



Offshore Design Section  
Engineering Services  
ISO - 9001:2008

FUNCTIONAL  
SPECIFICATION FOR  
"Piping Specialties"

Spec. No.	FS 2004 D
Rev. No.	Rev. 8
Discipline	Piping
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# FUNCTIONAL SPECIFICATION FOR PIPING SPECIALTIES

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## 1.0 INTRODUCTION

### 1.1 GENERAL

This refers to the minimum and mandatory requirements of designs & materials for piping specialties & components as per approved P& ID , approved Data-Sheet and Bid-Package. All piping assemblies, specialties & materials supplied or installed under these specifications shall be in accordance with sound engineering principles. Any omission from this specification shall not relieve the contractor from his responsibility of furnishing equipment's or materials to meet the specific process parameters, environmental parameters, safety parameters and any other applicable statutory laws or relevant codes & standards. Substitution or changes from this specification must be accompanied with sufficient information/justification and written approval shall be obtained from the Company.

All welding and NDT shall be performed as per Spec. 2009 F.

### 1.2 CONTRACTOR'S RESPONSIBILITIES

The Contractor shall be responsible for the selection and design of piping specialties, including full compliance with all applicable project specifications and design Codes / Standards, including those listed in Section 2.0 of this Specification.

## 2.0 PROJECT SPECIFICATIONS

2.1 The piping specialties covered by this Specification shall be designed, manufactured and tested in accordance with the requirements of Piping Design Criteria and the following Project Specifications:

1. Piping Design (spec. 2004-A)
2. Piping fabrication (spec. 2004-B)
3. Protective Coatings ( spec. 2005 )
4. Insulation of piping and equipment ( spec. 2006 )

2.2 The Contractor shall be responsible for the design, engineering, supply of materials, fabrication, coating, installation and testing of the pipe work, supply of drawings and data, all sub-contractor co-ordination and guarantees as required, notwithstanding any omissions from this Specification.

## 3.0 ENVIRONMENTAL DESIGN CRITERIA AND UTILITIES

### 3.1 SEISMIC AND TRANSPORTATION LOADS

Refer relevant clause of piping design (Spec. no. 2004A)



### 3.2 DESIGN LIFE

The process facilities design life requirement is 25 years.

## 4.0 GENERAL REQUIREMENTS

### 4.1 COMPANY’S REQUIREMENTS

The contractor shall prepare detailed datasheet for each specialty item based on this bid package and approved P&ID and submit to the company for approval.

The Datasheet shall contain the following data, but not limited to:

Design Pressure and design temperature.  
Material of construction.  
Rating.  
Governing Codes and Standards and Specification.  
Relevant technical notes.  
Tag no.  
Size.  
Reference to approved P&ID.  
Relevant calculations.  
Relevant drawings.

### 4.2 DIMENSIONS

SI units shall be used. Dimensions shall be in mm and be related to the Platform datum’s or reference lines.

## 5.0 DESIGN REQUIREMENTS

### 5.1 GENERAL

Materials shall conform to this Specification with the attached piping specification index and the identified API, ASME, ASTM, BS and NACE codes and Standards.

Refer piping design criteria (Vol II sec 3.3) & piping design (spec 2004-A).

Pressure and temperature ratings of ASME B16.5 shall apply for the design conditions.

Requests for substitutions of any kind shall be complete with all pertinent engineering information required for the Company’s evaluation of the proposed substitution.

### 5.2 DESIGN LOAD CASES

Specialties, its supports and anchors, shall be designed to withstand the results of the following applicable combinations of loads and forces within the limits of stress set by ASME B31.3:



1. Hydro-test Condition (The empty weight plus weight of water to fill the piping).
2. Operating and Design Conditions (The empty weight plus the weight of operating fluid).
3. Wind loading condition
4. Dynamic Loading Condition
5. Periodic Site Test Condition
6. Any other condition that would affect the safety of the pipe work, e.g. cyclic loading and slug forces, when identified on the Data Sheet.

### 5.3 DESIGN STRESS

Allowable stress shall be the maximum stresses permitted by ASME B31.3

### 5.4 DRAWINGS AND CALCULATIONS

Vendor drawings shall contain all pertinent information relating to the Codes, Standards and Specifications used in the design, fabrication, inspection and testing of all the specialties, the pipe work, including the materials used.

The Contractor shall submit detailed calculations establishing the compliance of their design with the requirements of ASME B31.3.

Contractor to prepare the data sheets for each specialty & shall provide the information such as item description, pipe size, thickness, valve selection & tag Nos, designed pressure- temperature ratings, hydrostatic pressure, list of spares and applicable codes/standards. Contractor to submit the data sheets and all other information required for design of each specialty for company's review & approval.

Contractor to prepare the specifications, data sheets based on the functional parameters, relevant piping class as per approved P&ID & material of construction and submit to company for review & approval.

All calculations shall be complete, giving all references and showing all working methods. The Contractor shall be able to provide proof of software verification for any software used. Computer printouts will not be accepted without the program flow chart, input data and complete printout, and then only by prior written agreement with the Company at the quotation stage.

Where relevant, additional calculations shall be undertaken regarding the effects of slug forces.

The pipe work shall be analyzed in its corroded state for each load combination.



Approval of drawings, calculations and other documents by the Company does not relieve the Contractor of their responsibility for the correctness of the design to suit the stated conditions.

## 6.0 MATERIALS

### 6.1 GENERAL

Materials shall be as per ASTM, BS or API specifications referenced in the project piping specifications (SPEC 2004- A & B) and piping design criteria.

### 6.2 MATERIAL IDENTIFICATION

All piping specialties except those with threaded connections, shall be supplied with mill certified test reports and certificates to identify the type of steel, composition, heat number and any special testing.

The Contractor shall furnish to the Company Inspector (OD- Rep) with one (1) copy of all mill certificates for all the materials purchased by the Contractor duly certified by company approved third party inspection agency.

### 6.3 SOUR SERVICE

All sour service materials shall conform to piping design criteria and Spec 2004A.

### 6.4 CERTIFICATION DOCUMENTS

All pressure parts material certification shall be traceable to heat numbers. Certificates, including all material certificates, mechanical test certificates, welding qualification certificates, heat treatment certificates and hydrostatic test certificates shall be available at final inspection and for counter signature by the certification authority and stored by the Contractor for a minimum of 5 years after acceptance of the piping by the Company. Pressure retaining parts shall be clearly marked to allow verification of tractability.

## 7.0 SPECIALTY ITEMS

Specialty items shall be supplied with a stainless steel tag. Specialty Items shall be supplied, designed, tested & installed as specified in the Project Specification for specialty items. This specialties refers to items like Strainers, Scraper Tees, Hinged Closures, Pig Detector, CP/BP/SP, 5D radius Bends, SDV, HCV, Choke Valves, Strainers, Spray Nozzle, Fire water & foam hose reel, Chemical and Utility hose reel, Continuous drainer etc. used in the Offshore Platforms. The materials of construction, piping class, governing codes and standards, quality assurance shall be followed as per relevant clauses of this specification. All specialties shall be hydro tested as per respective piping class and 1.5 times the design pressure. All pressure welds shall be 100% radio graphed. All piping specialties shall be painted in accordance with Spec. 2005. However, piping speciality supplied by the vendor with primer as per Spec. 2005 followed by subsequent coating (With touch up primer coating wherever required as per Spec. 2005) by main contractor is also acceptable.





## 7.1 STRAINERS

All basket type strainers shall be designed as per ASME Section – VIII. Div. 1 and others as per ASME B 31.3,

MOC of the body, nozzle etc shall be same as that of the connected piping.

Screen material shall be as follows:

Body Material		Screen Material
C.S	-	S 316
C.S. (NACE)	-	SS 316 (NACE)
Other than C.S.	-	Compatible with Piping Class.

Mesh size for all strainers shall be 40, unless otherwise specified.

Drains with ball valve and blind shall be provided.

Installation of strainer shall conform cleaning without dismantling strainer housing and associated piping & instrumentation.

Break out spools shall be installed wherever the temporary strainers are recommended in P&ID.

## 7.2 SCRAPPER TEES

Scraper tee (or sphere tee or flow tee as it is called) essentially consists of concentric barrel tees. The purpose of the scraper tee is not to allow passage of pig sphere/scraper on to the branch side.

The scraper tee shall be suitable for pigging operation with process hydrocarbon/raw sea water. The scraper tee inside diameter shall be same as that of inside diameter of riser in splash zone to maintain constant ID to permit smooth pigging operations.

No bars shall be used.

Maximum possible opening shall be provided through slots to limit the pressure drop i.e. total opening shall be 1.0 to 1.5 times the branch pipe area.

Thickness of run/branch is to be calculated by Vendor to the required design pressure and temperature and it shall match with the corresponding matching pipeline for free passage of pig as per DNV rules for submarine pipeline.



### 7.3 SHUT DOWN VALVES (XSDV)

#### 1. SHUT DOWN VALVES (XSDV):

Type : Flanged Ball valve with manual override

Size : Contractor to prepare data sheet based on process parameter.

Others: Valves rating; flange facing; body, ball, seat and trim material, packing etc. shall be to the relevant piping specs. All XSDV shall have flanged ends irrespective of line sizes and class rating.

Shutdown time : Contractor to specify.

All hydrocarbon valves are to be supplied as per approved P&ID's to meet NACE-MR-01-75 (latest edition) and Piping Design Criteria.

#### 2. ACTUATOR:

Type Pneumatic piston, spring return, Quarter turn operation

Size. Actuator torque shall be 1.25 times the valve torque required at full rated differential pressure of valve, (Vendor shall indicate actuator model no, valve torque and actuator torque in a tabular form along with the quotation.

Supply Pressure Instrument air/gas at 7 kg/cm<sup>2</sup>g (10.6 kg/cm<sup>2</sup> g max) (min. pressure being 5.5 kg/cm<sup>2</sup>g)

Pneumatic 3/8” NPT (female) Tubing shall be SS 316 3/8” OD x 0.049” WT

Accessories Filter regulator with gauge.

#### 3. VALVE POSITION SWITCH (XVPS):

Valve positions switches to indicate open/close position for remote operation.

Type Sealed Micro type, lever operated

Rating 24V DC 2 amp suitable for inductive load

Enclosure Weatherproof and explosion proof (NEMA 4/7)

Area classification NEC Class 1, Division 1, Group-D

Housing CS Nickel plated

Contacts DPDT



Cable Entry 2 Nos. ¾” NPT (F)

#### 4. PILOT VALVE (XPV):

Pneumatic Pilot valve for remote operation with manual reset / shut in

Type Three-way NC SIGMA 11 RSS 83 or equal

Body trim material SS 316 Valve to be leak proof with ‘O’ ring seal

Supply Instrument air/gas at 7.0 kg/cm<sup>2</sup>g (10.6 kg/cm<sup>2</sup>g max.)  
(Min pressure being 5.5 kg/cm<sup>2</sup>g)

Signal 0 or 3.5 kg/cm<sup>2</sup>g instrument air

Accessories Filter regulator with gauge (1 No.)

#### 5 SOLENOID VALVE (XSV)

Electrical solenoid valve for remote operation (If shown in P&ID)

Type Three-way NC manual reset/shut in

Connection Universal, inbuilt terminal box

Body/trim material SS 316 Valve to be leak proof with O ring seals

Enclosures Weatherproof and explosion proof (NEMA 4/7)

Area Classification NEC Class-I, Division I, Group-D

Power supply 24V DC (-ve earthed)

Supply Pressure Instrument air/gas at 10.6 kg/cm<sup>2</sup> (max)  
7.0 kg/cm<sup>2</sup>g (normal) 5.5 kg/cm<sup>2</sup>g (min.)

Cable entry ¾” NPT (F)

Accessories Filter regulator with gauge.

#### NOTES:

- Valves to be designed and tested as per API-6D or BS-5351 as applicable.
- Actuator shall be mounted on the valve and tested as follows:



- Cycle (open and shut) each valve with its actuator at least five (5) times to ensure smoothness of operation
  - Shut valve and apply hydraulic differential pressure across the valve. Open valve with the installed actuator and note valve operation. Valve operation should not be jerky or binding. This shall be repeated at least three (3) times and shutdown time noted at minimum supply pressure.
- c) Test shall be witnessed by company's or company's authorized representative.
- d) All soft seated valves shall be of fire safe design as per API 607/API6FA/BS 6755 Part 2 (latest edition) except the valves used in services such as injection water, fire water, pot water service etc.
- e) Fire safe tests duly witness and certified by recognized third party inspection agency e.g. LLOYD/DNV/BV/EIC shall be furnished.
- g) Valve with actuator shall be suitable for installation in horizontal/vertical lines.
- h) Shut down valve is a package with valve vendor having single point responsibility and actuator shall be sourced from ONGC SVL.

#### 7.4 UTILITY HOSE REELS

Galvanized, welded steel hose reel drum with single length (15M min.), non-collapsible, non-shrinkable hose with end connections.

Nozzles wherever required shall be of Elkart SFL make (or equal), 95 GPM capacity suitable for required service conditions.

Hose coupling wherever required shall be KAMLOCK Fig 633A and 634B or equivalent.  
Hose reel assembly shall be mounted on a frame.

Hosepipe shall have an external coating of oil and abrasion resistant material unless otherwise specified to protect them from sunlight or mild dew damage.

Each hose reel assembly shall be hydrostatically tested to two times the working pressure or at 21.0 kg/cm<sup>2</sup>g whichever is higher

#### 7.5 5D RADIUS BENDS

Bends shall be manufactured by hot bending of pipe applying heating only. Company's approval for bending procedures shall be obtained prior to start of work. The adopted procedure shall be such that the finished product shall not require any additional heat treatment after bending. If



such a heat treatment is required, the same shall be permitted only after written approval of company/and/or Engineer-in-Charge.

Bends shall not have any circumferential joint.

No repair by welding is allowed on any part of the bends.

Bulges, dents and flats shall not appear within 100 mm from the ends and for remaining part they shall be as per MSS-SP-75.

Wrinkles : Measurement of the outside diameter shall be taken in the plane of bend at the locations where wrinkles are present (O.D. max) and at locations where wrinkles are not present (O.D. min.). The acceptance limit shall be as given below:

$$\frac{\text{O.D. Max} - \text{O.D Min.}}{\text{Nominal dia}} < 2\%$$

CTOD TEST shall be performed on each size, service & piping class as per BS 7448 PART I.

## 7.6 SCALE/CORROSION/BIOLOGICAL PROBES & RETRIEVAL TOOLS KIT

1. The scale/corrosion/biological unit shall consist of the following assemblies

A) The access fitting assembly consisting of three parts:

- Access Fitting Body (Non Tee): Access fitting body shall be of a nominal 2” system. Body shall have a weldolet (Flare Weld) base and 3” ACME Threads on the outlet. Weldolet Base shall be 2” Flare weld size.
- Plug assembly: solid plug assembly for holding scale/corrosion/ biological probe coupon.
- Protective Cover: A steel protective cover for the ACME Threads.

B) Corrosion Coupons and Coupon Holder.:

Multiple disc coupons and holders shall be supplied for a nominal 2” system. Holder shall be supplied with mounting and insulating hardware. Each holder shall position three discs. one each at top of line, middle of line, and bottom of the line. Coupons shall be multiple disc type. However, in case wake frequency with multiple disc type is above the acceptable value then contractor shall provide corrosion coupon as per following order of priority:

- Contractor shall provide two single disc flush coupon, one at 6 o’clock position and another at 12 o’ clock position.



In case space does not permit installation of two coupons as above, then contractor shall provide

- (ii) Multiple disc coupon and holder having more than 2” nominal system.

In case, this option is also not feasible, then following option shall be provided.

- (iii) Multiple strip coupon and number of coupon shall not be less than 2 numbers.

C) Scale Coupons and Coupon Holder:

Strip coupons of 150 mm (6”) length shall be supplied for a nominal 2” system. Scale coupons shall have a range of predrilled holes suitable for monitoring scale buildup. Holder shall be supplied with mounting and insulating hardware. Each holder shall position two strips for bottom of line monitoring.

- D) Biological Coupon and coupon holder shall be for nominal 2” system. Holders shall be supplied with mounting and insulating hardware.

2. Retrieval Tool Kit:

A retrieval tool kit shall consist of complete kit for inspection and removal of corrosion coupons. The retrieval tool kit shall be for nominal size of 2" system.

The retrieval tool kit shall be sized for the largest line size and pressure rating and shall be suitable for retrieving all scale/corrosion /biological probes during operation on the platform.

Tool shall be complete with full-bore ball valve kit as per the respective piping class.

Demonstration/ commissioning shall be shown to company’s or company’s authorized representative about retrieval of all probes while in operation.

All probes to be installed in 6 O’clock position.

All probes shall be accessible for maintenance/retrieval while in Operation.

Quantities of retrieval tool kit shall be one (1) each for each controlling process platform suitable for each type of probe.

## 7.7 PIG DETECTOR

Pig Detector is a device which indicates the presence of a pig at a specific position in a pipeline.



There are two categories of Pig Detecting device – Intrusive Pig Detector and Non-Intrusive Pig Detector.

#### 7.7A Intrusive Pig Detector:

Intrusive pig detector is static and mechanically activated and as a result of activation of the trigger due to presence of pig in a specific position in the pipeline wherever the pig signaler is installed. Actuating mechanism of an intrusive pig detector is a mechanical trigger therefore; the intrusive pig detector is required to intrude into the pipeline. Intrusive pig detector is required to be suitable to pressure temperature rating and medium flowing inside the pipeline.

Pig detector shall be Bi-directional type mechanical sphere/pig Detector with multiple accessory flexibility.

Accessories: Visual indicator with manual reset, Micro switch lever arm operated, DPDT (Double Pole Double Throw) Type rated for 24 volts DC at 2.0 amps. Inductive load or SPST (single pole single throw) proximity type switch. Enclosure shall be weather proof and explosion-proof as per NEMA-4 & 7, suitable for area classification of Class-1, Division-2, and Group-D. Electrical connections shall be ¾” NPT (F) with two (2) entries.

Accessory may be installed or changed without removing unit from line. Isolation Ball Valve shall also be provided for replacement/maintenance of internal parts.

One tool for removal of pig indicators shall be provided for each platform.

Any possibility of detector being operated by line operating pressure shall not be permitted. All pig detectors shall have:

Internal parts / Enclosures as given below:

MOC of Connected Piping	MOC of Internal parts/Enclosures
CS/C.S (NACE)	S.S 316
D.S.S	D.S.S
Incoloy	Incoloy/D.S.S

External parts :        -        For C.S /C.S (NACE) -SS-316 except scarfed welding .  
                                     -        For others it shall be compatible with the MOC of the Piping.

#### 7.7B Non-Intrusive Pig Detector:

Non-intrusive pig detector is device which detects the passage of pig at a specific location. However, design shall be such that the device is not required to intrude in the pipe line on which the detector is installed.

The pig detector shall be bi-directional and suitable for all types of pigs including magnetic as well as non-magnetic pig.



Pig detector shall be such that it can be installed easily on the pipeline. All the required accessories for installation of the detector on to the pipeline shall be provided. Pig detector shall also have facility to detach it easily from its installed position so that same pig detector can be utilized for other pipeline segment.

Pig Detector for well head platform shall have own power/battery source and shall be standard size battery (AA/R6 or C/R 14 or D/R 20) operated. The battery shall not be rechargeable type.

For well head platform, pig detector shall have provision for local display and also remote monitoring at control room of the respective process complex through SCADA interface, separate SPDT volt free contact shall be provided.

Pig detector for process platform shall be 24V DC type.

For process platform, the pig detector shall have provision such that data/information of the detector has local and remote display at control room. The pig detector shall have interface suitable for all type of PLC with smart technology to ensure valid communication is maintained.

The inbuilt Power Source/Battery for system back up (if any) of well head as well as Process Platform shall have a minimum self-life of one year.

Pig detector shall be suitable for salt laden marine environment and highest surface temperature of the pipeline segments under the project.

MOC of the Pig Detector as a minimum shall be Stainless Steel (SS 316).

Design of pig detector shall be such that it can display information related to Pig arrival/departure and shall have the facility to store data for minimum 100 nos. of pig passage events.

Any possibility of detector being operated by line operating pressure shall not be permitted.

Enclosure shall be weather proof as per IP66 and Explosion-proof suitable for ZONE – 1. Electrical connections shall be ¾” NPT (F) with two (2) entries. As a minimum complete enclosure shall be ATEX certified for ZONE-1

*In addition to pig detector as specified in clause no. 7.7A, two nos. of non-intrusive pig detectors suitable for the entire pipeline segments (i.e. pipeline segments means pipeline from pig barrel to pig barrel or any part of it) under each project shall be provided.*

## 7.8 HINGED CLOSURES

The hinged closures shall be quick opening type closure with O- ring seats and necessary pressure warning/release devices. These shall be suitable for horizontal or vertical mounting as per layout requirements. Hinge orientation shall be as per approved piping plan.





End closure shall be designed as per ASME Section VIII, Division-I. Quick actuating closure shall be designed that the failure of a single locking component while the vessel is pressurized (or contains a static head of liquid acting at the closure) will not cause the hinged closure to open or leak or result in the failure of any other locking component or holding element or increase the stress in any other component or holding element by more than 50% above the allowable stress of the component.

Corrosion allowance shall be as MOC suitable to respective piping class.

Closure shall be so designed that holding elements of the closure are fully engaged upon closing and that all internal pressure is released before closure can be opened. A vent plug interlocked with clamp ring/operating lever shall be provided to warn the operator if an attempt is made to open the door, before the pig barrel is depressurized.

Clamp type quick closure with bolt tightening at both sides of the door or end closure with exposed screw expander or captive ratchet braces shall not be used.

Lifting Eyes shall be required for size 16” and higher.

The closure shall be approved by ASME- approved third party inspection agency.

The fit up and installation of hinged closure shall be witnessed by the manufacture of hinged closure and a certificate shall be obtained from the manufacturer stating that the hinged closure has been installed correctly and submit to company for approval. And there after a minimum of two closing and opening cycles shall be performed in presence of company approved TPI. The correct operation of both quick opening and safety system shall be established and furnished to the Company.

Wetted Seal Face of Hinged closure of MOC - CS Nace, Non Nace shall be clad with Incoloy 825 or Inconell 625 by weld overlay as per following:

1. The minimum cladding thickness shall be 3mm.
2. Applicable specification for cladding shall be ASME IX, API 6A and NACE MR01-75/ISO-15156-1/2/3.
3. A complete Overlay Welding Procedure Qualification Record in accordance with ASME IX shall be developed for overlay of nickel based alloy (generally Incoloy 825 or Inconell 625).
4. Testing requirement on clad seal face:

(a) Chemical Composition: Chemical composition shall be ascertained by appropriate method for top 2mm of cladding thickness and chemical composition shall be within



limit of nickel base alloy (generally Incoloy 825 or Inconell 625). Iron dilution shall not exceed 10%.

- (b) Other tests indicated in FS 2004A for Incoloy 825 or Inconell 625 shall not be applicable for overlay of seal face of hinged closure.

For cladding by over lay, the vendor shall develop their own procedure and testing requirements during detail engineering.

Hinged closure shall be painted as per FS 2005 suitable to marine environment after installation.

## 7.9 CHOKE VALVES

### 7.9A Choke valve: (Lift Gas Injection)

Choke is normally used for controlling Flow rate as well as pressure for injection of lift gas into wells.

The body shall be straight line adjustable choke assembly or angle – globe type as indicated in the P&ID.

Trim shall be microform type.

Material of Body shall be compatible with MOC of the connected piping.

Trim material shall be as given below.

MOC of Connected Piping	MOC of Trim
CS/C.S (NACE)	S.S 316
D.S.S	D.S.S
Incoloy	Incoloy/D.S.S

Actuation shall be manual single port design.

Inspection and testing of choke Valve shall be same that of globe Valve indicated in FS 2004A.

### 7.9B Adjustable Choke Valve: Well fluid flow arm

This part of specification is for adjustable choke valve being used in the well fluid flow arm.

The design and testing of the choke valve shall be as per API 6A. The choke valve shall be angle type. The choke valve shall be generally manually actuated type unless otherwise stated. The actuator design shall also conform the requirement of API 6A. The manually actuated choke valve shall have position indicator as indicated in API 6A in steps of 1/64” and also have locking arrangement.



Body material shall be compatible to connected piping and selected from material indicated in API 6A.

Trim material shall be tungsten carbide to handle fluid velocity at MACH 1 or more.

Trim form shall be cage guided sleeve and designed such that the trim can be changed to multi stage type without change of body.

Trim shall have sufficient stages.

Trim shall meet noise requirement of 85db as per National Institute of Occupational Safety and Health.

Inspection and testing of choke Valve shall be same that of globe Valve indicated in FS 2004A.

### 7.9C Adjustable Choke Valve: Water Injection

This part of specification is for adjustable choke valve being used in the water Injection Service

The design and testing of the choke valve shall be as per ASME B 16.34. The choke valve shall be angle type unless otherwise dictated by process requirements. The choke valve shall be generally manually actuated type unless otherwise stated. The actuator design shall such that torque requirement is within the limit as indicated in API 6D or any other relevant guide line indicated specification. All-out effort shall be made to keep the torque requirement as low as possible with hand wheel diameter as indicated in API 6D. The manually actuated choke valve shall have position indicator and also have locking arrangement.

Body material shall be compatible to connected piping and high flow velocity fluid.

Trim material shall be tungsten carbide to handle high fluid velocity with abrasive material.

Trim form shall be plug and cage.

Inspection and testing of choke Valve shall be same that of globe Valve indicated in FS 2004A.

### 7.10 SPRAY NOZZLES

This refers the requirements for the supply of spray nozzles to be installed in a deluge type salt/fire water spray network on the offshore platform.

The spray nozzles shall be attached to piping by means of threaded half couplings or threadolet.

All spray nozzles shall of the Type-Medium velocity, open, non-clog type.

Discharge pattern: Solid cone of dense, far reaching water fog.

Spray nozzles shall meet NFPA-15 requirements and shall be approved by



Underwriters Laboratories, USA/VJTI, Mumbai, India.

Materials: Nozzles (including deflector plate): copper alloy of a grade suitable for salt water service and marine atmosphere, material to 5% Ni-Al-Bronze conforming to BS-1400 AB 2C/, BS EN 1982 C333G/ASTM B 148 C 95800 or equivalent.

## 7.11 FIRE AND FOAM HOSE REELS

Galvanized, welded steel hose reel with single length (18 M min.) 1½” (ID) all rubber non-collapsible, non-shrinkable hose with brass couplings.

Nozzle shall be an Elkhart SFL (or equal, 95 GPM capacity with straight steam or fog capability, of chrome-plated brass for salt water service. Supply shall also include an AFFF 6% concentrate, tank constructed of 316 SS. Hose reel shall be mounted on the top of tank having capacity of 30 Gal (US). (Minimum).

Eductor system shall be of bypass type with metering valve for foam control 0% to 6% setting and a transparent pick-up tube.

Hose shall be Neoprene rubber lined and have an external coating of oil and abrasion resistant material to protect them from sunlight or mild dew damage.

Hose reels shall have underwriters laboratory/US coast Guard/FM approval. Hose shall be suitable for maximum working pressure of 14 kg/cm<sup>2</sup> and tested to 21 kg/cm<sup>2</sup>g.

Design and construction of hose reel station shall be in accordance with NFPA and relevant Codes and Standards.

## 7.12 CONTINUOUS DRAINERS

Continuous Drainers shall be direct acting float operated type with MOC compatible with connected piping as per P&ID and with RF flanged ends to ASME 150/300 as applicable for 2” and above, Screwed for 1-1/2 and below.

Contractor to select proper valve and seat to ensure that continuous Drainers shall operate at 3 times the normal flow.

All continuous Drainers shall be suitable for the intended applications.

All continuous Drainers shall be supplied with line size Y-type strainers.

## 7.13 CHEMICAL UTILITY, HOSES & HOSE CONNECTION

### 1. HOSES



The manufacturer shall guarantee the suitability of the hoses for the intended service and working conditions .

The requirement of Materials, Construction, Dimensions and Testing of Hoses shall be as per approved applicable codes & relevant piping class of approved P&ID’S.

The nipples shall have male threads and be made from seamless pipe conforming to ASTM A312 TP 316 unless stated otherwise.

Nipples shall be built-in-type i.e. vulcanized with the Hose such that normal flexing and stretching will not subject it to stresses which might cause breakage/damage.

Each hose shall be hydrostatically tested to two times the working pressure, or at 21.0 kg/cm<sup>2</sup>g whichever is higher.

The length of finished hose assembly shall not differ from nominal length by more than +2% and –1%. For this purpose the hose assembly shall be measured after being subjected to tests. All hoses shall be of single hose lengths.

All hose assemblies shall be suitable for Marine Environment and shall be resistant to aging, abrasion, sunlight and dews.

All hoses shall be non-collapsible type and able to withstand full suction.

All potable water hoses shall be FDA approved types. All hoses for chemical diesel and hydrocarbon service shall be fire-resistant type as per United States Coast Guard (USCG).

## 2. HOSE CONNECTIONS

### A. Description:

- a) KAMLOCK type couplers and adapters for use in hose connections of different services is as under:
- b) KAMLOCK Type Hose Couplings: KAMLOCK Type Hose Couplings shall be KAMLOCK 633-D Services with NPTF ends with adapter KAMLOCK 633- A Series with NPTF ends and dust plug (KAMLOCK 634A/634B series).

Foster one-way shut-off 6 series industrial interchange quick detachable type plug and socket for use in hose connectors.

### B. Materials:

Body (coupler, adaptor and dust plug type) - 316 L (Stainless Steel)  
Cam Arms and Pins - 316 (Stainless Steel)  
Gasket - PTFE/Buna-N.



- C. Each coupler, adopter and dust plug shall be subjected to a hydrostatic test at 21 kg/cm<sup>2</sup>g or at two times the working pressure whichever is higher.

#### 7.14 HAND CONTROL VALVE

- a) Body & Bonnet Material: Carbon Steel 'ENP' Coated
- b) Trim Material : Tungsten Carbide/Stainless Steel with stellite facing.
- c) Type of Trim : Variable Resistance trim
- d) Type of Valve : Multistage Pressure Reducing Valve (FO)
- e) Operation: Pneumatic Actuator with manual override available gas with supply pressure 8.0 g/cm<sup>2</sup> (g) (Maximum Pressure 10.6 kg/cm<sup>2</sup>(g) (Minimum Pressure 5.5 kg/cm<sup>2</sup>(g)
- g) Function: To divert derated sea water of 0.02 mg/lit. oxygen (sometimes raw sea water with 7 ppm oxygen) over board during start-up and pre-commissioning operations. Inlet from de-rated seawater header and outlet dumped to sea.

##### Notes for Valve:-

Valve shall be 100% radio graphed as per the procedure and acceptance criteria specified in ANSI B 16.34 latest edition.

Vendor shall furnish sizing calculations, material of construction etc. along with quotation and shall also furnish predicted noise level calculations with the quotation.

Vendor shall perform the functional test at offshore. To ensure cavitation/vibration free operation, pressure drop and noise level to be within specified/acceptable limits. In case there is a fault/malfunctioning vendor must replace the parts/complete valve or carryout necessary rectification is at his cost.

Trim shall be anti-cavitation, anti-corrosion, anti-erosion and anti-noise type.

An input torque limiter shall be provided in order to close the valve adequately to avoid wiring erosion.

Vendor shall submit the recommended piping installation drawings upstream and downstream of the Hand Control Valve in order to minimize the noise level.

Valve shall be equipped with a seat incorporating Teflon insert to avoid wiring erosion.

A restriction orifice assembly shall be provided downstream of each Hand Control Valve. Hand Control Valve Vendor shall decide intermediate pressure (PA).



A complete restriction orifice plate with matching flanges shall be supplied along with Hand Control Valve to suit working conditions as specified.

All external hardware to be suitable for offshore service where the atmosphere is salt laden and corrosive.

Valves shall be with 'Variable Resistance Trim concept which allows cavitation free operation. Vendor shall provide Pneumatic actuator spring return type.

One pressure regulator with  $\phi 150\text{mm}$  (0-100%) dial allowing to deliver 3-15 psig to the valve positioner along with adapting parts. Vendor shall supply one pressure regulator with gauge reducing the instrument air pressure from 10.6 kg/cm<sup>2</sup>g to 20 psig along with adapting parts for mounting on 2” pipe for Pneumatic Actuator Manual holding station.

#### 7.15 FLAME ARRESTORS

Body shall be of 316 SS bank. End connection shall be flanged. Weather- hood shall be provided wherever necessary. Flame arrestor shall be listed by UL/ FM or equivalent, if applicable. Design standard for Flame Arrestor shall be BS EN ISO: 16852 or Equivalent.

#### 7.16 DOUBLE BLOCK AND BLEED VALVE

Double Block and Bleed Valve under this specification means a device having two Ball Valves in the main flow line for isolation and a needle Valve installed in between the two ball Valves to bleed the fluid trapped between the Isolation Ball Valves. The design of two isolation ball valves and the needle Valve shall be same as that of Ball Valve/Needle Valve as described elsewhere in the bid package.

The combination of both the Ball Valve and the needle shall be of integral and single assembly. It is preferred that both the Ball Valves and the Bleed Valve assembly is of compact design so that space requirement is as less as possible.

An assembly having two independent ball valves and an independent needle Valve assembled together is not acceptable wherever Double Block and Bleed Valve are specified in the bid package. End connections can be flanged by flanged or flanged by screwed. Vent connection shall be ½” NPT as standard.

Piping or tubing (as applicable) shall be routed to nearest vent or drain line (as applicable).

Torque requirement and hand wheel/lever of both the Ball Valves and Needle Valve shall not be more than as specified in API 6D or any guide line specified in Bid Package.

Testing requirements of Ball Valves and Needle shall be same as that of respective valve standards under which Valves are designed.





Double Block and Bleed Valve assembly shall be of fire safe design as per API 607/API6FA/BS 6755 Part 2 (latest edition) except the valves used in services such as injection water, fire water, pot water service etc.

#### 7.17 VALVE FOR HIPPS (High Integrity Pressure Protection System)

HIPPS as defined in this specification is Instrumented System of High Reliability for isolation of topside facilities or pipeline from pressure source before allowable pressure is exceeded beyond the design pressure at Down Stream of HIPPS.

This specification of HIPPS is a functional description indicating requirements for design and manufacture of main process isolation Valves used in HIPP System. Since HIPP System calls for high reliability and redundancy, minimum two numbers of isolation Valves shall be installed in each HIPP System. Valves used in HIPPS shall be termed as Primary Process Isolation Valve & Secondary Process Isolation Valve. For items/equipment other than the main process isolation valves refer scope of work and Functional Specification of HIPPS enclosed in the bid package.

Reliability and Safety Integrity level of the main process isolation valve must be same as that of the complete HIPPS including instruments and other items and equipment used along with the HIPPS.

Valves used in HIPPS shall comply with following:

Type: Ball valve or Axial Flow Valve.

Application: (a) Piggable Pipeline - Full Bore Ball Valve.  
(b) Non-Piggable Pipeline or Piping at top Side - Axial Flow Valve or Full Bore Ball Valve.

Size: As per P&ID.

Others: **Full Bore Ball Valve:** Valves rating; flange facing; body, piston, seat and trim material, packing etc. shall be to the Piping Functional Specification, FS 2004A. Valves shall have flanged ends irrespective of line sizes and class rating. Metal seated Ball valves may be considered for HIPPS application.

**Axial Flow Valve:** Valves rating; flange facing; body, Piston, seat and trim material, Packing etc. shall be to the Piping Functional Specification, FS 2004A. Valves shall have flanged ends irrespective of line sizes and class rating. Flow passage area of the valve shall be equivalent to full bore Ball Valve of same size to ensure pressure across the valve is equivalent to full bore Ball Valve of same size. In case of Axial Flow Valve, there is possibility of kinetic energy of fluid getting dissipated on the piston of the Valve. Hence MOC of part of trim which faces high velocity fluid directly on its surface shall be of a material suitable for the purpose i.e hardness of surface shall be





increased by using material such as tungsten Carbide, stellite, DSS, Incoloy, Inconel etc. based on fluid velocity and fluid characteristics.

**Torque:** Actuator Torque required to operate the valve shall be at least 1.5 times more than Break away torque of the Valve.

**Installation:** Valve installation shall be Horizontal unless otherwise established that Horizontal installation is not suitable for the purpose.

**Shutdown time:** Shut Down time shall be as dictated by Functional Specification of HIPPS enclosed in Bid package but preferred time for shut down shall be less than 0.2 Sec/inch diameters in case Specification of HIPPS does not dictate this parameter.

**Valve Design:** (a) Full Bore Ball Valve:  
Refer FS 2004A for details.  
(b) Axial Flow Valve:  
Design Standard: API 6D or BS EN ISO 17292 (Up to 2”) and design must be fire safe design.

**Leakage Rate:** Ball Valve:  
(i) Acceptable leakage rate for hydro test- No visible leakage (Rate-A for soft seated valve & Rate-B for metal seated Valve).  
(ii) Acceptable leakage rate for pneumatic/nitrogen gas test – Tight Shut off leakage rate- VI (ANSI class VI leakage)

Axial Flow Valve:  
(i) Acceptable leakage rate for hydro test-No visible leakage (Rate-A).  
(ii) Acceptable leakage rate for pneumatic/nitrogen gas test – Tight Shut off leakage rate- VI (ANSI class VI leakage)

**PST**  
(Partial Stroking): Ball Valve: Design of the Valve shall be such that there is provision to partially stroke the valve without effecting shut down of the process.

Axial Flow Valve: Design of the Valve shall be such that there is provision to partially stroke the valve without effecting shut down of the process.

**SIL Level:** Safety Integrity level of HIPPS Valve shall be same as that of complete HIPPS system described in HIPPS specification i.e. C-104 and Valve shall be proven in use with the required SIL Level as indicated in C-104.



All hydrocarbon valves are to be supplied as per approved P&ID's to meet NACE-MR-01-75 (latest edition) and Piping Design Criteria.

Actuator shall be mounted on the valve and tested as follows:

- Cycle (open and shut) each valve with its actuator at least five (5) times to ensure smoothness of operation.
  - Shut valve and apply hydraulic differential pressure across the valve. Open valve with the installed actuator and note valve operation. Valve operation should not be jerky or binding. This shall be repeated at least three (3) times and shutdown time noted at minimum supply pressure.
- c) Test shall be witnessed by company's representative or company's authorized representative.
- d) All soft seated valves shall be of fire safe design as per API 607 or API6FA or ISO 10497 or BS 6755 PART II (latest edition) except the valves used in services such as injection water, fire water, pot water service etc.
- e) Fire safe tests duly witness and certified by recognized third party inspection agency e.g. LLOYD/DNV/BV/EIC shall be furnished.

**NOTE:** HIPPS system shall be a package item with component vendors as enlisted in SVL.

For new PQDs of HIPPS System Package, PTR for the HIPPS package shall be for complete package supplied to various offshore oil and gas projects and shall be submitted with satisfactory Performance feedback for 2 years service OR in the form of repeat PO copies with a minimum time gap of 2 years from the date of delivery. The major components of the package are Logic Solver, valve & Actuator which shall remain same as supplied in package (considered for PTR) above.

## 7.18 SAMPLE BOMB

Sample bomb shall be designed as per ASME Sec VIII Div I. Hose for sample bomb assembly shall be fire-resistant type as per United States Coast Guard (USCG).

## 8.0 SPARES

Manufacturer shall recommend and provide the spares required for startup and commissioning for all specialties.

Manufacturer shall recommend and provide a list of spares needed for one-year operation and maintenance for all specialties.

## 9.0 WARRANTY

Vendor shall warrant all the piping specialties furnished by him in accordance with Piping Design Criteria (Vol II sec 3.3).

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