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 한국가스공사 KOREA GAS CORPORATION						
SAMCHEOK LNG TERMINAL (삼척기지 LNG RELOADING 시스템 구축 기술검토 및 설계 용역)						
FITTINGS SPECIFICATION						
SCALE	JOB NO.	PHASE	DOCUMENT NO.			REV.
NONE			P3-1-1-P-M12-53-516			0
 한국가스기술공사 KOREA GAS TECHNOLOGY CORPORATION						

	삼척기지 LNG RELOADING 시스템구축 기술검토 및 설계 용역	2019. 06
	FITTINGS SPECIFICATION	REVISION : 0
	P3-1-1-P-M12-53-516	PAGE : 1 OF 10

CONTENTS

1. GENERAL
2. MATERIALS
3. DESIGN
4. RECORD
5. MARKING AND IDENTIFICATION
6. CORROSION ACCEPTANCE CRITERIA
7. ADDITIONAL REQUIREMENTS FOR CRYOGENIC SERVICE

ATTACHMENT : STANDARD TEE

	삼척기지 LNG RELOADING 시스템구축 기술검토 및 설계 용역	2019. 06
	FITTINGS SPECIFICATION	REVISION : 0
	P3-1-1-P-M12-53-516	PAGE : 2 OF 10

1. GENERAL

1.1 Scope

Fittings shall be purchased in accordance with this specification and SPECIFICATION REQUIREMENTS FOR BULK MATERIAL.

Related pipe classes : all classes except for WOWA3, WOWA4
W1W1,W1H1

1.2 Applicable Codes and Standards

All following Codes and Standards of the latest edition shall be applied, unless otherwise specified.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME Section II	Material Specifications", Part A - "Ferrous Materials
<u>ASME</u> B31.3	Process Piping
<u>ASME</u> B1.1	Unified Inch Screw Threads
<u>ASME</u> B1.20.1	Pipe Threads, General Purpose (Inch)
<u>ASME</u> B16.9	Factory-Made Wrought Steel Buttwelding Fittings
<u>ASME</u> B16.11	Forged Steel Fittings, Socket-Welding and Threaded
<u>ASME</u> B16.25	Buttwelding Ends

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A105	Forgings, Carbon Steel for Piping Components
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	삼척기지 LNG RELOADING 시스템구축 기술검토 및 설계 용역	2019. 06
	FITTINGS SPECIFICATION	REVISION : 0
	P3-1-1-P-M12-53-516	PAGE : 3 OF 10

ASTM A182	Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for high-Temperature Service
ASTM A234	Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures
ASTM A403	Wrought Austenitic Stainless Steel Piping Fittings
ASTM B6-77	Zinc (Slab Zinc)
ASTM D2200-67	Pictorial Surface Preparation Standards for Painting Steel Surfaces (R 1980)

2. MATERIALS

2.1 General

- 1) Items shall be furnished in accordance with the material specification specified in the order, including the specific grade, type, or alloy designation.
- 2) Items specified to ASME material specifications are intended for application under the jurisdiction of ASME B31.3.
- 3) Components specified as galvanized shall be galvanized inside and outside by the hot dip process. The zinc used for coating shall be any grade of zinc conforming to ASTM B6.

	삼척기지 LNG RELOADING 시스템구축 기술검토 및 설계 용역	2019. 06
	FITTINGS SPECIFICATION	REVISION : 0
	P3-1-1-P-M12-53-516	PAGE : 4 OF 10

2.2 Heat Treatment

Swage nipples shall be properly heat treated and conform to the specifications specified in the order. Manufacture to other standards may be allowed upon prior written approval by the purchaser.

2.3 Carbon Steel Fittings

Swage nipples forged from ASTM A105 are acceptable in place of A234.

2.4 Stainless Steel Fittings

No substitution is permitted without the written prior agreement of the Purchaser. Under no circumstance will 'L' grade pipe be accepted in place of straight grade unless the material is dual certified at source.

3. DESIGN

3.1 General

- 1) Items shall be furnished in accordance with the wall thickness or schedule, pressure rating and size specified in the order.
- 2) If the seller obtains the written approval of the Purchaser, items having schedules or wall thickness exceeding those specified in the order may be used. If substitutions are approved, taper boring requirements shall be as specified by the Purchaser.

	삼척기지 LNG RELOADING 시스템구축 기술검토 및 설계 용역	2019. 06
	FITTINGS SPECIFICATION	REVISION : 0
	P3-1-1-P-M12-53-516	PAGE : 5 OF 10

3) Threaded ends shall have NPT threads conforming to ASME B1.20.1.

4) Buttweld end preparation shall be in accordance with [ASME](#) B16.25.

5) Where seamless fittings are specified welded seam fittings will not normally be permitted.

3.2 Nipples

1) Unless specified otherwise, the length of nipples shall be 100 mm.

2) All burrs shall be removed from nipples.

3.3 Fittings

Fittings shall conform to the following standards :

1) Buttwelding(2" & larger) : [ASME](#) B16.9 or [ASME](#) B16.28

2) Socket welded and threaded(1-1/2" & smaller) : [ASME](#) B16.11, B16.14, MSS SP-79, or SP-83

3) Fitting types shall be as follows :

(1) Carbon steel

- 14" and smaller : seamless type fittings
- 16" and larger : welding type fittings

(2) Stainless steel

- 12" and smaller : seamless type fittings
- 14" and larger : welding type fittings

	삼척기지 LNG RELOADING 시스템구축 기술검토 및 설계 용역	2019. 06
	FITTINGS SPECIFICATION	REVISION : 0
	P3-1-1-P-M12-53-516	PAGE : 6 OF 10

4) Attached tee dwg. shall be applied to 1R1J-9R1J, 1P1-15P1, 9P0J classes.

4. RECORD

4.1 If items are made and marked in accordance with an acceptable standard, such as ASTM or ASME, no records shall be required, except as amended by Paragraphs 4.2. through 4.3.

4.2 Material test reports shall be submitted and retained for the following :

- 1) All impact tested materials shall include the results of the impact tests for cryogenic service(1R1J-9R1J classes) materials.
- 2) When special or supplementary requirements are imposed on the material specification.

4.3 Certificates of Compliance are permitted in lieu of Material Test Reports for the following cases :

- 1) For material acquired from stock for which Material Test Reports are not obtainable, if accepted in writing by the Purchaser.
- 2) When the markings on fittings are missing provided certification of the unmarked material is acceptable to the Purchaser's inspector; to the governing standard, specification, or code; and provided evidence can be furnished demonstrating to the inspector's satisfaction that the certification is accurate.

	삼척기지 LNG RELOADING 시스템구축 기술검토 및 설계 용역	2019. 06
	FITTINGS SPECIFICATION	REVISION : 0
	P3-1-1-P-M12-53-516	PAGE : 7 OF 10

5. MARKING AND IDENTIFICATION

5.1 All items shall be marked in accordance with the standards to which they are manufactured and any additional requirements of the order.

5.2 Stamping on all austenitic steels and impact tested materials shall be with "low-stress" steel stamps having round or "U" shaped cross sections or with "Interrupted-dot" die stamps.

5.3 Marking with paint or ink on all austenitic steels shall be with a water insoluble material that contains no harmful substance; e.g., metallic pigments, sulfur, or chlorides, which would harmfully affect austenitic steels at ambient or documented history of use which demonstrate that the marking materials for use on austenitic steels meet the requirements specified herein.

6. CORROSION ACCEPTANCE CRITERIA

The amount of permitted surface rust shall be determined in accordance with the grades specified in ASTM D2200. The acceptance or rejection of pipe or piping components based on these grades, at the destination specified in the order, shall be as follows:

- Grade A & B – ACCEPTABLE
- Grade C – ACCEPTABLE (If not covering more than 25% of surface area)
- Grade D – NOT ACCEPTABLE

	삼척기지 LNG RELOADING 시스템구축 기술검토 및 설계 용역	2019. 06
	FITTINGS SPECIFICATION	REVISION : 0
	P3-1-1-P-M12-53-516	PAGE : 8 OF 10

7. ADDITIONAL REQUIREMENTS FOR CRYOGENIC SERVICE (PIPE CLASSES: 1R1J-9R1J)

7.1 Purchaser requires resilience tests for sheet metal over 5.00 mm thick.

Acceptance criteria for resilience tests shall be allowable average value (3 tests) over 600 kJ/m^2 (6 daJ/cm^2) with no individual value under 400 kJ/m^2 (4 daJ/cm^2) (KCV at -196°C -Transversal Impact Test) according to ASTM A370. The specimens for impact test shall be taken from two fittings of each lot. A lot of fittings mean the same size and same wall thickness from any one heat of steel. Additionally, base metal shall be impact tested at minus($-$) 196°C in accordance with Para.323.3.5(b) of ASME B31.3 (ie, lateral expansion not less than 0.38 mm).

7.2 Weld metal deposits and heat affected zone(HAZ) shall be impact tested at minus($-$) 196°C in accordance with Para.323.3.5(b) of ASME B31.3.

7.3 The same manufacturer, brand designation and type of welding materials used in the procedure qualification shall be used for production welding. A change of brand or type shall require re-qualification including weld metal impact test.

7.4 To ensure adequate impact properties of austenitic welds at cryogenic service the following conditions shall be met.

- 1) Nitrogen shall not be used for shielding gas or back-up gas.
- 2) Pre-qualified welding materials shall be used for all welds. Each heat or lot of pre-qualified materials shall demonstrate acceptable impact properties at -320° F (-199° C) or lower when welded with the same procedure as the production welds.

	삼척기지 LNG RELOADING 시스템구축 기술검토 및 설계 용역	2019. 06
	FITTINGS SPECIFICATION	REVISION : 0
	P3-1-1-P-M12-53-516	PAGE : 9 OF 10

7.5 All Welding Procedure Specifications and Procedure Qualifications (with impact test results, where applicable) shall be submitted for review prior to welding.

7.6 Internal protrusion due to root pass shall conform to following limitation;

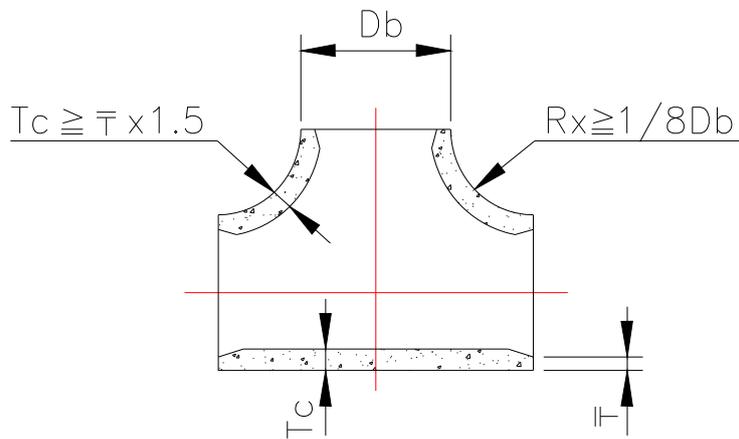
The height of internal protrusion : MAX. 2 mm

7.7 All the longitudinal weld seams shall be 100% radiographic tested.

7.8 Tee which is used in piping classes (1P1-9P1, 1R1J-9R1J, 9P0J) shall be supplied in accordance with the attached tee dwg.

STANDARD TEE

적용 PIPING MATERIAL SPEC : 1P1~15P1, 1R1J~9R1J, 9POJ, 1L1~9L1



- 비고) 1) \bar{t} 는 배관 MATERIAL SPEC의 PIPE SCHEDULE를 기준한다.
 2) B.W 부위는 ASME B16.25 기준으로 BEVELING 한다.

TITLE :			
STANDARD TEE			
SCALE	DRAWING NO.	SHT NO.	REV.
NONE	STD-P-004		