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한국조선해양기자재연구원
Korea Marine Equipment Research Institute

LNG 벙커링기자재 시험평가 설비 기본 및 상세설계

GENERAL REQUIREMENTS FOR VALVES

SCALE	JOB NO.	PHASE	DOCUMENT NO.	REV.
NONE			BTB-P-REQ-1000	0

한국가스기술공사
KOREA GAS TECHNOLOGY CORPORATION

CONTENTS

1. GENERAL

1.1 Scope

1.1.1 This specification embody the requirements for valves.

1.1.2 The term "Purchase Order", as used in this specification is defined as the actual Purchase Orders, Terms and Conditions, Purchasing Specification Summary Sheets, and all related specifications and engineering standards, industrial standards and codes, drawings and data sheets included or referenced therein.

1.1.3 The name KOMERI, as used in this specification is defined as the Purchaser. As such, the name includes KOMERI or other offices of the KOMERI.

1.1.4 The Seller shall refer all conflicts between the requirements of this specification and the Purchase Order or any valve type, feature, or component beyond the scope of the Purchase Order documents to KOMERI, in writing for clarification and resolution before proceeding with the manufacture or procurement of the valves. The Seller shall retain full responsibility for designing and fabricating or procuring the valves to perform and operate in accordance with the Purchase Order and any operating, design, test, or service conditions specified. The Seller's responsibility for the compliance with these requirements shall not be relieved, in whole or in part, by anything contained in or omitted from this specification or the Purchase Order.

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

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B31.3.	Process Piping
ASME SEC.Ⅷ	Rules for Construction of Pressure Vessels
ASME SEC.IX	Welding and Brazing Qualifications
ASME B1.1	Unified Inch Screw Threads
ASME B1.20.1	Pipe Threads, General Purpose (inch)
ASME B16.1	Cast Iron Pipe Flanges and Flanged Fittings
ASME B16.5	Pipe Flanges and Flanged Fittings
ASME B16.10	Face-to-Face and End-to-End Dimensions of

	Ferrous Valves
ASME B16.11	Forged Steel Fittings. Socket-Welding and Threaded
ASME B16.25	Buttwelding Ends
ASME B16.34	Valves-Flanged, Threaded, and Welding End.
ASME B16.42	Ductile Iron Pipe Flanges and Flanged Fittings
ASME B18.2.1	Square Hex Bolts and Screws
ASME B18.2.2	Square and Hex Nuts
ASME B36.10	Welded and Seamless Wrought Steel Pipe
ASME B36.1.9	Stainless Steel Pipe
ASME B46.1	Surface Texture

AMERICAN PETROLEUM INSTITUTE (API)

API 6FA	Fire Test For Valves
API 594	Wafer Type Check Valves
API 595	Cast Iron Gate Valves
API 597	Steel Venturi Gate Valves
API 598	Valve Inspection and Test
API 600	Steel Gate Valves, Flanged or Buttwelding Ends
API 602	Compact Carbon Steel Gate Valves
API 603	Class 150, Corrosion-Resistance Gate Valves
API 604	Ductile Iron Gate Valves
API 606	Compact Carbon Steel Gate Valves, Extended Body
API 607	Fire Test for Soft-Seated Ball Valves
API 609	Butterfly Valves to 150 PSIG and 150F

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS-SP-25	Standard Marking System for Valves, Fittings, Flanges and Unions
MSS-SP-44	Steel Pipe Line Flanges
MSS-SP-45	Bypass and Drain Connection Standard
MSS-SP-55	Quality Standard for Steel Castings for Valves, Flanges and Fittings and Other Piping Components-Visual Method

MSS-SP-61	Pressure Testing of Steel Valves
MSS-SP-67	Butterfly Valves
MSS-SP-70	Cast Iron Gate Valves, Flanged and Threaded Ends
MSS-SP-71	Cast Iron Swing Check Valves, Flanged and Threaded Ends
MSS-SP-72	Ball Valves with Flanged or Buttwelding Ends for General Service
MSS-SP-75	Specification for High Test Wrought Butt Welding fittings
MSS-SP-85	Cast Iron Globe and Angle Valves, Flanged and Threaded Ends

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA-C207	Steel Pipe Flanges for Waterworks service-Sizes 4" through 144"

KOREA GAS CORPORATION STANDARDS

KOGAS-GSD-0222	Standard for Control of Steel Castings Parameters
KOGAS-GSM-1011	Specification for Cryogenic Ball Valve
KOGAS-GSM-1012	Specification for Cryogenic Gate Valve
KOGAS-GSM-1013	Specification for Cryogenic Globe Valve
KOGAS-GSM-1014	Specification for Cryogenic Check Valve
KOGAS-GSM-1015	Specification for Cryogenic Butterfly Valve
KOGAS-GSM-1016	Specification for Cryogenic Safety Relief Valve
KOGAS-GSM-2207	Specification for Natural Gas Pressure Safety Valve
KOGAS-GSM-2201	Specification for Natural Gas Pressure Regulation Unit

1.2 Bids

1.2.1 The term "inquiry", as used in this specification, is defined as the inquiry, Terms and Conditions, with all specifications, drawings, standards and codes included or referenced therein.

1.2.2 The Bidder shall compile one quotation in accordance with the inquiry. The Bidder shall state in his quotation that the items offered shall be fully complied with the inquiry. The Bidder shall confirm that document transmittal dates will be in accordance with the requirements of the Purchase Order. If the Bidder does not so state these conditions, the bid will be subject to rejection.

a. The Bidder may also submit alternate bids, take exceptions to, or make deviations from the requirements of the inquiry, provided these exceptions or deviations are stated explicitly by the Bidder in his quotation. The Bidder shall obtain written approval from KOMERI before any work is performed or procurement action initiated relative to these alternate bids, exceptions or deviations. KOMERI approval may be contained within the Purchase Order and referenced documents, if the Bidder becomes the seller.

b. The Bidder shall quote as separate costs all optional components or services which are necessary to install, operate, maintain or service valves but are not specified.

1.2.3 The Bidder shall include in his quotation the cost of providing documentation, examination and testing of the quoted valves as required by the inquiry. Costs for required tests or examinations shall be quoted as separate unit prices and shall be based on use of the Bidder's testing equipment facilities and personnel.

1.2.4 Bids on valves required to be specially designed or manufactured to meet codes or governmental rules or regulations shall include the cost of the required inspections.

1.2.5 The Bidder shall furnish quotations in the number of copies specified in the inquiry.

1.2.6 If the Bidder's operational warranty requires the presence of an installation superintendent, the quotation shall so state, and the cost of the services shall be included in the quoted price and not as a separate quotation.

1.2.7 The Bidder shall include the cost of all preparation for delivery, packing, crating, and cartage in his quotation. This quote shall be in accordance with the specification for packing, crating and cartage in the inquiry.

1.3 Drawings and Data

1.3.1 In addition to the information furnished in the quotation, as a supplier, the

Seller shall expeditiously submit for planning, layout, installation, maintenance, and record purposes. certified outline drawings indicating the information listed below.

a. KOMERI requisition number and valve number.
b. The principal dimensions of the valve; the size, type, and style.
c. Materials of construction.
d. Pressure-temperature limitation.

The number of copies and the format shall be as specified in the Purchase Order.

1.3.2 The Seller shall identify all drawings and data with KOMERI job number. complete Purchase Order number, client's name, job location and KOMERI valve number. The Seller's drawings shall include revision boxes to describe the latest revisions in full detail.

1.3.3 All drawings, lists, and instructions shall be sent to the address shown in the Purchase Order.

1.4 Records

1.4.1 Records as defined below and fully identified with the specific materials they represent, shall be available for examination by KOMERI or its representative at the time and place of inspection, whether at the premises of manufactures or distributors.

These records shall be kept for a period of five years after the valve is shipped.

1.4.2 Definitions

a. "Material Test Report" shall mean the original material manufacturer, mill, or foundry's test reports. Such reports shall state the specification to which the material, the heat, lot or melt identification number, the heat treatment (if any), the results of chemical analysis, and both physical and non destructive tests. When heat treatment information is missing on Material Test Reports, certificates will be acceptable only as permitted by the applicable codes or specifications.

b. "Certificate" shall be a written declaration by the mill (or by the Seller to the extent that his work or records permit) that the chemical and mechanical properties and heat treatment conform to a particular material specification such as an ASTM or ASME specification.

1.4.3 No record is required for valves made and marked in accordance with an

acceptable national standard except as indicated in paragraph 1.4.4.

1.4.4 Material Test Reports are required for the following cases:

a. When required by the Purchase Order.

b. For all materials requiring impact tests. Material Test Reports shall include the results of the impact tests.

c. For all aluminium and 316L materials.

d. For all materials specified with supplementary or special material requirements (such as 316L "modified or 0.04 minimum carbon").

1.4.5 Certificates are required in addition to Material Test Reports for item (1) below and are permitted in lieu of Material Test Reports for item (2) below.

a. When heat treatment information is missing from Material Test Reports, provided certification is allowed by the governing code or specification.

b. For bolting material and for pressure and non-pressure part material acquired from stock for which Material Test Reports are not obtainable, except when certification in lieu of Material Test Reports is not permitted by the provisions of paragraph 1.4.4.

1.4.6 When the examinations, tests, or operations referred to in the following paragraphs are included in the manufacturing sequence, the manufacturer shall retain the following records and submit them to the office shown on the Purchase Order.

a. Procedure for all applied non-destructive testing such as radiographic, ultrasonic, magnetic particle, and dye penetrant.

b. Certificates for the results of required magnetic particle, liquid penetrant, ultrasonic, or other methods of examinations; and certified results of all impact tests.

c. Charts or other records of required hydrostatic, pneumatic, and other tests. Test logs shall include the date, duration of the test, temperature of the test fluid, test pressure, a description of the valve tested, a traceable identifying number such as a shop order number, and the signature of the manufacturer's shop inspector witnessing the test.

d. Pyrometer charts or other detailed records of heat treatment such as post weld, normalising, and heating for forming.

e. Detailed description of any major casting repair, including a sketch, photo, or drawing indicating the location and size of the repaired area.

f. Other material records when specified by the applicable code or the material standard or as required by KOMERI.

1.4.7 Procedure Qualification Records and Operator Qualification Records for all applied nondestructive testing shall be retained by the manufacturer.

1.4.8 When welding is included in the manufacturing sequence of the Seller or any of his sub-vendors, the following documents shall be complete and available to the Purchaser's Inspector before and during all fabrication. In addition, when the Seller is specifically required to submit welding procedures for review by KOMERI, these documents shall also be submitted to KOMERI before fabrication begins.

- Welding Procedure Specifications (WPS).
- Procedure Qualification Records (PQR).
- Welder or welding operator qualification test results shall be retained by the manufacturer.
- Radiographic film is to be retained in the shop for review by the inspector.

1.5 Examination, Inspection and Acceptance Criteria

1.5.1 Examination inspection, and acceptance criteria shall be in accordance with ASME B31.3.

1.5.2 Non Destructive Examination

All procedures and acceptance standards shall be in accordance with ASME B16.34, unless otherwise specified.

Scope and extent of examination shall be as specified below:

a. End preparation on all butt weld ended valves and seat areas in all sizes, classes and materials.

b. Valves for hydrogen service and high pressure valves of class 900 and above. This examination will be on one qualifying valve for each type selected by size, range, class and material from each foundry or forgemaster, as applicable.

Qualifying test valves may only represent valves with bodies of similar design but may cover two sizes below and two sizes above the NPS of the test valve. In addition, they may represent one class below and one class above the rating of the test valve. Sizes NPS 1.1/4, 2.1/2 and CLASS 400 may be excluded.

c. In addition to b. above, 5% of all cast valves, selected at random, shall be examined. Whenever a valve is rejected, then two similar valves from the same batch shall be tested accordingly. If these two valves fail to meet the

requirements of examination, the whole of that production batch shall be rejected.

d. The type of examination shall be radiography for cast valves and radiography or ultrasonic examination for forged valves.

End preparation of buttweld valves not covered by b. above and in sizes below NPS 4 may be examined by magnetic particle or dye penetrant means.

1.5.3 Quality Assurance

The Bidder shall have, as part of his usual business practice, an established, routine, and documented quality control program.

This program shall ensure that all variables affecting the requirements for reliability, safety, operability, and durability of the completed valves have been considered, evaluated, tested, and controlled. At KOMERI's option, this program shall be subject to review and comment. Comments by KOMERI shall be resolved by the Bidder, before he becomes the Seller, to KOMERI's satisfaction.

1.5.4 The manufacturer shall also furnish his own quality control to ensure that all the KOMERI requirements for material, design, fabrication, examination, inspection, and testing have been met.

1.5.5 All materials of construction shall be new and unless otherwise specified, shall be of the Manufacturer's standard. All materials of construction shall be suitable to fulfill all of the requirements specified in the Purchase Order.

1.5.6 Inspection

In addition to any required code inspection or testing, all fabrication, materials, and packaging shall be subject to inspection by purchaser or the authorized agent.

The latest shop drawings of the valves shall be available to the KOMERI inspector at the time of the inspection. Surfaces shall not be painted until the inspection is completed.

1.6 Defect Removal and Repair

1.6.1 Defect removal and repair shall be in accordance with ASME B31.3, except that repairs shall not be permitted on any Cast Iron materials (ductile, plain grey, austenitic, or high silicon).

1.6.2 Weld Repair

No weld repair to castings or forgings will be allowed except with the written agreement of the Purchaser, Repairs must be re-examined by a suitable

method of NDE to be specified by the Purchaser. All repaired valves shall be subject to a full pressure test (body and seat) as originally specified. Request for repairs must be accompanied by full welding procedures and welder qualification documentation as listed in 1.4.8, together with a full description of the defect and a drawing locating the defective area.

1.7 Rejection

1.7.1 Completed valves, components, or materials containing defects originating with the Manufacturer's design, materials, or workmanship; or that are not in complete compliance with the requirements of KOMERI's Purchase Order and referenced documents will be subject to rejection.

1.7.2 Discovery of such conditions, after inspection and acceptance of the valves by KOMERI, does not relieve the Seller of his responsibility to comply with the requirements of this specification, the Purchase Order, and referenced documents.

1.8 Packing and Shipping

1.8.1 The Seller shall be responsible for suitable packing of each valve so as to protect it from damage during handling and shipment in accordance with the Purchase Order requirements. Valves shall be prepared for shipment in such a manner so as to minimize damage or atmospheric corrosion to inside or outside surfaces, or parts, during storage or while in transportation. Particular attention shall be given to the protection of austenitic stainless steel from exposure to salt water or salt spray during shipment and/or storage. Packages and crates shall include lifting lugs or designated lifting points. In addition to the receiving address, each item or crate shall be durably marked with KOMERI's valve number and complete requisition number of the contents therein.

1.8.2 The threaded, bevelled, or plain open ends of valves shall be suitably closed with solid metal or plastic protectors that fit either inside or outside the valve opening to prevent entrance of foreign matter after cleaning and during shipment. Internally threaded openings shall be protected with plastic plugs or inserts.

1.8.3 Valve flanges shall be protected with plastic or bolted metal or plywood covers with a rubber gaskets between as described in Tables Ⅰ and Ⅱ.

Table I Flange Cover Thickness

Nominal Pipe size NPS (㎜)	Cover Thickness Inches (㎜)	Remark
1/2 to 6 (15 to 150)	5/16 (8)	
8 to 18 (200 to 450)	3/8 (10)	

Table II Flange Cover Bolt Sizes

No. of Flange Holes	Minimum Bolt Size Inches (㎜)	Cover Bolting	Remark
4 to 28	1/2 (12)	Every Other Hole	
32 to 48	1/4 (20)	Every 4th Hole	

1.8.4 The Seller shall furnish a master shipping list, in advance of the shipment, listing total quantities of each valve required for the complete shipment.

1.8.5 The Seller shall include a packing list in each shipment, listing the contents by KOMERI's valve number of each box, crate, or skid. The list shall state whether the contents are complete or partial.

1.8.6 The Seller shall include, on all shipments: a copy of each instruction manual; all drawings required for assembly, installation, or erection; and one extra copy of all data required under paragraph 1.3.1. These documents shall be attached preferably to the inside of the largest crate in the shipment and this crate shall be marked accordingly.

1.8.7 Valves shall not be transported to the job site as above deck cargo without prior written approval of KOMERI.

1.8.8 In addition to the requirements stated herein, shipping and packaging shall be in accordance with the specifications referenced in the Purchase Order.

1.8.9 Quarantine requirements for wood packaging materials

All wood packaging materials for all imported consignments shall be subject to quarantine requirements of National Plant Quarantine Service, under the sole responsibility of Seller.

1.9 Painting

Valves shall be painted in compliance with the painting specification.

1.10 Markings Tagging and Stamping

1.10.1 Body Marking

All valves shall be marked in accordance with the standard they are manufactured to. Each pressure part and all body/bonnet/cover bolting shall be marked as required by the applicable product specification. However, if no marking criteria exists. MSS-SP-25 shall be used as the minimum guideline.

All valves having a preferred direction of flow shall have their bodies legibly marked with an arrow cast on the valve body or the word "in" or "inlet" cast or stamped on the inlet end of the body to indicate the direction of flow.

1.10.2 Nameplate

In addition to the body marking of paragraph 1.10.1, all valves shall be identified by KOMERI's commodity code valve number, stamped in characters approximately 5㎜ (3/16 inch) high, preferably on the manufacturer's valve name plate approved by the Purchaser or on a corrosion resistant metal tag of 20 gauge (1㎜) minimum thickness

Metal tags, if used, shall be permanently attached by a corrosion resistant metal band of minimum 1/2 inch (12㎜) wide 20 gauge (1㎜) thick bent around the Handwheel or yoke and riveted at the ends.

1.10.3 The nameplate or tag shall also show manufacturer's name or trademark, material designation, rating, size, trim and design.

The requirements for Special Markings" as described in ASME B16. 34 para 41.8 shall also be adhered to.

1.10.4 Buttwelded end valves, in addition to other required markings, shall have the pipe wall schedule (e.g, 40, 80S, STD, XXS) marked as a suffix to KOMERI's valve number. Identification shall be in accordance with ASME B36.10 or ASME B36.19.

1.10.5 All valves shall be colored in accordance with KOMERI specification.

1.11 Additional requirements

1.11.1 Valves(Ball, Globe, Relief valves and valves for the purpose of main emergency shut down) which are used in the NG/LNG/FG piping including all cryogenic services' piping shall be qualified by stamp of "Korea Gas Safety Corporation".

1.11.2 Cryogenic valves shall be marked as "LT" indicating the cryogenic services.

NOTE This can be cast on the body or permanently vibro-etched.

1.11.3 For Marking, Tagging and Stamping of "Korea Gas Safety Corporation". vendor or his agent in Korea shall provide admission for checking, installing & pre-operating. Vendor shall also carry out the related site-work without additional cost when required of witness during the site installation, test arid inspection in Korea. In the event vendor's job-site inspection is required, vendor's dispatching expenses shall be borne by vendor.

1.11.4 Third Party Inspection

a. If necessary, Supplier shall conduct, at it's own expense and responsibility, the tests and inspections required under contract documents by third party inspectors such as DNV. ABS HSB, BV and KR(Korean Register of Shipping) which are internationally authorized. In the event Owner or it's representatives witness the inspection, the costs, fees and expenses arising therefrom shall be borne by vendor.

b. Inspection working procedure On raking a contract with KOMERI, Vendor shall select more than 2 authorities of 1.11.4 a. and shall submit the resumes of inspectors who carry out the inspection works to QA discipline of KOMERI and then, vendor shall perform the inspection works after getting approval.

1.11.5 Deviation Items

Contractor shall submit deviation item lists in case of generating some deviations between manufacturing documents and contract items. If those deviation Items were not approved by purchaser item by items, the contract items should be always prior to those manufacturing documents.

2. DESIGN

2.1 Primary Criteria

2.1.1 As piping components in accordance with ASME B31.3 all materials, design, and fabrication of valves, including any required examination and testing shall be in accordance with these code requirements and limitations. This includes any maximum temperature limitation for a material or limitation governing the use of a material at a low temperature.

2.1.2 All welded attachments to valves shall be considered as a part of the valve assembly and shall be subject to all applicable design, fabrications material, examination, inspection, and testing requirements

2.1.3 Valve shall be subject to pressure from both inlet and outlet directions and

shall be designed and constructed to withstand design and test conditions from both upstream and downstream directions.

2.1.4 In addition to the above requirements, all cast, forged, and fabricated steel valves shall be manufactured as "Special Class" valves in accordance with ASME B16.34 except as modified herein or by the Purchase Order documents.

2.2 Dimensions

All flanged and buttwelded end valves shall have face to face or end to end dimensions in accordance with ASME B16.10.

2.3 Pressure Ratings and Wall Thicknesses

2.3.1 Valve pressure ratings and shell wall thicknesses shall be in accordance with valve lists and the appropriate manufacturing standards.

Any steel or stainless steel valves not covered shall have wall thicknesses compatible with their rating and as listed in ASME B16.34 unless the manufacturer supplies calculations based on the requirements of ASME B31.3.

2.3.2 Flanged cast or ductile iron valves shall have pressure ratings to suit flanges to ASME B16.1.

Wall thicknesses may be of manufacturers' standards but as a minimum must be compatible with pressure rating of flanges and meet the requirements of ASME B31.3.

2.4 Manufacturing Standards

Valves shall comply with the manufacturing standards specified in the attachment related "Purchasing Specification".

2.5 Valve Port Sizes

Valves which have ports specified as full, reduced, standard or regular shall have port openings as defined below:

2.5.1 Full Port gate valves shall have a port size equal to the port size specified in API 600.

2.5.2 Full Port ball valves shall have a port size equal to the port size specified in API 608.

2.5.3 Reduced port gate valves shall have a port size equal to the port size specified in API 602.

2.6 General Design Features

2.6.1 Operation

All valves shall be capable of opening and closing under full differential pressure. Handwheel diameter shall not exceed 760㎜. The direction of rotation of the Handwheel shall be clockwise to close.

Regardless of size and pressure rating of valves, force to operate Handwheel, lever or wrench shall not exceed 245.2 N(25 ㎏f).

Gear operator shall be provided if the force exceeds 245.2 N(25 kgf).

One wrench, suitable for opening and closing the valves, shall be furnished with each wrench-operated valve. Wrench shall be properly sized and of a material compatible with the valve stem. Valves specified to be "Gear Operated" shall be furnished with a fully enclosed worm gear operator, unless specified otherwise.

2.6.2 Auxiliary Connections

Valves requiring auxiliary connections or taps shall be bossed, if required; and drilled, tapped, and plugged in accordance with ASME B16.34 and MSS-SP-45.

2.6.3 Flange Facing

Where 125AARH is specified for flange surface finish, the range for acceptance shall be 125AARH to 250AARH with surface finish roughness conforming to ASME B46.1.

2.6.4 Miscellaneous Requirements

For Butterfly valves designed in accordance with API 609 or AWWA C504, the following terms shall be defined as indicated :

Standard	As defined in API 609
Heavy duty	As defined by manufacturer
Extended neck	As defined by manufacturer
Short pattern	As defined in AWWA C504.

Valves that have threaded by socket welded end connections shall have the socket welded end as the pressure side with the flow arrow directed toward the threaded end.

2.7 Abbreviations and Definitions

The abbreviations, acronyms, trade-names, and definitions listed herein shall be defined as follows. Material which is equal to the trade-names or types listed herein may be substituted only with the prior knowledge of and written concurrence by KOMERI.

AISI	American Iron and Steel Institute
ASME	American Society of Mechanical Engineers
API	American Petroleum Institute
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association

Bune-N	Nitrile rubber, a copolymer of butadiene-acrylonitrile
D	Double or split wedge disc
EPDM/EPT	Ethylene propylene diene monomer / ethylene propylene terpolymer
F	Flexible disc
Full	Full port gate valves ha11 have a port size equal to the port size specified In API 600.
H	Horizontal
ISNR	Inside screw, nonrising stem
ISR	Inside screw, rising stem

Metals :

Alloy 20	A 20% chromium - 29% nickel-molybdenum-copper austenitic steel alloy
Inconnel X	An International Nickel Company nickel-chromium alloy (e.g., Inconnel X-750)
Monel	An International Nickel Company 67% nickel-30% copper alloy (e.g., Monel 400).
Mfr	Manufacturer
Mod	Model
Non-Slam	A check valve design which reduces disc closing force and travel distance to minimize slam, surge and shock.
MSS	Manufacturer's Standardization Society of the Valve and Fittings Industry.
OS&Y	Outside screw and yoke

Packings :

Grafoil	Union Carbide Corporation, Carbon Products Division, corrosion resistant, self-lubricating, all graphite packing containing no resin binders or inorganic fillers.
John Crane	John Crane Packing Company, anti-corrosive packing of braided pure asbestos yarn with an Inconel-wire insert around a graphite-impregnated, resilient asbestos core.
Teflon	DuPont Company, tetrafluoroethylene polymer (TFE) which may be reinforced and impregnated with fibers or other fillers.

Red	Reduced port valves, specified in API 602, which are distinguished from regular port valves specified in API 600 and venturi port valves specified in API 597.
Rtg	Rating
S	Solid Disc
Ser	Series
Std	Manufacturer's standard (conventional) port opening
T	Tee pattern, vertical stem
TFE	A polymer of tetrafluoroethylene (see Teflon)
Thrd	Threaded
T/S	Threaded by socket welded
UL	Underwriters Laboratories
V	Vertical
Viton	DuPont, synthetic fluororubber of vinylidene fluoride hexafluoropropylene
Y Y	Pattern, inclined stem

3. MATERIALS OF CONSTRUCTION

3.1 General

3.1.1 Valve materials shall be in accordance with requirements and limitations of ASME B31.3 unless specified otherwise in the Purchase Order documents.

3.1.2 Materials shall be as specified in the valve description given in Attachment 2

3.1.3 When ASME Section II materials are specified, identical ASTM materials are specified, identical ASTM materials may be supplied as permitted by ASME Section I, PG-11.

3.1.4 Materials substitutions, except those indicated below shall not be allowed without prior written approval from KOMERI.

The following substitutions may be made without approval of KOMERI:

316L	for 304L
316	for 304
316H	for 304H
A395	for A126
A316	for Low Temperature Materials LF2, LCB & 3% Ni

3.1.5 All ASME 1.1/4 Cr-1/2Mo socketwelded and buttwelded valves that are NPS

4 and smaller shall be manufactured with ASME 1.1/4 Cr-1/2Mo body material that has a maximum specified carbon content of 0.15%.

3.1.6 Wherever Type 316 stainless steel trim is specified for 304 stainless steel globe valves, the trim shall be as follows:

a. 316 stainless steel disc

b. Manufacturer's standard for remaining trim

3.2 Copper and Alloys

Copper and copper base alloys shall be avoided wherever feasible for parts exposed to the atmosphere. Such alloys where used for practical considerations shall be protected from atmospheric corrosion by means of nickel plating or preferably with suitable organic coatings. Copper alloys containing more than 15% Zinc are prohibited.

Internal valve parts shall not be manufactured from copper, brass. bronze, aluminium and aluminium alloys, except where specifically permitted by the KOMERI valve description.

Copper base alloys are those alloys containing more that 50% copper. The restrictions listed above do not apply to copper bearing steels, nickel alloys, or stainless steels such as 17-4 PH.

3.3 Body

Plugs for body taps, if any, shall be in accordance with ASME B16. 11 and shall be of solid forged construction having the same basic metallurgy as the valve.

3.4 Trim

3.4.1 Trim shall be defined for a corresponding valve type in the applicable codes, standards and specifications referenced in the Purchase Order documents.

3.4.2 Trim surfaces faced with hardfacing alloy shall be in accordance with the manufacturer's standard and shall meet AWS A5.13 (CoCr-A). Hard face shall be on the seat ring. Disc or plug to be 11-13% Cr or body material with 11-13% Cr overlay.

Stem and back seat bushing to be 11-13% Cr

3.4.3 Where trim surfaces faced with hardfacing alloy is specified for API 602

valve trim, the parts to be hardfaced shall be the seat and the disc. Disc and stem materials to be 11-13% Cr.

3.4.4 Trim materials shall be properly heat treated.

3.4.5 Glass reinforced teflon shall have a minimum 15% of glass fiber by weight.

3.5 Stem Packing

Unless otherwise specified in the valve description given in Attachment 2, stem packing shall be in accordance with the following:

3.5.1 Carbon steel, ferritic alloy steel, stainless steel and nickelbase alloy valves; graphited braided asbestos suitable for 593C (1100F) steam or petroleum services and containing a sacrificial metal corrosion inhibitor. (John Crane Number 187-1 or Purchaser's approved substitute).

3.5.2 Teflon stem packing when specified shall be suitable for 232C (450F) maximum service temperature.

3.5.3 Where graphite stein packing is specified in the item description the packing shall be split rings and the material shall be pure graphite containing no resin binders or inorganic fillers (Union Carbide Corporation "Grafoil" or Purchaser's approved substitute). Wiper rings shall be provided.

3.5.4 The Supplier shall be prepared to furnish, upon request, packing gland dimensions and the number and size of packing rings required for each type and size of valve shown on the Purchase Order.

3.5.5 The type and/or style of stem packing used during the pressure test shall be the same as that finally supplied with the valve.

3.6 Bonnet and Cover Gaskets

3.6.1 Gaskets shall be in accordance with the standard to which the valve is manufactured unless otherwise specified.

3.6.2 Metallic and nonmetallic bonnet and cover gaskets shall have corrosion resistance equal, at least, to that of the body and bonnet material.

3.6.3 Bonnet and cover gaskets shall be suitable for the following temperatures:

a. Compressed asbestos: -46℃ to 593℃ (-50°F to 1100°F).

b. Solid metal: same temperature rating as body and bonnet material.

c. Spiral wound metal with filler; same temperature rating as body and bonnet material.

d. Teflon or Teflon-based: -198℃ to 232℃ (-325°F to 450°F).

3.6.4 Metal windings of austenitic stainless steel spiral-wound gaskets shall be limited to a maximum hardness of 160 HB.

3.6.5 Rings, for valves with ring-joint bonnet or cover shall have maximum hardness in accordance with the following:

a. Soft iron - 90 HB
b. 5 Chrome - 130 HB
c. Austenitic stainless steel - 160 HE
d. Monel - 125 HB

3.7 Bonnet, Cap and Body Bolting

Bolting shall be in accordance with the standard to which the valve is manufactured unless otherwise specified.

3.8 Locking device

3.8.1 Locking device shall be supplied according to the requirement of purchaser.

3.8.2 Drawing and document of manufacturer including the following content at least that was related with locking device shall be submitted to purchaser for approval.

- Locking device
- Material specification for each element of locking device
- Handling accessories related with locking device
- Also, items to be required by purchaser

3.9 Gear boxes

Gearboxes shall be of a waterproof manufacturing to prevent any ingress of water.

4. TESTING

4.1 General

All valves shall be tested in accordance with the requirements of their design and manufacturing standard, as listed in 2.4 together with any special testing which may be required by the purchase order.

4.2 Pressure Testing

4.2.1 As a minimum requirement, all valves shall be pressure tested in accordance with API 598, unless otherwise specified.

4.2.2 For austenitic stainless steel valves, the test water shall have less than 30 ppm chloride. The use of water with higher chloride levels will not be permitted except, subject to Buyer's approval, where thorough draining and mopping or flushing with demineralized water is possible. Drying by evaporation using dry warm air or gas is strictly prohibited unless demineralized water is used for testing.

4.2.3 The Seller shall submit the record charts by auto-pressure recorder with inspector's signature for all pressure tests and get the approval from KOMERI before shipment.

4.3 Fire Testing

All firesafe valves shall be shown to conform to a firesafe prototype tested to API 607 or API 6FA.

5. VENDOR'S DATA REQUIREMENTS

Vendor shall comply with the "VENDOR'S DATA REQUIREMENTS SHEET" in the attachment 1.

6. GUARANTEE

The Vendor shall guarantee that the item furnished is free from fault in design, workmanship, and material, and is of sufficient size and capacity, and is of proper material to fulfill satisfactorily the operating conditions specified. Should any defect in design, material, workmanship or operating characteristics develop for the thirty-six(36) months after the goods have been arrived at the final destination indicated in the contract the Vendor shall make all necessary or desirable alterations, repairs, and replacements of defective equipment, free of charge, and shall pay transportation involved to and from the Owner's plant. No allowance will be made for alterations or repairs made by others without written consent or approval of KOMERI. If the defect or failure to function cannot be corrected, the Vendor shall replace promptly, free of charge, said equipment or to remove the

equipment and refund the full purchase price.

7. OTHERS

If there is any discrepancy between data sheets and purchasing specifications, data sheets shall govern.

8. ATTACHMENTS

The following attachments shall form an integral part of this specification

Attachment 1. Vendor's Data Requirements Sheet

Attachment 2. Piping Material Specification

ATTACHMENT 1. VENDOR'S DATA REQUIREMENTS SHEET

NO	ITEMS	FOR BID	FOR APPROVAL	FOR CONSTRUCTION	FINAL
1	DRAWINGS&DATA SUBMITTAL SCHEDULE	-	*2	*3	-
2	MANUFACTURING SCHEDULE	*1	*2	*3	-
3	MANUFACTURING CERTIFICATES (IF NECESSARY) - ISO 9000 SERIES - API 607/API 6FA & ETC. - KGS - KOSHA	*1	-	-	-
4	CATALOGUE	*1	-	-	-
5	CALCULATION SHEETS AND INCLUDING FOLLOWINGS FOR MOV & PNEUMATIC ON-OFF VALVE - OUTPUT TORQUE - OPERATING TIME - TEMPERATURE RISE - EFFICIENCY, POWER FACTOR - LOCKED MOTOR CURRENT	*1	*2	*3	*3
6	SET VALVE CALCULATION FOR MOV - TORQUE SWITCH - THERMOSTAT - THERMAL RELAY	-	*2	*3	*3
7	INTERNAL CONNECTION DIAGRAM FOR MOV	*1	*2	*3	*3
8	TERMINAL BLOCK DIAGRAM FOR MOV	*1	*2	*3	*3
9	CONTROL BOX AIR SCHEMATIC DIAGRAM FOR PNEUMATIC ON-OFF VALVE	*1	*2	*3	*3
10	ASSEMBLY&DIMENSIONAL DRAWINGS WITH DATA SHEETS, ACTUATOR CONTROL BOX INCLUDING TOTAL WEIGHTS&MATERIALS	*1 (FOR REF.)	*2	*3	*3
11	DETAIL DRAWING AND INCLUDING FOLLOWINGS FOR AIR DRUM - INCLUDING MATERIAL COMPOSITION - ASSEMBLY DRAWING(WITH DRAIN VALVE) - STRENGTH CALCULATION SHEET - SAFETY RELIEF VALVE SPECIFICATION AND RELATING DATA (WITH KGS CERTIFICATION)	*1	*2	*3	*3
12	MANUFACTURING SPECIFICATION	*1	*2	*3	*3
13	QA/QC PROGRAM AND QUALITY PLAN	-	*2	*3	-
14	TEST & INSPECTION PROCEDURE	*1	*2	*3	*3

NO	ITEMS	FOR BID	FOR APPROVAL	FOR CONSTRUCTION	FINAL
15	PAINTING SPECIFICATION	*1	*2	*3	*3
16	PACKING SPECIFICATION	-	*2	*3	-
17	SPARE PART LISTS	*1	*2	*3	*3
18	SPECIAL TOOL LISTS (IF NECESSARY)	*1	*2	*3	*3
19	SUB VENDOR LIST	-	*2	*3	*3
20	MATERIAL CERTIFICATE	-	-	*3	*3
21	TEST & INSPECTION RECORDS / REPORTS	-	-	*3	*3
22	TEST CERTIFICATE AND INCLUDING FOLLOWINGS FOR MOV & PNEUMATIC ON-OFF VALVE -TEST CERTIFICATE FOR EXPLOSION PROOF ENCLOSURE ISSUED BY AUTHORIZED AGENCY	-	-	*3	*3
23	INSTALLATION / OPERATION & MAINTENANCE MANUAL	-	-	*3	*3
24	DEVIATION AND / OR ALTERNATIVE LISTS	*1	*1	*1	*3
25	THE OTHERS REQUESTED BY PURCHASER	-	*1	*1	*2
26	MONTHLY REPORT (PRODUCT PROGRESS SCHEDULE)	-	-	10C	-

NOTE:

1. The documents for approval shall be submitted within one month after P/O.
2. "Certified correct" data and drawings shall be submitted within one week after return of "commented" data and drawings.
3. The documents for construction shall be submitted within 2 weeks after approval, unless otherwise specified.
4. The documents for final shall be submitted within one (1) month before shipment, unless otherwise specified.
5. Quotation cost must include all above data.

Legend

C: Copy R: Original

*1: 1R+4C *2: 1R+5C

*3: 1R+10C