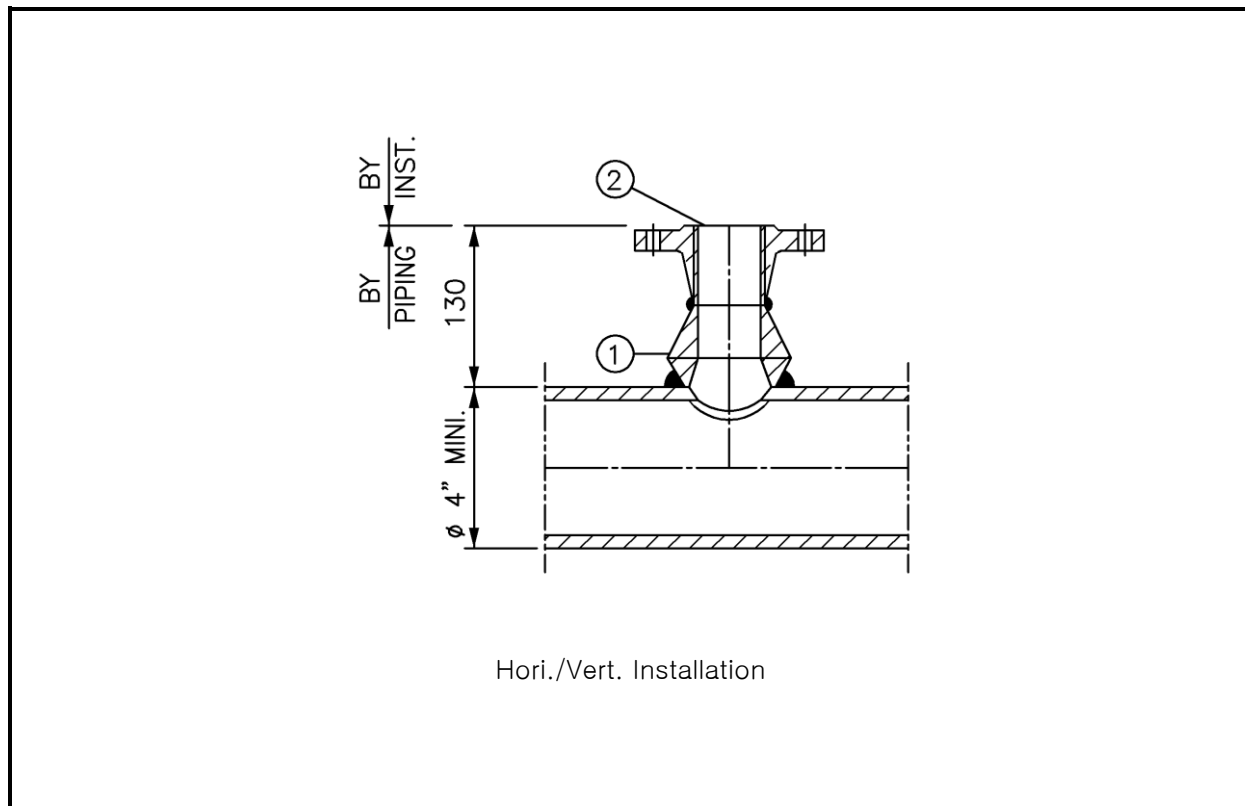


Note :

1. \*1 (50 mm)는 설치시 엄격하게 검사되어야 한다.
2. 100 mm로 구매된 Special Coupling 을 현장설치 여건에 맞게 조정하여 설치한다.
3. 재질은 Piping Material Spec.을 따른다.

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 20 OF 49


## 6.2 Piping Material Spec. : 25P1, 25R1J



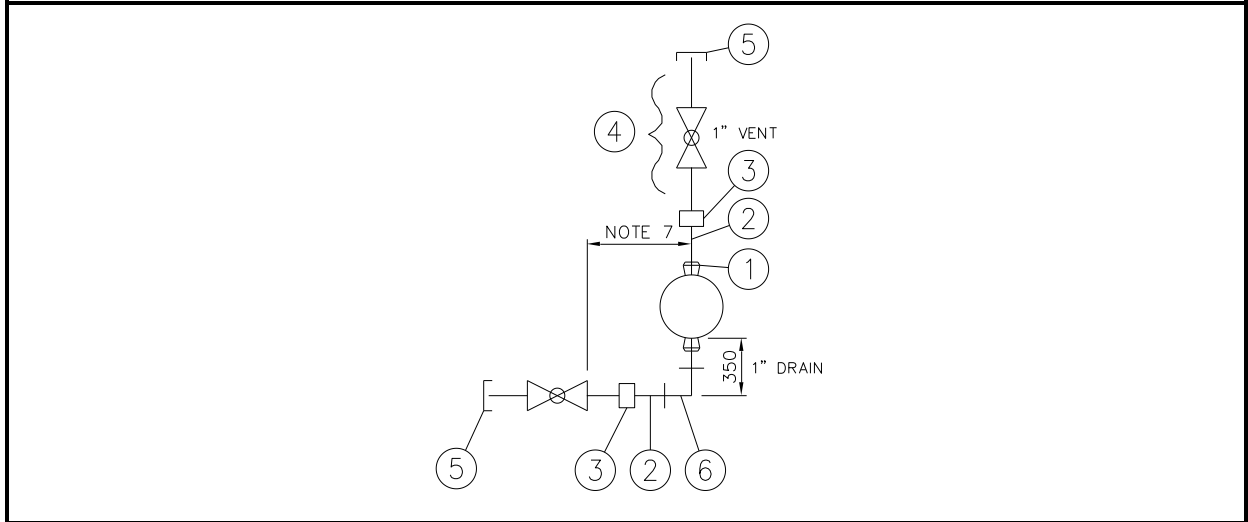
No.	Item	Description	Remark
1	Weldolet	1" BW (MSS-SP-97)	
2	WN Flange	RTJ(ASME B16.5)	

Note :

1. 각 Item 의 재질 및 사양은 각각의 Piping Material Spec.을 따른다.

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 21 OF 49


## 7.1 Piping Material Spec. : 1R1J, 3R1J



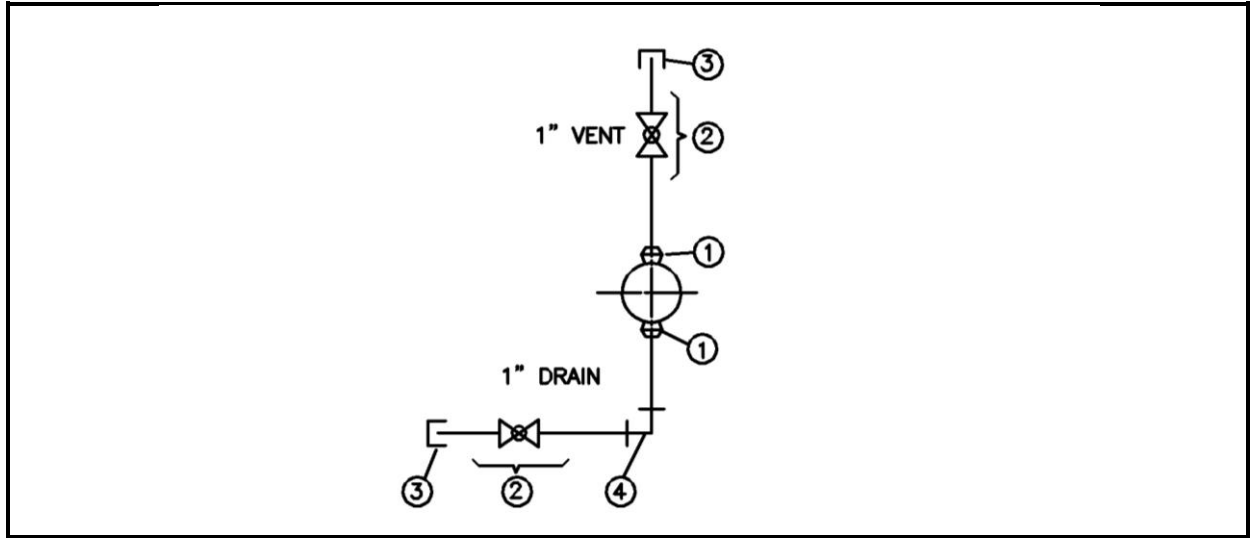
No.	Item	Description	Remark
1	Socket	SW (MSS SP-97)	Note 1
2	Nipple	PBE, L=150 mm	
3	Full Coupling	SW (ASME B16.11)	
4	SW Ball Valve With Nipple	Nipple : 100 mm TOE/POE Nipple : 100 mm PBE	Note 3
5	Cap	Thread Cap (ASME B16.11)	
6	90 ° Elbow	SW (ASME B16.11)	

### Note :

- Header 가 1/2"~3/4"인 경우의 Drain & Vent Size 는 Header 와 동일하게 한다.
- Branch 연결 Type 은 Main 배관이 3/4"~1 1/2" 이면 R.Tee 사용, 1/2"이면 S.Tee 사용, 이외에는 Half Coupling 을 사용한다.
- Ball Valve 양쪽에 Nipple 이 부착된 상태로서 Extended Stem Type 이다.
- Size 및 Type 을 P&ID 에서 별도 명기시는 P&ID 를 기준으로 한다.
- 각 Item 의 재질 및 사양은 각각의 Piping Material Spec.을 따른다.
- 1 1/2" Branch 부분에는 "22. Bracing of Branch"의 기준에 따라 Brace 를 설치한다.
- Valve Steam 과 Main Pipe 보온재간의 간섭을 피하기 위해 충분한 거리를 유지한다.

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 22 OF 49


7.2 Piping Material Spec. : 1P1, 3P1



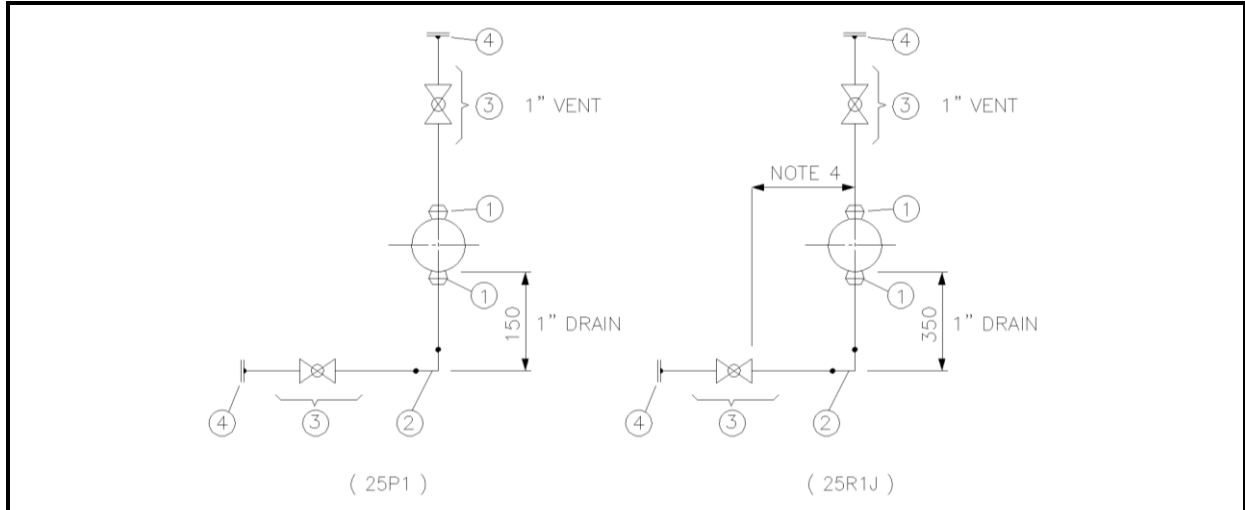
No.	Item	Description	Remark
1	Sockolet	SW (MSS SP-97)	Note 2
2	SW Ball Valve With Nipple	Nipple : 100 mm TOE/POE	Note 3
3	Cap	Thread Cap (ASME B16.11)	
4	90 ° Elbow	SW (ASME B16.11)	

Note :

- Header 가  $\frac{1}{2}$ "~ $\frac{3}{4}$ "인 경우의 Drain & Vent Size 는 Header 와 동일하게 한다.
- Branch 연결 Type 은 Main 배관이  $\frac{3}{4}$ "~ $1\frac{1}{2}$ " 이면 R.Tee 사용,  $\frac{1}{2}$ "이면 S.Tee 사용, 이외에는 Half Coupling 을 사용한다.
- Ball Valve 양쪽에 Nipple 이 부착된 상태로서 Without Extended Stem Type 이다.
- Size 및 Type 을 P&ID 에서 별도 명기시는 P&ID 를 기준으로 한다.
- 각 Item 의 재질 및 사양은 각각의 Piping Material Spec.을 따른다.

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 23 OF 49


7.3 Piping Material Spec. : 25P1, 25R1J



No.	Item	Description	Remark
1	Weldolet	BW (MSS SP-97)	
2	90 ° Elbow	BW (ASME B16.9)	
3	BW Ball Valve With Nipple	Nipple : 100 mm BBE	NOTE 1
4	WN Flange & BL Flange	RTJ (ASME B16.5)	

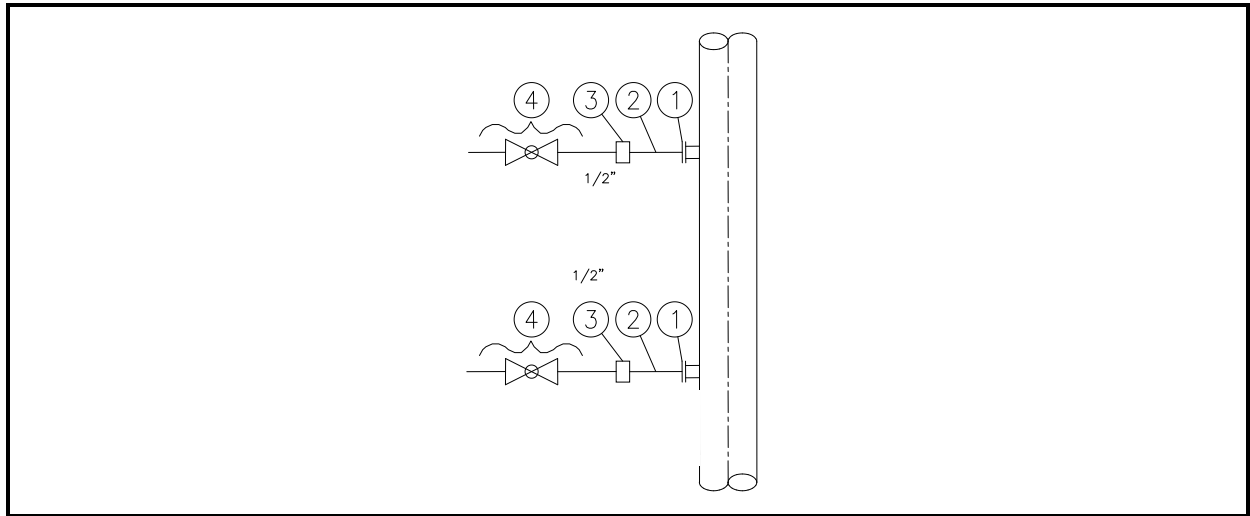
Note :

1. Ball Valve 양쪽에 Nipple 이 부착된 상태로서 Without Extended Stem Type 이다.  
단, 25R1J 는 Extended Stem Type 이다.
2. Size 및 Type 을 P&ID 에서 별도 명기시는 P&ID 를 기준으로 한다..
3. 각 Item 의 재질 및 사양은 각각의 Piping Material Spec.을 따른다.
4. VLAVE STEAM 과 MAIN PIPE 보온재간의 간섭을 피하기 위해 충분한 거리를 유지한다.

 <b>KOGAS-Tech</b>	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 24 OF 49

## 8. LT INSTALLATION DWG

8.1 Piping Material Spec. : 1R1J, 3R1J




No.	Item	Description	Remark
1	Flange Or Sockolet	SW	
2	Nipple	PBE, L=150 mm	
3	Full Coupling	SW (ASME B16.11)	
4	SW Ball Valve With Nipple	Nipple : 100 mm TOE/POE Nipple : 100 mm PBE	Note 1

Note :

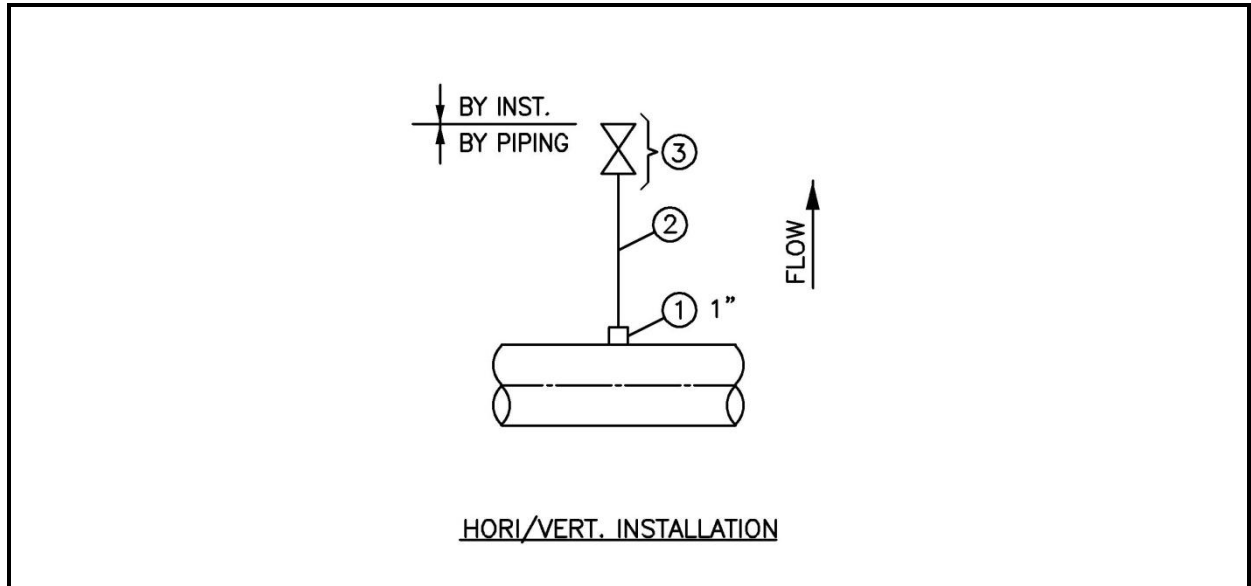
1. Ball Valve 양쪽에 Transition Piece 가 부착된 상태로서 Extended Stem Type 이다.
2. Size 및 Type 을 P&ID 에서 별도 명기시는 P&ID 를 기준으로 한다.
3. 각 Item 의 재질 및 사양은 각각의 Piping Material Spec.을 따른다.



 <b>KOGAS-Tech</b>	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 25 OF 49

## 8. IA INSTALLATION DWG


8.1 Piping Material Spec. : Z1



No.	Item	Description	Remark
1	Sockolet	SW (MSS SP-97)	
2	Nipple	PBE, L=100 mm	
4	SW Gate Valve	SW (ASME B16.11)	Note 2

Note :

1. Size 및 Type 을 P&ID 에서 별도 명기시는 P&ID 를 기준으로 한다.
2. 각 Item 의 재질 및 사양은 각각의 Piping Material Spec.을 따른다.

 <b>KOGAS-Tech</b>	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 26 OF 49

## 10. VALVE DESCRIPTION

CLASS

1P1

3P1


25P1

1R1J

3R1J

25R1J

Z1

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	PIPING MATERIAL SPECIFICATION	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 27 OF 49

CLASS : 1P1

ITEM NO.	DESCRIPTION	SIZE	REQ Q'TY	REMARKS
----------	-------------	------	----------	---------

502314110 GATE 800# SW A105/F6 BB OS&Y

SOCKET WELDED GATE VALVE, CLASS 800# PER API 602;  
CARBON STEEL BODY (ASTM A105 FORGING), F6(13% CR) TRIM,  
API 600/602 TRIM NUMBER 1, JOHN CRANE 187-I STEM PACKING;  
OS&Y, STANDARD PORT, SOLID WEDGE, BOLTED BONNET, HANDWHEEL OPERATED;  
SOCKET WELDING ENDS PREPARATION ANSI B16.11;

1/2 - 1.1/2

502315111 GATE 800# NPT/SW A105/F6 BB OS&Y FOR D/V

THREADED BY SOCKET WELDED GATE VALVE FOR DRAIN/VENT/INSTRUMENT, CLASS 800# PER API 602;  
CARBON STEEL BODY (ASTM A105 FORGING), F6(13% CR) TRIM,  
API 600/602 TRIM NUMBER 1, JOHN CRANE 187-I STEM PACKING,  
OS&Y, STANDARD PORT, SOLID WEDGE, BOLTED BONNET, HANDWHEEL OPERATED,  
THREADED INTERNALLY TAPER-THREADED PER ANSI B1.20.1;  
SOCKET WELDING ENDS PREPARATION ANSI B16.11;

1/2 - 1.1/2

503132050 GATE 150# RF A216-WCB/F6 BB OS&Y

RAISED FACE FLANGED GATE VALVE, CLASS 150# PER API 600;  
CARBON STEEL BODY (ASTM A216 WCB CASTING), F6(13%CR) TRIM,  
API 600/602 TRIM NUMBER 1, JOHN CRANE 187-I STEM PACKING;  
OS&Y, FULL PORT, FLEXIBLE OR SOLID WEDGE, BOLTED BONNET, HANDWHEEL OPERATED;  
FLANGE DIMENSIONS PER ANSI B16.5;

2 - 4

503132750 GATE 150# RF A216-WCB/F6 BB OS&Y G.O


RAISED FACE FLANGED GATE VALVE, CLASS 150# PER API 600;  
CARBON STEEL BODY (ASTM A216 WCB CASTING), F6 (13% CR) TRIM,  
API 600/602 TRIM NUMBER 1; JOHN CRANE 187-I STEM PACKING;  
OS&Y, FULL PORT, FLEXIBLE OR SOLID WEDGE, BOLTED BONNET, GEAR AND HANDWHEEL OPERATED;  
FLANGE DIMENSIONS PER ANSI B16.5;

6 - 16

512314110 GLOBE 800# SW A105/F6 BB OS&Y


SOCKET WELDED GLOBE VALVE, CLASS 800# PER API 602;  
CARBON STEEL BODY (ASTM A105 FORGING), F6(13% CR) TRIM,  
API 600/602 TRIM NUMBER 1, JOHN CRANE 187-I STEM PACKING;  
OS&Y, T-BODY, DISC TYPE, BOLTED BONNET, HANDWHEEL OPERATED;  
SOCKET WELDING ENDS PREPARATION PER ANSI B16.11;

1/2 - 1.1/2

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 28 OF 49

CLASS : 1P1

ITEM NO.	DESCRIPTION	SIZE	REQ Q'TY	REMARKS
513132050	GLOBE 150# RF A216-WCB/F6 BB OS&Y  RAISED FACE FLANGED GLOBE VALVE, CLASS 150# PER API 600; CARBON STEEL BODY (ASTM A216 WCB CASTING),F6 (13% CR) TRIM, API 600/602 TRIM NUMBER 1, JOHN CRANE 187-I STEM PACKING; OS&Y, T-BODY, DISC TYPE, BOLTED BONNET, HANDWHEEL OPERATED; FLANGE DIMENSIONS PER ANSI B16.5,		2 - 4	
513132750	GLOBE 150# RF A216-WCB/F6 BB OS&Y G.O  RAISED FACE FLANGED GLOBE VALVE, CLASS 150# PER API 600; CARBON STEEL BODY (ASTM A216 WCB CASTING),F6 (13% CR) TRIM, API 600/602 TRIM NUMBER 1, JOHN CRANE 187-I STEM PACKING; OS&Y, T-BODY, DISC TYPE, BOLTED BONNET, GEAR AND HANDWHEEL OPERATED; FLANGE DIMENSIONS PER ANSI B16.5,		6 - 16	
522317910	CHECK 800# SW A105/F6 PISTON  SOCKET WELDED CHECK VALVE, CLASS 800# PER API 602; CARBON STEEL BODY (ASTM A105), F6 (13% CR) TRIM, API 600/602 TRIM NUMBER 1; BOLTED COVER, SPRING CONTROLLED PISTON TYPE, HORIZONTAL AND VERTICAL USE; SOCKET WELDING ENDS PREPARATION PER ANSI B16.11;		1/2 - 1.1/2	
523922050	CHECK 150# RF A216-WCB/410 WAFER  WAFER CHECK VALVE, CLASS 150# PER API 594; CARBON STEEL BODY (ASTM 216 WCB CASTING); 410 STAINLESS STEEL DISC, 410 STAINLESS STEEL SEAT, 410 STAINLESS STEEL PIN. STAINLESS STEEL SPRING TO MANUFACTURER'S STANDARDS; DUAL PLATE WAFER TYPE, FOR USE IN THE HORIZONTAL AND VERTICAL POSITIONS; RAISED FACE FLANGE DIMENSIONS PER ANSI B16.5;		2 - 16	
532884510	BALL 800# SW A105/316+PTFE WITH PBE NIPPLE  SOCKET WELDED BALL VALVE, CLASS 800# PER API 602; CARBON STEEL BODY (ASTM A105 FORGING), 316 STAINLESS STEEL BALL & STEM, PTFE SEAT; FIRE SAFE DESIGN, FLOATING BALL, WRENCH OPERATED, BASICALLY REDUCED PORT, BUT IN CASE OF FULL PORT - BE DEFINED IN B/M. 3 PIECES BOLTED TYPE; 100MM NIPPLE WELDED ON EACH END, PBE + PBE; SOCKET WELDING ENDS PREPARATION PER ANSI B16.11;		1/2 - 1.1/2	

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 29 OF 49

CLASS : 1P1

ITEM NO.	DESCRIPTION	SIZE	REQ Q'TY	REMARKS
----------	-------------	------	----------	---------

532884511 BALL 800# SW A105/316+PTFE WITH TOE/POE NIPPLE

SOCKET WELDED BALL VALVE, CLASS 800# PER API 602;  
CARBON STEEL BODY (ASTM A105 FORGING),  
316 STAINLESS STEEL BALL & STEM, PTFE SEAT;  
FIRE SAFE DESIGN, FLOATING BALL, REDUCED PORT, WRENCH OPERATED,  
3 PIECES BOLTED TYPE, FOR DRAIN/VENT/INSTRUMENT;  
100MM NIPPLE WELDED ON EACH END, POE/TOE(ANSI B1.20.1) + PBE;  
SOCKET WELDING ENDS PREPARATION PER ANSI B16.11;

1/2 - 1.1/2

533702450 BALL 150# RF A216-WCB/316+PTFE


RAISED FACE FLANGED BALL VALVE, CLASS 150# PER API 6D;  
CARBON STEEL BODY (ASTM A216 GR WCB CASTING), 316 STAINLESS STEEL TRIM,  
FIRE SAFE DESIGN, FLOATING BALL TYPE, PTFE SEAT, WRENCH OPERATED,  
BASICALLY REDUCED PORT, BUT IN CASE OF FULL PORT - BE DEFINED IN B/M;  
END TO END DIMENSIONS TO ANSI B16.10, FLANGE DIMENSION PER ANSI B16.5;

2 - 4

533702950 BALL 150# RF A216-WCB/316+PTFE G.O

RAISED FACE FLANGED BALL VALVE, CLASS 150# PER API 6D;  
CARBON STEEL BODY (ASTM A216 GR WCB CASTING), 316 STAINLESS STEEL TRIM,  
FIRE SAFE DESIGN, PTFE SEAT, GEAR AND HANDWHEEL OPERATED,  
BASICALLY REDUCED PORT, BUT IN CASE OF FULL PORT - BE DEFINED IN B/M;  
8" & LARGER - TRUNNION BALL, 6" & SMALLER - FLOATING BALL TYPE ;  
END TO END DIMENSIONS TO ANSI B16.10, FLANGE DIMENSION PER ANSI B16.5;

6 - 16

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 30 OF 49

CLASS : 3P1

ITEM NO.	DESCRIPTION	SIZE	REQ Q'TY	REMARKS
----------	-------------	------	----------	---------

502314110 GATE 800# SW A105/F6 BB OS&Y

SOCKET WELDED GATE VALVE, CLASS 800# PER API 602;  
CARBON STEEL BODY (ASTM A105 FORGING), F6(13% CR) TRIM,  
API 600/602 TRIM NUMBER 1, JOHN CRANE 187-I STEM PACKING;  
OS&Y, STANDARD PORT, SOLID WEDGE, BOLTED BONNET, HANDWHEEL OPERATED;  
SOCKET WELDING ENDS PREPARATION ANSI B16.11;

1/2 - 1.1/2

502315111 GATE 800# NPT/SW A105/F6 BB OS&Y FOR D/V

THREADED BY SOCKET WELDED GATE VALVE FOR DRAIN/VENT/INSTRUMENT, CLASS 800# PER API 602;  
CARBON STEEL BODY (ASTM A105 FORGING), F6(13% CR) TRIM,  
API 600/602 TRIM NUMBER 1, JOHN CRANE 187-I STEM PACKING,  
OS&Y, STANDARD PORT, SOLID WEDGE, BOLTED BONNET, HANDWHEEL OPERATED,  
THREADED INTERNALLY TAPER-THREADED PER ANSI B1.20.1;  
SOCKET WELDING ENDS PREPARATION ANSI B16.11;

1/2 - 1.1/2

503132051 GATE 300# RF A216-WCB/F6 BB OS&Y

RAISED FACE FLANGED GATE VALVE, CLASS 300# PER API 600;  
CARBON STEEL BODY (ASTM A216 WCB CASTING), F6(13%CR) TRIM,  
API 600/602 TRIM NUMBER 1, JOHN CRANE 187-I STEM PACKING;  
OS&Y, FULL PORT, FLEXIBLE OR SOLID WEDGE, BOLTED BONNET, HANDWHEEL OPERATED;  
FLANGE DIMENSIONS PER ANSI B16.5;

2 - 4

503132751 GATE 300# RF A216-WCB/F6 BB OS&Y G.O


RAISED FACE FLANGED GATE VALVE, CLASS 300# PER API 600;  
CARBON STEEL BODY (ASTM A216 WCB CASTING), F6 (13% CR) TRIM,  
API 600/602 TRIM NUMBER 1; JOHN CRANE 187-I STEM PACKING;  
OS&Y, FULL PORT, FLEXIBLE OR SOLID WEDGE, BOLTED BONNET, GEAR AND HANDWHEEL OPERATED;  
FLANGE DIMENSIONS PER ANSI B16.5;

6 - 14

512314110 GLOBE 800# SW A105/F6 BB OS&Y


SOCKET WELDED GLOBE VALVE, CLASS 800# PER API 602;  
CARBON STEEL BODY (ASTM A105 FORGING), F6(13% CR) TRIM,  
API 600/602 TRIM NUMBER 1, JOHN CRANE 187-I STEM PACKING;  
OS&Y, T-BODY, DISC TYPE, BOLTED BONNET, HANDWHEEL OPERATED;  
SOCKET WELDING ENDS PREPARATION PER ANSI B16.11;

1/2 - 1.1/2

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 31 OF 49

CLASS : 3P1

ITEM NO.	DESCRIPTION	SIZE	REQ Q'TY	REMARKS
513134083	GLOBE 300# RF A216-WCB/F6 BB OS&Y  RAISED FACE FLANGED GLOBE VALVE, CLASS 150# PER API 600; CARBON STEEL BODY (ASTM A216 WCB CASTING),F6 (13% CR) TRIM, API 600/602 TRIM NUMBER 1, JOHN CRANE 187-I STEM PACKING; OS&Y, T-BODY, DISC TYPE, BOLTED BONNET, HANDWHEEL OPERATED; FLANGE DIMENSIONS PER ANSI B16.5,		2 - 4	
513134883	GLOBE 300# RF A216-WCB/F6 BB OS&Y G.O  RAISED FACE FLANGED GLOBE VALVE, CLASS 150# PER API 600; CARBON STEEL BODY (ASTM A216 WCB CASTING),F6 (13% CR) TRIM, API 600/602 TRIM NUMBER 1, JOHN CRANE 187-I STEM PACKING; OS&Y, T-BODY, DISC TYPE, BOLTED BONNET, GEAR AND HANDWHEEL OPERATED; FLANGE DIMENSIONS PER ANSI B16.5,		6 - 14	
522317910	CHECK 800# SW A105/F6 PISTON  SOCKET WELDED CHECK VALVE, CLASS 800# PER API 602; CARBON STEEL BODY (ASTM A105), F6 (13% CR) TRIM, API 600/602 TRIM NUMBER 1; BOLTED COVER, SPRING CONTROLLED PISTON TYPE, HORIZONTAL AND VERTICAL USE; SOCKET WELDING ENDS PREPARATION PER ANSI B16.11;		1/2 - 1.1/2	
523922051	CHECK 300# RF A216-WCB/410 WAFER  WAFER CHECK VALVE, CLASS 300# PER API 594; CARBON STEEL BODY (ASTM 216 WCB CASTING); 410 STAINLESS STEEL DISC, 410 STAINLESS STEEL SEAT, 410 STAINLESS STEEL PIN. STAINLESS STEEL SPRING TO MANUFACTURER'S STANDARDS; DUAL PLATE WAFER TYPE, FOR USE IN THE HORIZONTAL AND VERTICAL POSITIONS; RAISED FACE FLANGE DIMENSIONS PER ANSI B16.5;		2 - 14	
532884510	BALL 800# SW A105/316+PTFE WITH PBE NIPPLE  SOCKET WELDED BALL VALVE, CLASS 800# PER API 602; CARBON STEEL BODY (ASTM A105 FORGING), 316 STAINLESS STEEL BALL & STEM, PTFE SEAT; FIRE SAFE DESIGN, FLOATING BALL, WRENCH OPERATED, BASICALLY REDUCED PORT, BUT IN CASE OF FULL PORT - BE DEFINED IN B/M. 3 PIECES BOLTED TYPE; 100MM NIPPLE WELDED ON EACH END, PBE + PBE; SOCKET WELDING ENDS PREPARATION PER ANSI B16.11;		1/2 - 1.1/2	

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 32 OF 49

CLASS : 3P1

ITEM NO.	DESCRIPTION	SIZE	REQ Q'TY	REMARKS
----------	-------------	------	----------	---------

532884511 BALL 800# SW A105/316+PTFE WITH TOE/POE NIPPLE

SOCKET WELDED BALL VALVE, CLASS 800# PER API 602;  
CARBON STEEL BODY (ASTM A105 FORGING),  
316 STAINLESS STEEL BALL & STEM, PTFE SEAT;  
FIRE SAFE DESIGN, FLOATING BALL, REDUCED PORT, WRENCH OPERATED,  
3 PIECES BOLTED TYPE, FOR DRAIN/VENT/INSTRUMENT;  
100MM NIPPLE WELDED ON EACH END, POE/TOE(ANSI B1.20.1) + PBE;  
SOCKET WELDING ENDS PREPARATION PER ANSI B16.11;

1/2 - 1.1/2

532884593 BALL 300# RF A216-WCB/316+PTFE

RAISED FACE FLANGED BALL VALVE, CLASS 300# PER API 6D;  
CARBON STEEL BODY (ASTM A216 GR WCB CASTING), 316 STAINLESS STEEL TRIM,  
FIRE SAFE DESIGN, FLOATING BALL TYPE, PTFE SEAT, WRENCH OPERATED,  
BASICALLY REDUCED PORT, BUT IN CASE OF FULL PORT - BE DEFINED IN B/M;  
END TO END DIMENSIONS TO ANSI B16.10, FLANGE DIMENSION PER ANSI B16.5;


2 - 4

532884594 BALL 300# RF A216-WCB/316+PTFE G.O

RAISED FACE FLANGED BALL VALVE, CLASS 300# PER API 6D;  
CARBON STEEL BODY (ASTM A216 GR WCB CASTING), 316 STAINLESS STEEL TRIM,  
FIRE SAFE DESIGN, PTFE SEAT, GEAR AND HANDWHEEL OPERATED,  
BASICALLY REDUCED PORT, BUT IN CASE OF FULL PORT - BE DEFINED IN B/M;  
8" & LARGER - TRUNNION BALL, 6" & SMALLER - FLOATING BALL TYPE ;  
END TO END DIMENSIONS TO ANSI B16.10, FLANGE DIMENSION PER ANSI B16.5;


6 - 14



	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	PIPING MATERIAL SPECIFICATION	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 33 OF 49

CLASS : 25P1

ITEM NO.	DESCRIPTION	SIZE	REQ Q'TY	REMARKS
512314294	GLOBE 2500# BW A105/F6+HF WB OS&Y XXS  BUTTWELDED GLOBE VALVE, CLASS 2500# PER API 602; CARBON STEEL BODY (ASTM A105 FORGING), UNIVERSAL TRIM, API 600/602 TRIM NUMBER 8, JOHN CRANE 187-I STEM PACKING; OS&Y, T-BODY, DISC TYPE, WELDED BONNET, HANDWHEEL OPERATED; BUTTWELDING ENDS (XXS) PREPARATION PER ANSI B16.25 FIG.2A OR 3A AS APPLICABLE  1/2 - 1.1/2			
513134095	GLOBE 2500# BW A216-WCB/F6+HF BB OS&Y XXS G.0  BUTTWELDED GLOBE VALVE, CLASS 2500# PER API 600; CARBON STEEL BODY (ASTM A216 WCB CASTING), UNIVERSAL TRIM API 600/602 TRIM NUMBER 8, JOHN CRANE 187-I STEM PACKING; OS&Y, T-BODY, DISC TYPE, BOLTED BONNET, GEAR AND HANDWHEEL OPERATED; BUTTWELDING ENDS (XXS) PREPARATION PER ANSI B16.25 FIG.2A OR 3A AS APPLICABLE  2 - 3			
513134096	GLOBE 2500# BW A216-WCB/F6+HF BB OS&Y 20.3MM G.0  BUTTWELDED GLOBE VALVE, CLASS 2500# PER API 600; CARBON STEEL BODY (ASTM A216 WCB CASTING), UNIVERSAL TRIM API 600/602 TRIM NUMBER 8, JOHN CRANE 187-I STEM PACKING; OS&Y, T-BODY, DISC TYPE, BOLTED BONNET, GEAR AND HANDWHEEL OPERATED; BUTTWELDING ENDS (20.3MM) PREPARATION PER ANSI B16.25 FIG.2A OR 3A AS APPLICABLE  4 - 4			
513134097	GLOBE 2500# BW A216-WCB/F6+HF BB OS&Y 28.6MM G.0  BUTTWELDED GLOBE VALVE, CLASS 2500# PER API 600; CARBON STEEL BODY (ASTM A216 WCB CASTING), UNIVERSAL TRIM API 600/602 TRIM NUMBER 8, JOHN CRANE 187-I STEM PACKING; OS&Y, T-BODY, DISC TYPE, BOLTED BONNET, GEAR AND HANDWHEEL OPERATED; BUTTWELDING ENDS (28.6MM) PREPARATION PER ANSI B16.25 FIG.2A OR 3A AS APPLICABLE  6 - 6			
522317991	CHECK 2500# BW A105/F6 PISTON XXS  BUTTWELDING CHECK VALVE, CLASS 2500# PER API 602; CARBON STEEL BODY (ASTM A105), F6 (13% CR) TRIM, API 600/602 TRIM NUMBER 1; BOLTED COVER, SPRING CONTROLLED PISTON TYPE, HORIZONTAL AND VERTICAL USE; BUTTWELDING END PREPARATION (XXS) PER ANSI B16.25 FIG. 2A OR 3A AS APPLICABLE;  1/2 - 2			

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	PIPING MATERIAL SPECIFICATION	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 34 OF 49

CLASS : 25P1

ITEM NO.	DESCRIPTION	SIZE	REQ Q'TY	REMARKS
----------	-------------	------	----------	---------

523134195 CHECK 2500# BW A216-WCB/F6 SWING XXS

BUTTWELDING CHECK VALVE, CLASS 2500# PER API 600;  
CARBON STEEL BODY, DISC & COVER (ASTM A216 WCB CASTING); F6(13% CR) TRIM,  
API600/602 TRIM NUMBER 1;  
BOLTED COVER SWING TYPE, HORIZONTAL AND VERTICAL USE;  
VALVE SHALL BE DRILLED, TAPPED, AND PLUGGED AT LOCATION "G" PER ANSI B16.34  
BUTTWELDING END PREPARATION (XXS) PER ANSI B16.25 FIG. 2A OR 3A AS APPLICABLE;

3 - 3

523134196 CHECK 2500# BW A216-WCB/F6 SWING 20.3MM

BUTTWELDING CHECK VALVE, CLASS 2500# PER API 600;  
CARBON STEEL BODY, DISC & COVER (ASTM A216 WCB CASTING); F6(13% CR) TRIM,  
API600/602 TRIM NUMBER 1;  
BOLTED COVER SWING TYPE, HORIZONTAL AND VERTICAL USE;  
VALVE SHALL BE DRILLED, TAPPED, AND PLUGGED AT LOCATION "G" PER ANSI B16.34  
BUTTWELDING END PREPARATION (20.3MM) PER ANSI B16.25 FIG. 2A OR 3A AS APPLICABLE;

4 - 4

523134197 CHECK 2500# BW A216-WCB/F6 SWING 28.6MM


BUTTWELDING CHECK VALVE, CLASS 2500# PER API 600;  
CARBON STEEL BODY, DISC & COVER (ASTM A216 WCB CASTING); F6(13% CR) TRIM,  
API600/602 TRIM NUMBER 1;  
BOLTED COVER SWING TYPE, HORIZONTAL AND VERTICAL USE;  
VALVE SHALL BE DRILLED, TAPPED, AND PLUGGED AT LOCATION "G" PER ANSI B16.34  
BUTTWELDING END PREPARATION (28.6MM) PER ANSI B16.25 FIG. 2A OR 3A AS APPLICABLE;

6 - 6

532884590 BALL 2500# BW A105/316+PTFE WITH BBE NIPPLE

BUTTWELDED BALL VALVE, CLASS 2500# PER API 602;  
CARBON STEEL BODY (ASTM A105 FORGING),  
316 STAINLESS STEEL BALL & STEM, PTFE SEAT;  
FIRE SAFE DESIGN, FLOATING BALL, WRENCH OPERATED,  
BASICALLY REDUCED PORT, BUT IN CASE OF FULL PORT - BE DEFINED IN B/M.  
3 PIECES BOLTED TYPE;  
100MM NIPPLE WELDED ON EACH END, BBE;  
BUTTWELDING END PREPARATION (XXS) PER ANSI B16.25 FIG. 2A OR 3A AS APPLICABLE;

1/2 - 1.1/2

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	PIPING MATERIAL SPECIFICATION	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 35 OF 49

CLASS : 25P1

ITEM NO.	DESCRIPTION	SIZE	REQ Q'TY	REMARKS
----------	-------------	------	----------	---------

532884591 BALL 2500# BW A216-WCB/F6+PTFE G.O XXS

BUTTWELDED BALL VALVE, CLASS 2500# PER API 6D;  
CARBON STEEL BODY (ASTM A216 GR WCB CASTING), F6(13% CR) TRIM,  
TOP ENTRY TYPE, TRUNNION BALL TYPE, FIRE SAFE DESIGN, PTFE SEAT,  
GEAR AND HANDWHEEL OPERATED, TRANSITION PIECE WELDED ON EACH END,  
BASICALLY REDUCED PORT, BUT IN CASE OF FULL PORT - BE DEFINED IN B/M;  
END TO END DIMENSIONS TO ANSI B16.10,  
BUTTWELDING ENDS PREPARATION (XXS): ANSI B16.25 FIG 2A/3A AS APPLICABLE;

2 - 3

532884592 BALL 2500# BW A216-WCB/F6+PTFE G.O 20.3MM


BUTTWELDED BALL VALVE, CLASS 2500# PER API 6D;  
CARBON STEEL BODY (ASTM A216 GR WCB CASTING), F6(13% CR) TRIM,  
TOP ENTRY TYPE, TRUNNION BALL TYPE, FIRE SAFE DESIGN, PTFE SEAT,  
GEAR AND HANDWHEEL OPERATED, TRANSITION PIECE WELDED ON EACH END,  
BASICALLY REDUCED PORT, BUT IN CASE OF FULL PORT - BE DEFINED IN B/M;  
END TO END DIMENSIONS TO ANSI B16.10,  
BUTTWELDING ENDS PREPARATION (20.3MM): ANSI B16.25 FIG 2A/3A AS APPLICABLE;

4 - 4

532884593A BALL 2500# BW A216-WCB/F6+PTFE G.O 28.6MM

BUTTWELDED BALL VALVE, CLASS 2500# PER API 6D;  
CARBON STEEL BODY (ASTM A216 GR WCB CASTING), F6(13% CR) TRIM,  
TOP ENTRY TYPE, TRUNNION BALL TYPE, FIRE SAFE DESIGN, PTFE SEAT,  
GEAR AND HANDWHEEL OPERATED, TRANSITION PIECE WELDED ON EACH END,  
BASICALLY REDUCED PORT, BUT IN CASE OF FULL PORT - BE DEFINED IN B/M;  
END TO END DIMENSIONS TO ANSI B16.10,  
BUTTWELDING ENDS PREPARATION (28.6MM): ANSI B16.25 FIG 2A/3A AS APPLICABLE;

6 - 6

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 36 OF 49

CLASS : 1R1J

ITEM NO.	DESCRIPTION	SIZE	REQ Q'TY	REMARKS
----------	-------------	------	----------	---------

50376405H GATE 150# BW A351-CF3/316+HF BB OS&Y SCH40S

BUTTWELDED GATE VALVE, CLASS 150# PER ANSI B16.34;  
 304L STAINLESS STEEL BODY & BONNET (ASTM A351 GR CF3 CASTING),  
 316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS,  
 SPIRAL WOUND GASKET: 316SS+ GRAPHITE FILLER, 316SS INNER RING,  
 BOLT A320 B8M CL.2, PACKING DIAGONAL BRAID OF PTFE FIBERS IMPREGNATED WITH PTFE;  
 OS&Y, FULL PORT, FLEXIBLE WEDGE, BOLTED BONNET, EXTENDED BONNET, HANDWHEEL OPERATED,  
 SELF RELIEVING TYPE TO RELIEVE EXCESS BODY PRESSURE, REPLACEABLE UNDER PRESSURE;  
 VALVE SHALL BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT - 199 DEG C;  
 BUTTWELD END(SCH40S) TO ANSI B16.25, END TO END AS PER ANSI B16.10 ;

2 - 3

50376405F GATE 150# BW A351-CF3/316+HF BB OS&Y SCH10S


BUTTWELDED GATE VALVE, CLASS 150# PER ANSI B16.34;  
 304L STAINLESS STEEL BODY & BONNET (ASTM A351 GR CF3 CASTING),  
 316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS,  
 SPIRAL WOUND GASKET: 316SS+ GRAPHITE FILLER, 316SS INNER RING,  
 BOLT A320 B8M CL.2, PACKING DIAGONAL BRAID OF PTFE FIBERS IMPREGNATED WITH PTFE;  
 OS&Y, FULL PORT, FLEXIBLE WEDGE, BOLTED BONNET, EXTENDED BONNET, HANDWHEEL OPERATED,  
 SELF RELIEVING TYPE TO RELIEVE EXCESS BODY PRESSURE, REPLACEABLE UNDER PRESSURE;  
 VALVE SHALL BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT - 199 DEG C;  
 BUTTWELD END(SCH10S) TO ANSI B16.25, END TO END AS PER ANSI B16.10 ;

4 - 4

50376485F GATE 150# BW A351-CF3/316+HF BB OS&Y G.O SCH10S

BUTTWELDED GATE VALVE, CLASS 150# PER ANSI B16.34;  
 304L STAINLESS STEEL BODY & BONNET (ASTM A351 GR CF3 CASTING),  
 316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS,  
 SPIRAL WOUND GASKET: 316SS+ GRAPHITE FILLER, 316SS INNER RING,  
 BOLT A320 B8M CL.2, PACKING DIAGONAL BRAID OF PTFE FIBERS IMPREGNATED WITH PTFE;  
 OS&Y, FULL PORT, FLEXIBLE WEDGE, BOLTED BONNET, EXTENDED BONNET,  
 GEAR AND HANDWHEEL OPERATED, SELF RELIEVING TYPE TO RELIEVE EXCESS BODY PRESSURE,  
 REPLACEABLE UNDER PRESSURE;  
 VALVE SHALL BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT - 199 DEG C;  
 BUTTWELD END(SCH10S) TO ANSI B16.25, END TO END AS PER ANSI B16.10 ;

6 - 12

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	PIPING MATERIAL SPECIFICATION	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 37 OF 49

CLASS : 1R1J

ITEM NO.	DESCRIPTION	SIZE	REQ Q'TY	REMARKS
----------	-------------	------	----------	---------

512904110 GLOBE 800# SW A182-F304L/316+HF SW OS&Y

SOCKET WELDED GLOBE VALVE, CLASS 800# PER API 602;  
304L STAINLESS STEEL BODY & BONNET (ASTM A182 GR F304L FORGING),  
316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS,  
SPIRAL WOUND GASKET: 316SS+ GRAPHITE FILLER, 316SS INNER RING, BOLT A320-B8M CL2;  
OS&Y, BOLTED BONNET, RENEWABLE SEATS, STANDARD BORE,  
LOOSE PLUG TYPE DISC, EXTENDED BONNET, HANDWHEEL OPERATED;  
VALVE TO BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C;  
SOCKETWELD ENDS TO ANSI B16.11;

1/2 - 1.1/2

51376405H GLOBE 150# BW A351-CF3/316+HF BB OS&Y SCH40S

BUTTWELDED GLOBE VALVE, CLASS 150# PER ANSI B16.34;  
304L STAINLESS STEEL BODY & BONNET (ASTM A351 GR CF3 CASTING),  
316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS,  
SPIRAL WOUND GASKET: 316+ GRAPHITE FILLER, 316 INNER RING, BOLT A320 B8M CL.2;  
OS&Y, BOLTED BONNET, RENEWABLE SEATS, LOOSE PLUG TYPE DISC,  
EXTENDED BONNET, HANDWHEEL OPERATED;  
VALVE SHALL BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C;  
BUTTWELD END(SCH40S) TO ANSI B16.25, END TO END AS PER ANSI B16.10;

2 - 3

51376405F GLOBE 150# BW A351-CF3/316+HF BB OS&Y SCH10S


BUTTWELDED GLOBE VALVE, CLASS 150# PER ANSI B16.34;  
304L STAINLESS STEEL BODY & BONNET (ASTM A351 GR CF3 CASTING),  
316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS,  
SPIRAL WOUND GASKET: 316+ GRAPHITE FILLER, 316 INNER RING, BOLT A320 B8M CL.2;  
OS&Y, BOLTED BONNET, RENEWABLE SEATS, LOOSE PLUG TYPE DISC,  
EXTENDED BONNET, HANDWHEEL OPERATED;  
VALVE SHALL BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C;  
BUTTWELD END(SCH10S) TO ANSI B16.25, END TO END AS PER ANSI B16.10;

4 - 4

51376485F GLOBE 150# BW A351-CF3/316+HF BB OS&Y G.O SCH10S

BUTTWELDED GLOBE VALVE, CLASS 150# PER ANSI B16.34;  
304L STAINLESS STEEL BODY & BONNET (ASTM A351 GR CF3 CASTING),  
316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS,  
SPIRAL WOUND GASKET: 316+ GRAPHITE FILLER, 316 INNER RING, BOLT A320 B8M CL.2;  
OS&Y, BOLTED BONNET, RENEWABLE SEATS, LOOSE PLUG TYPE DISC,  
EXTENDED BONNET, GEAR AND HANDWHEEL OPERATED;  
VALVE SHALL BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C;  
BUTTWELD END(SCH10S) TO ANSI B16.25, END TO END AS PER ANSI B16.10;

6 - 12

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	PIPING MATERIAL SPECIFICATION	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 38 OF 49

CLASS : 1R1J

ITEM NO.	DESCRIPTION	SIZE	REQ Q'TY	REMARKS
----------	-------------	------	----------	---------

522907910 CHECK 800# SW A182-F304L/316+HF PISTON

SOCKET WELDED CHECK VALVE, CLASS 800# PER API 602;  
304L STAINLESS STEEL BODY, DISC & COVER (ASTM A182 GR F304L FORGING),  
316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS,  
SPIRAL WOUND GASKET: 316SS+ GRAPHITE FILLER, 316SS INNER RING,  
SPRING-MANUFACTURE'S STANDARD, BOLT A320 B8M CL2;  
T-BODY, PISTON LIFT TYPE, BOLTED COVER,  
SPRING ARRESTED FOR USE IN THE HORIZONTAL AND VERTICAL;  
VALVE TO BE SUITABLE FOR CRYOGENIC SERVICE AT-199 DEG C;  
SOCKETWELD ENDS TO ANSI B16.11;

1/2 - 1.1/2

523552050 CHECK 300# RF A351-CF8/316 WAFER

WAFER CHECK VALVE, CLASS 300# PER API 594;  
304 STAINLESS STEEL BODY, DISC & COVER (ASTM A351 GR CF8 CASTING),  
316 STAINLESS STEEL TRIM, SPRING INCONEL 600, BOLT A320 B8M CL2,  
SPIRAL WOUND GASKET: 316SS+ GRAPHITE FILLER, 316SS INNER RING,  
DUAL PLATE WAFER TYPE, FOR USE IN THE HORIZONTAL AND VERTICAL POSITIONS;  
VALVE TO BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C;  
RAISED FACE FLANGE DIMENSION: AS PER ANSI B16.5  
MATING FLANGE RATING 300# RF(125AARH);

2 - 12

523762550 CHECK 300# RF A351-CF8/316+HF NON-SLAM


RAISED FACE FLANGED CHECK VALVE, CLASS 300# PER ANSI B16.34;  
304 STAINLESS STEEL BODY, DISC & COVER (ASTM A351 GR CF8 CASTING);  
316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS, 316 STAINLESS STEEL SPRING;  
NON-SLAM TYPE, SUITABLE FOR USE IN THE HORIZONTAL AND VERTICAL POSITIONS;  
VALVE TO BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C;  
FLANGE DIMENSIONS PER ANSI B16.5;

2 - 12

52376415F CHECK 150# BW A351-CF3/316+HF SWING SCH10S

BUTTWELDED CHECK VALVE, CLASS 150# PER ANSI B16.34;  
304L STAINLESS STEEL BODY, DISC & COVER (ASTM A351 GR CF3 CASTING);  
316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS, BOLT A320 B8M CL2,  
SPIRAL WOUND GASKET: 316SS+ GRAPHITE FILLER, 316SS INNER RING;  
SWING CHECK TYPE, BOLTED COVER, INTERNAL HINGE DESIGN (NOEXTERNAL PLUGS),  
RENEWABLE SEATS, SUITABLE FOR USE IN THE HORIZONTAL AND VERTICAL POSITIONS,  
VALVE TO BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C;  
BUTTWELD END(SCH10S) TO ANSI B16.25, END TO END AS PER ANSI B16.10;

4 - 12

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	PIPING MATERIAL SPECIFICATION	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 39 OF 49

CLASS : 1R1J

ITEM NO.	DESCRIPTION	SIZE	REQ Q'TY	REMARKS
----------	-------------	------	----------	---------

52376415H CHECK 150# BW A351-CF3/316+HF SWING SCH40S

BUTTWELDED CHECK VALVE, CLASS 150# PER ANSI B16.34;  
 304L STAINLESS STEEL BODY, DISC & COVER (ASTM A351 GR CF3 CASTING);  
 316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS, BOLT A320 B8M CL2,  
 SPIRAL WOUND GASKET: 316SS+ GRAPHITE FILLER, 316SS INNER RING;  
 SWING CHECK TYPE, BOLTED COVER, INTERNAL HINGE DESIGN (NOEXTERNAL PLUGS),  
 RENEWABLE SEATS, SUITABLE FOR USE IN THE HORIZONTAL AND VERTICAL POSITIONS,  
 VALVE TO BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C;  
 BUTTWELD END(SCH40S) TO ANSI B16.25, END TO END AS PER ANSI B16.10;

2 - 3

533224510 BALL 800# SW A182-F304L/316+KeL-F WITH PBE NIPPLE


SOCKET WELDED BALL VALVE, CLASS 800# PER API 602;  
 304L STAINLESS STEEL BODY(ASTM A182-F304L), 316 SS BALL & SEATHOLDERS,  
 STEM A182 GR F316, KeL-F SEAT, SEALS PTFE/GRAPHITE, BOLT A320-B8M CL2;  
 FIRE SAFE, ANTI STATIC DESIGN, FLOATING BALL, WITH EXTENDED STEM AND  
 VAPOUR SPACE, WRENCHED OPERATED, 3 PIECES TYPE,  
 BASICALLY REDUCED PORT, BUT IN CASE OF FULL PORT - BE DEFINED IN B/M.  
 A 1/8"(INCH) VENT HOLE SHALL BE DRILLED IN UPSTREAM FACE OF BALL TO  
 RELIEVE EXCESS BODY PRESSURE,  
 DIRECTION OF FLOW SHALL BE PERMANENTLY MARKED ON THE OUTSIDE OF THE BODY,  
 VALVE SHALL BE SUITABLE FOR MOUNTING WITH STEM IN A HORIZONTAL POSITION,  
 AND CRYOGENIC SERVICE OPERATING AT-199 DEG C;  
 100MM NIPPLE WELDED ON EACH END, PBE + PBE;  
 SOCKET WELDING ENDS PREPARATION PER ANSI B16.11;

1/2 - 1.1/2

533224511 BALL 800# SW A182-F304L/316+KeL-F WITH TOE/POE NIPPLE

SOCKET WELDED BALL VALVE, CLASS 800# PER API 602;  
 304L STAINLESS STEEL BODY(ASTM A182-F304L), 316 SS BALL & SEATHOLDERS,  
 STEM A182 GR F316, KeL-F SEAT, SEALS PTFE/GRAPHITE, BOLT A320-B8M CL2;  
 FIRE SAFE, ANTI STATIC DESIGN, FLOATING BALL, REDUCED PORT, WRENCH  
 OPERATED, WITH EXTENDED STEM AND VAPOUR SPACE, 3 PIECES TYPE,  
 A 1/8"(INCH) VENT HOLE SHALL BE DRILLED IN UPSTREAM FACE OF BALL TO  
 RELIEVE EXCESS BODY PRESSURE, FOR DRAIN/VENT/INSTRUMENT,  
 DIRECTION OF FLOW SHALL BE PERMANENTLY MARKED ON THE OUTSIDE OF THE BODY,  
 VALVE SHALL BE SUITABLE FOR MOUNTING WITH STEM IN A HORIZONTAL POSITION,  
 AND CRYOGENIC SERVICE OPERATING AT-199 DEG C, WRENCH OPERATED;  
 100MM NIPPLE WELDED ON EACH END, POE/TOE(ANSI B1.20.1) + PBE;  
 SOCKET WELDING ENDS PREPARATION PER ANSI B16.11;

1/2 - 1.1/2

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	PIPING MATERIAL SPECIFICATION	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 40 OF 49

CLASS : 1R1J

ITEM NO.	DESCRIPTION	SIZE	REQ Q'TY	REMARKS
----------	-------------	------	----------	---------

53408445H BALL 150# BW A351-CF3/316+KeL-F SCH40S

BUTTWELDED BALL VALVE, CLASS 150# PER API 6D;  
 304L STAINLESS STEEL BODY (ASTM A351 GR CF3 CASTING), 316 BALL & SEATHOLDER,  
 STEM A182 GR F316, KeI-F SEAT, SEALS PTFE/GRAPHITE, BOLT A320-B8M CL2;  
 ONE PIECE BODY, TOP ENTRY, EXTENDED STEM & VAPOUR SPACE, WRENCH OPERATED,  
 BASICALLY REDUCED PORT, BUT IN CASE OF FULL PORT - BE DEFINED IN B/M,  
 SELF RELIEVING TYPE TO RELIEVE EXCESS BODY PRESSURE, FIRE SAFE DESIGN,  
 TRANSITION PIECE WELDED ON EACH END, FLOATING BALL TYPE ;  
 DIRECTION OF FLOW SHALL BE PERMANENTLY MARKED ON THE OUTSIDE OF THE BODY,  
 VALVE SHALL BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C AND  
 MOUNTING WITH STEM IN A HORIZONTAL POSITION;  
 BUTTWELD ENDS(SCH40S) PER ANSI B16.25, END TO END DIMENSION PER ANSI B16.10;

2 - 3

53408445F BALL 150# BW A351-CF3/316+KeL-F SCH10S

BUTTWELDED BALL VALVE, CLASS 150# PER API 6D;  
 304L STAINLESS STEEL BODY (ASTM A351 GR CF3 CASTING), 316 BALL & SEATHOLDER,  
 STEM A182 GR F316, KeI-F SEAT, SEALS PTFE/GRAPHITE, BOLT A320-B8M CL2;  
 ONE PIECE BODY, TOP ENTRY, EXTENDED STEM & VAPOUR SPACE, WRENCH OPERATED,  
 BASICALLY REDUCED PORT, BUT IN CASE OF FULL PORT - BE DEFINED IN B/M,  
 FIRE SAFE DESIGN, SELF RELIEVING TYPE TO RELIEVE EXCESS BODY PRESSURE,  
 TRANSITION PIECE WELDED ON EACH END, FLOATING BALL TYPE ;  
 DIRECTION OF FLOW SHALL BE PERMANENTLY MARKED ON THE OUTSIDE OF THE BODY,  
 VALVE SHALL BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C AND  
 MOUNTING WITH STEM IN A HORIZONTAL POSITION;  
 BUTTWELD ENDS(SCH10S) PER ANSI B16.25, END TO END DIMENSION PER ANSI B16.10;


4 - 4

53408495F BALL 150# BW A351-CF3/316+KeL-F G.O SCH10S

BUTTWELDED BALL VALVE, CLASS 150# PER API 6D;  
 304L STAINLESS STEEL BODY (ASTM A351 GR CF3 CASTING), 316 BALL & SEATHOLDER,  
 STEM A182 GR F316, KeI-F SEAT, SEALS PTFE/GRAPHITE, BOLT A320-B8M CL2;  
 ONE PIECE BODY, TOP ENTRY, EXTENDED STEM & VAPOUR SPACE, GEAR AND HANWHEEL  
 OPERATED, BASICALLY REDUCED PORT, BUT IN CASE OF FULL PORT-BE DEFINED IN B/M,  
 8" & LARGER - TRUNNION BALL, 6" & SMALLER - FLOATING BALL TYPE ;  
 SELF RELIEVING TYPE TO RELIEVE EXCESS BODY PRESSURE,  
 TRANSITION PIECE WELDED ON EACH END, FIRE SAFE DESIGN;  
 DIRECTION OF FLOW SHALL BE PERMANENTLY MARKED ON THE OUTSIDE OF THE BODY,  
 VALVE SHALL BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C AND  
 MOUNTING WITH STEM IN A HORIZONTAL POSITION;  
 BUTTWELD ENDS(SCH10S) PER ANSI B16.25, END TO END DIMENSION PER ANSI B16.10;

6 - 12



	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 41 OF 49

CLASS : 3R1J

ITEM NO.	DESCRIPTION	SIZE	REQ Q'TY	REMARKS
----------	-------------	------	----------	---------

50376406H GATE 300# BW A351-CF3/316+HF BB OS&Y SCH40S

BUTTWELDED GATE VALVE, CLASS 300# PER ANSI B16.34;  
 304L STAINLESS STEEL BODY & BONNET (ASTM A351 GR CF3 CASTING),  
 316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS,  
 SPIRAL WOUND GASKET: 316SS+ GRAPHITE FILLER, 316SS INNER RING,  
 BOLT A320 B8M CL.2, PACKING DIAGONAL BRAID OF PTFE FIBERS IMPREGNATED WITH PTFE;  
 OS&Y, FULL PORT, FLEXIBLE WEDGE, BOLTED BONNET, EXTENDED BONNET, HANDWHEEL OPERATED,  
 SELF RELIEVING TYPE TO RELIEVE EXCESS BODY PRESSURE, REPLACEABLE UNDER PRESSURE;  
 VALVE SHALL BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT - 199 DEG C;  
 BUTTWELD END(SCH40S) TO ANSI B16.25, END TO END AS PER ANSI B16.10 ;

2 - 3

50376406F GATE 300# BW A351-CF3/316+HF BB OS&Y SCH10S


BUTTWELDED GATE VALVE, CLASS 300# PER ANSI B16.34;  
 304L STAINLESS STEEL BODY & BONNET (ASTM A351 GR CF3 CASTING),  
 316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS,  
 SPIRAL WOUND GASKET: 316SS+ GRAPHITE FILLER, 316SS INNER RING,  
 BOLT A320 B8M CL.2, PACKING DIAGONAL BRAID OF PTFE FIBERS IMPREGNATED WITH PTFE;  
 OS&Y, FULL PORT, FLEXIBLE WEDGE, BOLTED BONNET, EXTENDED BONNET, HANDWHEEL OPERATED,  
 SELF RELIEVING TYPE TO RELIEVE EXCESS BODY PRESSURE, REPLACEABLE UNDER PRESSURE;  
 VALVE SHALL BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT - 199 DEG C;  
 BUTTWELD END(SCH10S) TO ANSI B16.25, END TO END AS PER ANSI B16.10 ;

4 - 4

50376486F GATE 300# BW A351-CF3/316+HF BB OS&Y G.O SCH10S

BUTTWELDED GATE VALVE, CLASS 300# PER ANSI B16.34;  
 304L STAINLESS STEEL BODY & BONNET (ASTM A351 GR CF3 CASTING),  
 316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS,  
 SPIRAL WOUND GASKET: 316SS+ GRAPHITE FILLER, 316SS INNER RING,  
 BOLT A320 B8M CL.2, PACKING DIAGONAL BRAID OF PTFE FIBERS IMPREGNATED WITH PTFE;  
 OS&Y, FULL PORT, FLEXIBLE WEDGE, BOLTED BONNET, EXTENDED BONNET,  
 GEAR AND HANDWHEEL OPERATED, SELF RELIEVING TYPE TO RELIEVE EXCESS BODY PRESSURE,  
 REPLACEABLE UNDER PRESSURE;  
 VALVE SHALL BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT - 199 DEG C;  
 BUTTWELD END(SCH10S) TO ANSI B16.25, END TO END AS PER ANSI B16.10 ;

6 - 12

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	PIPING MATERIAL SPECIFICATION	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 42 OF 49

CLASS : 3R1J

ITEM NO.	DESCRIPTION	SIZE	REQ Q'TY	REMARKS
----------	-------------	------	----------	---------

512904110 GLOBE 800# SW A182-F304L/316+HF BB OS&Y

SOCKET WELDED GLOBE VALVE, CLASS 800# PER API 602;  
304L STAINLESS STEEL BODY & BONNET (ASTM A182 GR F304L FORGING),  
316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS,  
SPIRAL WOUND GASKET: 316SS+ GRAPHITE FILLER, 316SS INNER RING, BOLT A320-B8M CL2;  
OS&Y, BOLTED BONNET, RENEWABLE SEATS, STANDARD BORE,  
LOOSE PLUG TYPE DISC, EXTENDED BONNET, HANDWHEEL OPERATED;  
VALVE TO BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C;  
SOCKETWELD ENDS TO ANSI B16.11;

1/2 - 1.1/2

51376406H GLOBE 300# BW A351-CF3/316+HF BB OS&Y SCH40S

BUTTWELDED GLOBE VALVE, CLASS 300# PER ANSI B16.34;  
304L STAINLESS STEEL BODY & BONNET (ASTM A351 GR CF3 CASTING),  
316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS,  
SPIRAL WOUND GASKET: 316+ GRAPHITE FILLER, 316 INNER RING, BOLT A320 B8M CL.2;  
OS&Y, BOLTED BONNET, RENEWABLE SEATS, LOOSE PLUG TYPE DISC,  
EXTENDED BONNET, HANDWHEEL OPERATED;  
VALVE SHALL BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C;  
BUTTWELD END(SCH40S) TO ANSI B16.25, END TO END AS PER ANSI B16.10;

2 - 3

51376406F GLOBE 300# BW A351-CF3/316+HF BB OS&Y SCH10S


BUTTWELDED GLOBE VALVE, CLASS 300# PER ANSI B16.34;  
304L STAINLESS STEEL BODY & BONNET (ASTM A351 GR CF3 CASTING),  
316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS,  
SPIRAL WOUND GASKET: 316+ GRAPHITE FILLER, 316 INNER RING, BOLT A320 B8M CL.2;  
OS&Y, BOLTED BONNET, RENEWABLE SEATS, LOOSE PLUG TYPE DISC,  
EXTENDED BONNET, HANDWHEEL OPERATED;  
VALVE SHALL BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C;  
BUTTWELD END(SCH10S) TO ANSI B16.25, END TO END AS PER ANSI B16.10;

4 - 4

51376486F GLOBE 300# BW A351-CF3/316+HF BB OS&Y G.O SCH10S

BUTTWELDED GLOBE VALVE, CLASS 300# PER ANSI B16.34;  
304L STAINLESS STEEL BODY & BONNET (ASTM A351 GR CF3 CASTING),  
316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS,  
SPIRAL WOUND GASKET: 316+ GRAPHITE FILLER, 316 INNER RING, BOLT A320 B8M CL.2;  
OS&Y, BOLTED BONNET, RENEWABLE SEATS, LOOSE PLUG TYPE DISC,  
EXTENDED BONNET, GEAR AND HANDWHEEL OPERATED;  
VALVE SHALL BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C;  
BUTTWELD END(SCH10S) TO ANSI B16.25, END TO END AS PER ANSI B16.10;

6 - 12

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	PIPING MATERIAL SPECIFICATION	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 43 OF 49

CLASS : 3R1J

ITEM NO.	DESCRIPTION	SIZE	REQ Q'TY	REMARKS
----------	-------------	------	----------	---------

522907910 CHECK 800# SW A182-F304L/316+HF PISTON

SOCKET WELDED CHECK VALVE, CLASS 800# PER API 602;  
304L STAINLESS STEEL BODY, DISC & COVER (ASTM A182 GR F304L FORGING),  
316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS,  
SPIRAL WOUND GASKET: 316SS+ GRAPHITE FILLER, 316SS INNER RING,  
SPRING-MANUFACTURE'S STANDARD, BOLT A320 B8M CL2;  
T-BODY, PISTON LIFT TYPE, BOLTED COVER,  
SPRING ARRESTED FOR USE IN THE HORIZONTAL AND VERTICAL;  
VALVE TO BE SUITABLE FOR CRYOGENIC SERVICE AT-199 DEG C;  
SOCKETWELD ENDS TO ANSI B16.11;

1/2 - 1.1/2

52376416H CHECK 300# BW A351-CF3/316+HF SWING SCH40S


BUTTWELDED CHECK VALVE, CLASS 300# PER ANSI B16.34;  
304L STAINLESS STEEL BODY, DISC & COVER (ASTM A351 GR CF3 CASTING);  
316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS, BOLT A320 B8M CL2,  
SPIRAL WOUND GASKET: 316SS+ GRAPHITE FILLER, 316SS INNER RING;  
SWING CHECK TYPE, BOLTED COVER, INTERNAL HINGE DESIGN (NOEXTERNAL PLUGS),  
RENEWABLE SEATS, SUITABLE FOR USE IN THE HORIZONTAL AND VERTICAL POSITIONS,  
VALVE TO BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C;  
BUTTWELD END(SCH40S) TO ANSI B16.25, END TO END AS PER ANSI B16.10;

2 - 3

52376416F CHECK 300# BW A351-CF3/316+HF SWING SCH10S

BUTTWELDED CHECK VALVE, CLASS 300# PER ANSI B16.34;  
304L STAINLESS STEEL BODY, DISC & COVER (ASTM A351 GR CF3 CASTING);  
316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS, BOLT A320 B8M CL2,  
SPIRAL WOUND GASKET: 316SS+ GRAPHITE FILLER, 316SS INNER RING;  
SWING CHECK TYPE, BOLTED COVER, INTERNAL HINGE DESIGN (NOEXTERNAL PLUGS),  
RENEWABLE SEATS, SUITABLE FOR USE IN THE HORIZONTAL AND VERTICAL POSITIONS,  
VALVE TO BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C;  
BUTTWELD END(SCH10S) TO ANSI B16.25, END TO END AS PER ANSI B16.10;

4 - 12

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	PIPING MATERIAL SPECIFICATION	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 44 OF 49

CLASS : 3R1J

ITEM NO.	DESCRIPTION	SIZE	REQ Q'TY	REMARKS
----------	-------------	------	----------	---------

533224510 BALL 800# SW A182-F304L/316+KeL-F WITH PBE NIPPLE

SOCKET WELDED BALL VALVE, CLASS 800# PER API 602;  
 304L STAINLESS STEEL BODY(ASTM A182-F304L), 316 SS BALL & SEATHOLDERS,  
 STEM A182 GR F316, KeI-F SEAT, SEALS PTFE/GRAPHITE, BOLT A320-B8M CL2;  
 FIRE SAFE, ANTI STATIC DESIGN, FLOATING BALL, WITH EXTENDED STEM AND  
 VAPOUR SPACE, WRENCHED OPERATED, 3 PIECES TYPE,  
 BASICALLY REDUCED PORT, BUT IN CASE OF FULL PORT - BE DEFINED IN B/M.  
 A 1/8"(INCH) VENT HOLE SHALL BE DRILLED IN UPSTREAM FACE OF BALL TO  
 RELIEVE EXCESS BODY PRESSURE,  
 DIRECTION OF FLOW SHALL BE PERMANENTLY MARKED ON THE OUTSIDE OF THE BODY,  
 VALVE SHALL BE SUITABLE FOR MOUNTING WITH STEM IN A HORIZONTAL POSITION,  
 AND CRYOGENIC SERVICE OPERATING AT-199 DEG C;  
 100MM NIPPLE WELDED ON EACH END, PBE + PBE;  
 SOCKET WELDING ENDS PREPARATION PER ANSI B16.11;

1/2 - 1.1/2


533224511 BALL 800# SW A182-F304L/316+KeL-F WITH TOE/POE NIPPLE

SOCKET WELDED BALL VALVE, CLASS 800# PER API 602;  
 304L STAINLESS STEEL BODY(ASTM A182-F304L), 316 SS BALL & SEATHOLDERS,  
 STEM A182 GR F316, KeI-F SEAT, SEALS PTFE/GRAPHITE, BOLT A320-B8M CL2;  
 FIRE SAFE, ANTI STATIC DESIGN, FLOATING BALL, REDUCED PORT, WRENCH  
 OPERATED, WITH EXTENDED STEM AND VAPOUR SPACE, 3 PIECES TYPE,  
 A 1/8"(INCH) VENT HOLE SHALL BE DRILLED IN UPSTREAM FACE OF BALL TO  
 RELIEVE EXCESS BODY PRESSURE, FOR DRAIN/VENT/INSTRUMENT,  
 DIRECTION OF FLOW SHALL BE PERMANENTLY MARKED ON THE OUTSIDE OF THE BODY,  
 VALVE SHALL BE SUITABLE FOR MOUNTING WITH STEM IN A HORIZONTAL POSITION,  
 AND CRYOGENIC SERVICE OPERATING AT-199 DEG C, WRENCH OPERATED;  
 100MM NIPPLE WELDED ON EACH END, POE/TOE(ANSI B1.20.1) + PBE;  
 SOCKET WELDING ENDS PREPARATION PER ANSI B16.11;

1/2 - 1.1/2

53408446H BALL 300# BW A351-CF3/316+KeL-F SCH40S

BUTTWELDED BALL VALVE, CLASS 300# PER API 6D;  
 304L STAINLESS STEEL BODY (ASTM A351 GR CF3 CASTING), 316 BALL & SEATHOLDER,  
 STEM A182 GR F316, KeI-F SEAT, SEALS PTFE/GRAPHITE, BOLT A320-B8M CL2;  
 ONE PIECE BODY, TOP ENTRY, EXTENDED STEM & VAPOUR SPACE, WRENCH OPERATED,  
 BASICALLY REDUCED PORT, BUT IN CASE OF FULL PORT - BE DEFINED IN B/M,  
 SELF RELIEVING TYPE TO RELIEVE EXCESS BODY PRESSURE, FIRE SAFE DESIGN,  
 TRANSITION PIECE WELDED ON EACH END, FLOATING BALL TYPE ;  
 DIRECTION OF FLOW SHALL BE PERMANENTLY MARKED ON THE OUTSIDE OF THE BODY,  
 VALVE SHALL BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C AND  
 MOUNTING WITH STEM IN A HORIZONTAL POSITION;  
 BUTTWELD ENDS(SCH40S) PER ANSI B16.25, END TO END DIMENSION PER ANSI B16.10;

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 45 OF 49

CLASS : 3R1J

ITEM NO.	DESCRIPTION	SIZE	REQ Q'TY	REMARKS
----------	-------------	------	----------	---------

53408446F BALL 300# BW A351-CF3/316+KeL-F SCH10S


BUTTWELDED BALL VALVE, CLASS 300# PER API 6D;  
 304L STAINLESS STEEL BODY (ASTM A351 GR CF3 CASTING), 316 BALL & SEATHOLDER,  
 STEM A182 GR F316, KeL-F SEAT, SEALS PTFE/GRAPHITE, BOLT A320-B8M CL2;  
 ONE PIECE BODY, TOP ENTRY, EXTENDED STEM & VAPOUR SPACE, WRENCH OPERATED,  
 BASICALLY REDUCED PORT, BUT IN CASE OF FULL PORT - BE DEFINED IN B/M,  
 SELF RELIEVING TYPE TO RELIEVE EXCESS BODY PRESSURE, FIRE SAFE DESIGN,  
 TRANSITION PIECE WELDED ON EACH END, FLOATING BALL TYPE ;  
 DIRECTION OF FLOW SHALL BE PERMANENTLY MARKED ON THE OUTSIDE OF THE BODY,  
 VALVE SHALL BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C AND  
 MOUNTING WITH STEM IN A HORIZONTAL POSITION;  
 BUTTWELD ENDS(SCH10S) PER ANSI B16.25, END TO END DIMENSION PER ANSI B16.10;

4 - 4

53408496F BALL 300# BW A351-CF3/316+KeL-F G.O SCH10S

BUTTWELDED BALL VALVE, CLASS 300# PER API 6D;  
 304L STAINLESS STEEL BODY (ASTM A351 GR CF3 CASTING), 316 BALL & SEATHOLDER,  
 STEM A182 GR F316, KeL-F SEAT, SEALS PTFE/GRAPHITE, BOLT A320-B8M CL2;  
 ONE PIECE BODY, TOP ENTRY, EXTENDED STEM & VAPOUR SPACE, GEAR AND HANWHEEL  
 8" & LARGER - TRUNNION BALL, 6" & SMALLER - FLOATING BALL TYPE ;  
 OPERATED, BASICALLY REDUCED PORT, BUT IN CASE OF FULL PORT-BE DEFINED IN B/M,  
 SELF RELIEVING TYPE TO RELIEVE EXCESS BODY PRESSURE,  
 INCASE OF SOFT SEAT & METAL SEAT BACK-UP VALVE,  
 TRANSITION PIECE WELDED ON EACH END, FIRE SAFE DESIGN;  
 DIRECTION OF FLOW SHALL BE PERMANENTLY MARKED ON THE OUTSIDE OF THE BODY,  
 VALVE SHALL BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C AND  
 MOUNTING WITH STEM IN A HORIZONTAL POSITION;  
 BUTTWELD ENDS(SCH10S) PER ANSI B16.25, END TO END DIMENSION PER ANSI B16.10;

6 - 12

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	<b>PIPING MATERIAL SPECIFICATION</b>	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 46 OF 49

CLASS : 25R1J

ITEM NO.	DESCRIPTION	SIZE	REQ Q'TY	REMARKS
----------	-------------	------	----------	---------

512904190 GLOBE 2500# BW A182-F304L/316+HF BB OS&Y

BUTTWELDED WELDED GLOBE VALVE, CLASS 2500# PER API 602;  
304L STAINLESS STEEL BODY & BONNET (ASTM A182 GR F304L FORGING),  
316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS,  
SPIRAL WOUND GASKET:316SS+ GRAPHITE FILLER, 316SS INNER RING, BOLT A320-B8M CL2;  
OS&Y, BOLTED BONNET, RENEWABLE SEATS, STANDARD BORE,  
LOOSE PLUG TYPE DISC, EXTENDED BONNET, HANDWHEEL OPERATED;  
VALVE TO BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C;  
BUTTWELD END(XXS) TO ANSI B16.25, END TO END AS PER ANSI B16.10;

1/2 - 1.1/2

513764881 GLOBE 2500# BW A351-CF3/316+HF BB OS&Y G.O XXS

BUTTWELDED GLOBE VALVE, CLASS 2500# PER ANSI B16.34;  
304L STAINLESS STEEL BODY & BONNET (ASTM A351 GR CF3 CASTING),  
316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS,  
SPIRAL WOUND GASKET: 316+ GRAPHITE FILLER, 316 INNER RING, BOLT A320 B8M CL.2;  
OS&Y, BOLTED BONNET, RENEWABLE SEATS, LOOSE PLUG TYPE DISC,  
EXTENDED BONNET, GEAR AND HANDWHEEL OPERATED;  
VALVE SHALL BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C;  
BUTTWELD END(XXS) TO ANSI B16.25, END TO END AS PER ANSI B16.10;

2 - 4

513764882 GLOBE 2500# BW A351-CF3/316+HF BB OS&Y G.O 28.88MM


BUTTWELDED GLOBE VALVE, CLASS 2500# PER ANSI B16.34;  
304L STAINLESS STEEL BODY & BONNET (ASTM A351 GR CF3 CASTING),  
316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS,  
SPIRAL WOUND GASKET: 316+ GRAPHITE FILLER, 316 INNER RING, BOLT A320 B8M CL.2;  
OS&Y, BOLTED BONNET, RENEWABLE SEATS, LOOSE PLUG TYPE DISC,  
EXTENDED BONNET, GEAR AND HANDWHEEL OPERATED;  
VALVE SHALL BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C;  
BUTTWELD END(28.88) TO ANSI B16.25, END TO END AS PER ANSI B16.10;

6 - 6

522907990 CHECK 2500# BW A182-F304L/316+HF PISTON

BUTTWELDED WELDED CHECK VALVE, CLASS 2500# PER API 602;  
304L STAINLESS STEEL BODY, DISC & COVER (ASTM A182 GR F304L FORGING),  
316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS,  
SPIRAL WOUND GASKET:316SS+ GRAPHITE FILLER, 316SS INNER RING,  
SPRING-MANUFACTURE'S STANDARD, BOLT A320 B8M CL2;  
T-BODY, PISTON LIFT TYPE, BOLTED COVER,  
SPRING ARRESTED FOR USE IN THE HORIZONTAL AND VERTICAL;  
VALVE TO BE SUITABLE FOR CRYOGENIC SERVICE AT-199 DEG C;  
BUTTWELD END(160) TO ANSI B16.25, END TO END AS PER ANSI B16.10;

1/2 - 1.1/2

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	PIPING MATERIAL SPECIFICATION	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 47 OF 49

CLASS : 25R1J

ITEM NO.	DESCRIPTION	SIZE	REQ Q'TY	REMARKS
----------	-------------	------	----------	---------

523764183 CHECK 2500# BW A351-CF3/316+HF SWING XXS

BUTTWELDED CHECK VALVE, CLASS 2500# PER ANSI B16.34;  
 304L STAINLESS STEEL BODY, DISC & COVER (ASTM A351 GR CF3 CASTING);  
 316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS, BOLT A320 B8M CL2,  
 SPIRAL WOUND GASKET: 316SS+ GRAPHITE FILLER, 316SS INNER RING;  
 SWING CHECK TYPE, BOLTED COVER, INTERNAL HINGE DESIGN (NOEXTERNAL PLUGS),  
 RENEWABLE SEATS, SUITABLE FOR USE IN THE HORIZONTAL AND VERTICAL POSITIONS,  
 VALVE TO BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C;  
 BUTTWELD END(XXS) TO ANSI B16.25, END TO END AS PER ANSI B16.10;

2 - 4

523764181 CHECK 2500# BW A351-CF3/316+HF SWING 28.88MM


BUTTWELDED CHECK VALVE, CLASS 2500# PER ANSI B16.34;  
 304L STAINLESS STEEL BODY, DISC & COVER (ASTM A351 GR CF3 CASTING);  
 316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS, BOLT A320 B8M CL2,  
 SPIRAL WOUND GASKET: 316SS+ GRAPHITE FILLER, 316SS INNER RING;  
 SWING CHECK TYPE, BOLTED COVER, INTERNAL HINGE DESIGN (NOEXTERNAL PLUGS),  
 RENEWABLE SEATS, SUITABLE FOR USE IN THE HORIZONTAL AND VERTICAL POSITIONS,  
 VALVE TO BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C;  
 BUTTWELD END(28.88) TO ANSI B16.25, END TO END AS PER ANSI B16.10;

6 - 6

533224590 BALL 2500# BW A182-F304L/316+KeL-F WITH BBE NIPPLE

BUTTWELDED BALL VALVE, CLASS 2500# PER API 602;  
 304L STAINLESS STEEL BODY(ASTM A182-F304L), 316 SS BALL & SEATHOLDERS,  
 STEM A182 GR F316, KeL-F SEAT, SEALS PTFE/GRAPHITE, BOLT A320-B8M CL2;  
 FIRE SAFE, ANTI STATIC DESIGN, FLOATING BALL, WITH EXTENDED STEM AND  
 VAPOUR SPACE, WRENCHED OPERATED, 3 PIECES TYPE,  
 BASICALLY REDUCED PORT, BUT IN CASE OF FULL PORT - BE DEFINED IN B/M.  
 A 1/8"(INCH) VENT HOLE SHALL BE DRILLED IN UPSTREAM FACE OF BALL TO  
 RELIEVE EXCESS BODY PRESSURE,  
 DIRECTION OF FLOW SHALL BE PERMANENTLY MARKED ON THE OUTSIDE OF THE BODY,  
 VALVE SHALL BE SUITABLE FOR MOUNTING WITH STEM IN A HORIZONTAL POSITION,  
 AND CRYOGENIC SERVICE OPERATING AT-199 DEG C;  
 100MM NIPPLE WELDED ON EACH END, BBE;  
 BUTTWELD ENDS(XXS) PER ANSI B16.25, END TO END DIMENSION PER ANSI B16.10;

1/2 - 1.1/2

	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	PIPING MATERIAL SPECIFICATION	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 48 OF 49

CLASS : 25R1J

ITEM NO.	DESCRIPTION	SIZE	REQ Q'TY	REMARKS
----------	-------------	------	----------	---------

534084481 BALL 2500# BW A351-CF3/316+KeL-F G.O XXS

BUTTWELDED BALL VALVE, CLASS 2500# PER API 6D;  
 304L STAINLESS STEEL BODY (ASTM A351 GR CF3 CASTING), 316 BALL & SEATHOLDER,  
 STEM A182 GR F316, KeL-F SEAT, SEALS PTFE/GRAPHITE, BOLT A320-B8M CL2;  
 ONE PIECE BODY, TOP ENTRY, EXTENDED STEM & VAPOUR SPACE, GEAR AND HANWHEEL  
 OPERATED, BASICALLY REDUCED PORT, BUT IN CASE OF FULL PORT-BE DEFINED IN B/M,  
 TRUNNION BALL TYPE, SELF RELIEVING TYPE TO RELIEVE EXCESS BODY PRESSURE,  
 TRANSITION PIECE WELDED ON EACH END, FIRE SAFE DESIGN;  
 DIRECTION OF FLOW SHALL BE PERMANENTLY MARKED ON THE OUTSIDE OF THE BODY,  
 VALVE SHALL BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C AND  
 MOUNTING WITH STEM IN A HORIZONTAL POSITION;  
 BUTTWELD ENDS(XXS) PER ANSI B16.25, END TO END DIMENSION PER ANSI B16.10;


2 - 4

534084983 BALL 2500# BW A351-CF3/316+KeL-F G.O 28.88MM

BUTTWELDED BALL VALVE, CLASS 2500# PER API 6D;  
 304L STAINLESS STEEL BODY (ASTM A351 GR CF3 CASTING), 316 BALL & SEATHOLDER,  
 STEM A182 GR F316, KeL-F SEAT, SEALS PTFE/GRAPHITE, BOLT A320-B8M CL2;  
 ONE PIECE BODY, TOP ENTRY, EXTENDED STEM & VAPOUR SPACE, GEAR AND HANWHEEL  
 OPERATED, BASICALLY REDUCED PORT, BUT IN CASE OF FULL PORT-BE DEFINED IN B/M,  
 TRUNNION BALL TYPE, SELF RELIEVING TYPE TO RELIEVE EXCESS BODY PRESSURE,  
 TRANSITION PIECE WELDED ON EACH END, FIRE SAFE DESIGN;  
 DIRECTION OF FLOW SHALL BE PERMANENTLY MARKED ON THE OUTSIDE OF THE BODY,  
 VALVE SHALL BE SUITABLE FOR CRYOGENIC SERVICE OPERATING AT-199 DEG C AND  
 MOUNTING WITH STEM IN A HORIZONTAL POSITION;  
 BUTTWELD ENDS(28.88) PER ANSI B16.25, END TO END DIMENSION PER ANSI B16.10;

6 - 6



	LNG 연료추진 기자재 안전성/성능 시험평가 설비 상세설계	2018.03.14
	PIPING MATERIAL SPECIFICATION	REVISION : 0
	Document No : LTB-P-SPC-1000	PAGE : 49 OF 49

CLASS : Z1

ITEM NO.	DESCRIPTION	SIZE	REQ Q'TY	REMARKS
----------	-------------	------	----------	---------

503632051 GATE 800# SW A351-CF8/316 BB OS&Y

SOCKET WELDED GATE VALVE, CLASS 800# PER API 602;  
304 STAINLESS STEEL STEEL BODY (ASTM A182-304 FORGING), 316 TRIM,  
API 600/602 TRIM NUMBER 10, JOHN CRANE 187-I STEM PACKING;  
OS&Y, T-BODY, DISC TYPE, BOLTED BONNET, HANDWHEEL OPERATED;  
SOCKET WELDING ENDS PREPARATION ANSI B16.11;

1/2 - 1.1/2

503632050 GATE 150# RF A351-CF8/316 BB OS&Y

RAISED FACE FLANGED GATE VALVE, CLASS 150# PER ANSI B16.34;  
304 STAINLESS STEEL BODY (ASTM A351 GR CF8 CASTING), 316 STAINLESS STEEL TRIM,  
API 600/602 TRIM NUMBER 10, JOHN CRANE 187-I PACKING;  
OS&Y, FULL PORT, FLEXIBLE OR SOLID WEDGE, BOLTED BONNET, HANDWHEEL OPERATED;  
FLANGE DIMENSIONS PER ANSI B16.5;

2 - 4

512724110 GLOBE 800# SW A182-F304/316 BB OS&Y

SOCKET WELDED GLOBE VALVE, CLASS 800# PER API 602;  
304 STAINLESS STEEL STEEL BODY (ASTM A182-304 FORGING), 316 TRIM,  
API 600/602 TRIM NUMBER 10, JOHN CRANE 187-I STEM PACKING;  
OS&Y, T-BODY, DISC TYPE, BOLTED BONNET, HANDWHEEL OPERATED;  
SOCKET WELDING ENDS PREPARATION ANSI B16.11;

1/2 - 1.1/2

523764160 CHECK 150# BW A351-CF8/316+HF SWING SCH10S

BUTTWELDED CHECK VALVE, CLASS 150# PER ANSI B16.34;  
304 STAINLESS STEEL BODY, DISC & COVER (ASTM A351 GR CF8 CASTING);  
316 STAINLESS STEEL TRIM WITH STELLITE ON DISCS AND SEATS, BOLT A320 B8M CL2,  
SPIRAL WOUND GASKET: 316SS+ GRAPHITE FILLER, 316SS INNER RING;  
SWING CHECK TYPE, BOLTED COVER, INTERNAL HINGE DESIGN (NOEXTERNAL PLUGS),  
RENEWABLE SEATS, SUITABLE FOR USE IN THE HORIZONTAL AND VERTICAL POSITIONS,  
BUTTWELD END(SCH10S) TO ANSI B16.25, END TO END AS PER ANSI B16.10;

2 - 4