









## HAI PHONG 2 PROJECT



# TECHNICAL REQUISITION DOCUMENT FOR MANUAL VALVE HP02-00-PI-TRD-0003



A	10-Nov-2023	Issued for Review		H.D.T	T.Q.T	N.T.S	V.L.T
REV. NO.	DATE	DESCRIPTION		PREP'N	CHECK	REVIEW	APPROVAL
REV. NO.	DISCIPLINE	PREPARATION	CHECK	REVIEW		APPROVAL	
A	PIPING						
		H.D.T	T.Q.T	N.T.S		V.L.T	

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## 1. GENERAL

### 1.1. Document Purpose

This document is to specify minimum requirements for **Manual valve package**, which shall be used for Hai Phong 2 Project.

It shall be read in conjunction with all relevant codes of practice, standard drawings, project datasheets, specifications and international codes & standards listed within this document.

### 1.2. Definition and Abbreviation

#### 1.2.1. Definition

Definitions used in this document are described below:

PROJECT	HAIPHONG 2 PROJECT
OWNER	The Branch of Top Solvent (Vietnam) Limited Liability Company – HaiPhong Terminal
EPC CONTRACTOR	PTSC Thanh Hoa Technical Services Company

#### 1.2.2. Abbreviation

Abbreviations used in this document are described below:



ITP	Inspection and Testing Plan
RT	Radiographic Test
UT	Ultrasonic test
DN	Nominal Diameter
GTAW	Gas tungsten arc welding
TRD	Technical Requisition Document

## 2. CONFLICT RESOLUTION

It is the responsibility of the **VENDOR** to bring to the attention of the **CONTRACTOR** any conflicts between the applicable documents. In the case of conflict in the requirements, intent or interpretation of the various codes, standards and regulations the most stringent shall apply.

The general order of precedence for the documents, standards and specifications shall be as listed below:

- Purchase Order / Purchase Contract
- Data sheets and drawings
- Project specifications
- This material requisition
- Codes and standards
- Standard industry practice

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### 3. DEVIATION LIST

Vendor's quotation shall be in full conformity with Purchaser's requirements. Unless exceptions, deviations or alternatives are clearly defined and listed on the attached Purchaser's form "Deviation List" and submitted with Vendor's quotation, the requirements and conditions of this Requisition shall be deemed to be accepted by the Vendor.

### 4. LANGUAGE AND UNITS

#### Language

All documents and drawings to be submitted shall be lettered in English language.

#### Units of measurement

The international System of Units (S.I.) shall be used



Glossary	Units
Temperature	°C (Degree)
Pressure	Bar (g) (psi for flange rating) mmH <sub>2</sub> O
Flow Rate	Kg/Hr, MT/Hr, Nm <sup>3</sup> /Hr, m <sup>3</sup> /Hr (bbl/d)
Velocity	m/sec
Length	mm (inch for nominal pipe size)
Weight	Kg, Ton (metric ton)
Power	W (KW)
Density	Kg/m <sup>3</sup>
Electrical Voltage	V
Electrical Current	A
Revolution	RPM
Energy	KJ, MJ
Frequency	Hz
Sound Pressure	dB(A)

### 5. ITEMS AND QUANTITIES

See attachment #1: MTO FOR MANUAL VALVE in this TRD

### 6. SCOPE OF SUPPLY AND WORK

The following scope of supply covers the minimum technical requirements for the supply of **Manual Valve package** for Hai Phong Terminal Project. Included all components and

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ancillary valves necessary to make valve complete, safe and ready for operation in accordance with this Requisition, as follows:

ITEM	NO. OFF	DESCRIPTION	BIDDER'S CONFIRMATION
1	Bulk	MTO as per Attachment #1– MTO for Manual Valves	
2	1 Lot	Spare parts for Pre-commissioning, commissioning and Start up	
3	1 Lot	Quality, Inspection and Testing requirement as per Attachment #4	
4	1 Lot	Test certificates as per EN10204:2004 Type 3.1	
5	1 Lot	Surface preparation & furnished painted including color code (top coat) in accordance with Painting Specification (Do. No.: HP02-00-PI-SPC-0002) as per Attachment #2	
6	1 Lot	Original Certificate of Origin & Original Certificate of Quality issued by manufacturer.	
7	1 Lot	Valve markings according to API 6D / MSS SP-25	
8	1 Lot	Vendor Data and Drawings as per VDRL in Attachment #3	
9	1 Lot	Long Term Preservation and Preparation for Shipment and Export Packaging	
10	1 Lot	Visual Inspection 100%	
11	1 Lot	RT/UT	
12	1 Lot	MPI / DPI	
13	1 Lot	PMI Examination for Stainless steel	
14	1 Lot	Transportation (As per PO requirement)	

## 7. GENERAL REQUIREMENTS

### 7.1. General

- The Package shall be strictly in accordance with data sheets, drawings, specifications, codes, and standards specified.

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- Compliance by the Vendor with the provision of this Requisition does not relieve him of his responsibility to furnish the package/ material and accessories of a proper design to meet the specified duty and / or local codes governing health and safety.
- All applicable documents mentioned below are attached with the request for inquiry. However, if the Vendor is not in possession of any of the listed or referenced Purchaser documents, it shall be Vendor's sole responsibility to obtain them from the Purchaser. Otherwise, it shall be assumed that the Vendor has received, read and understood the total contents of the documents.
- All materials and parts shall be new and un-used and free from defects and imperfections that would adversely affect the life or performance of the system.
- Vendor data shall include detailed design drawings and updated data sheets of each material and appurtenances. Detail design drawings shall be fully dimensioned and complete with Bill of Materials.
- No fabrication would commence until Purchaser has approved the drawings.
- Purchaser's approval on drawings does not relieve Vendor of compliance with applicable codes, specifications, safety design, or meeting the requirements of governmental agencies.
- Any work and documentation related to facilitating design appraisal approvals and inspection from Purchaser appointed Certification Authority (CA) and QA/QC Inspector (TPI) shall also be included in Vendor 's scope of supply

#### **7.2. Design Life, Availability and Reliability**



- The design life of the facility and all associated equipment, components and systems is minimum 25 years.
- All components which for practical, safety or cost-efficiency reasons are unable to meet the required design life shall be identified as soon as possible. Their expected service life shall be informed to Purchaser and provision made in the system design for maintenance to extend component life or routine change-out.

#### **7.3. Protective Coating and Painting**

Surface preparation and coating of all exposed metal parts shall be in accordance with Doc. No.: HP02-00-PI-SPC-0002\_Painting Specification

#### **7.4. Preparation for Shipment**

- All material shall be prepared for export shipment and shall be created to provide maximum protection during shipment and extended outdoor storage.
- Any equipment liable to be damaged during shipment shall be disassembled, packed separately, shipped with the unit and reassembled onsite under the supervision of Vendor 's commissioning/start-up technician.
- Each crate shall be clearly identified in accordance with the customer's specification. As a minimum the crate shall be marked with the Purchase Order number, the item number, the shipping mass and the delivery address.
- Flanged shall be protected by plastic cover plates.

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- The valves shall be suitably preserved to maintain in good condition throughout the phases of storage until ready to be operated.
- Exposed machined surfaces, including threads extending beyond the nuts, shall be protected with an easily removable rust-preventive coating.
- Tools and spare parts shall be packed in metal boxes suitable for long term storage. The boxes shall be galvanized or coated in accordance with Project requirement.

#### 7.5. Guarantee and Warranty

- The Vendor shall have final and total responsibility for the design and performance of all material supplied under this specification.
- The Vendor shall replace and install without cost to the Purchaser any materials, supplies which fails under design conditions due to defects in material or workmanship if the defect is observed and/or such failure occurs within the guarantee/warranty period. Acceptance of this order will signify acceptance of all conditions of this guarantee.
- The guarantee period shall be minimum **24** months from operating date.

#### 7.6. Spare part

##### Start-up and Commissioning Spares

- The Vendor shall include, as part of his bid, a detailed, price list of start-up and commissioning spares which shall be supplied as part of the original purchase package.

##### Two Year Spares

- The Vendor shall include, as part of his bid, a detailed, list of recommended spare parts for two years continuous operation. These spares shall be costed separately.



### 8. INSPECTION AND TEST REQUIREMENT

- Inspection and tests shall be made by the **VENDOR** in accordance with;
  - [X] Test & Inspection should be carried out acc. to the above applicable codes and standards
  - [X] Maker's standard plan & procedure as approved by Purchaser
  - [X] Local regulation, if any
- The Company and/or Purchaser inspector shall hold a right to be present at any manufacturing stage of the equipment and/or materials.
- The Vendor shall state the inspection method, acceptance criteria and the inspection items with "Witness" or "Not witness" in his inspection and test procedure

### 9. COORDINATION MEETING

After the purchase order is placed, Vendor shall, upon receipt of Purchaser's notice, send a sufficient number of qualified personnel at Vendor's cost to hold the meetings according to the following schedule:

[x] Kick-off meeting      Two (2) week(s) after the      [ ] Vendor      [x] Purchaser's

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	order		office
[x] Coordination meeting	(* Note 9a) month(s) after the order	[ ] Vendor	[x] Purchaser's office
[ ] Design review meeting	month(s) after the order	[ ] Vendor	[ ] Purchaser's office
[x] Pre-inspection meeting	1 month(s) before Fab. start	[x] Vendor	[ ] Purchaser's office

\* Note 9a: The time period for the same to be agreed at kick-off meeting.

#### 10. **VENDOR DATA REQUIREMENT**

The Vendor shall submit the completed documents and drawings, in accordance with the "Vendor Data Requirements" in time.

Vendor Data Requirements shall be referred to Attachment #4

#### 11. **SPECIAL REQUIREMENT**

- Also, vendor shall submit COC (Certificate of conformity/compliance) sample with proposal document. The original copy for COC (Certificate of conformity/compliance) shall be submitted before shipping.)
- All valves shall be manufactured and have C/O (certificate of origin) and C/Q (Certificate of Quality) from Japan/EU/G7 or Equivalent or Approved Vendor list from OWNER
- Vendor shall submit general technical data, catalogue, past experience list of similar capacity or process etc.

#### 12. **REFERENCE**

Documents listed below shall make an integral part of this material requisition:

Document No.	Rev.	Document Title	Remark
HP02-00-PI-SPC-0001	0	Piping Material Specification	
HP02-00-PI-SPC-0002	A	Painting Specification	
PTSC-COM-PS-008	A	Vendor Data Control Procedure	

#### 13. **ATTACHMENTS**

Attachment #1: MTO for Manual Valves

Attachment #2: Technical Specifications

Attachment #3: Vendor Data Requirement List

Attachment #4: Quality, Inspection and Test Requirement

Attachment #5: Purchaser Format







## **ATTACHMENT #1**

### MTO FOR MANUAL VALVES



No	Doc. No.	Rev.	Description	Remark
1	HP02-00-PI-MTO-0003	A	MTO for Manual Valves	

## MTO FOR MANUAL VALVE

**HPTP-00-PI-MTO-0003**



A	26-Oct-23	Issued for Review		H.D.T	T.Q.T	N.T.S	V.L.T
REV. NO.	DATE	DESCRIPTION		PREP'N	CHECK	REVIEW	APPROVAL
REV. NO.	DISCIPLINE	PREPARATION	CHECK	REVIEW		APPROVAL	
A	PIPING						
		H.D.T	T.Q.T	N.T.S		V.L.T	

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## 1. GENERAL

### 1.1 Purpose of document

This MTO is covered the Manual Valve to be installed on Hai Phong 2 Project and based on up-to-date P&ID.



### 1.2 Definitions and abbreviations

PROJECT                      HAI PHONG 2 PROJECT

OWNER                      The Branch of Top Solvent (Vietnam) Limited Liability Company – Hai Phong Terminal

EPC  
CONTRACTOR              PTSC Thanh Hoa Technical Services Company

## 2. MTO FOR MANUAL VALVE

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					MTO FOR MANUAL VALVE										
No	Class	Valve_Type	Size(in)	Rating	Material Specification Description						Unit	Qty(Net)	Spare	Quantity	Remarks
1	AA21	Ball Valve	6	150#	Ball valve RB floating type, Split Body, 150# RF API 6D ASTM A105/ASTM A216-WCB, Trim: SS316, PTFE, Lever OP						EA	12	0	12	Process
2	AA21	Ball Valve	3/4	800#	Ball valve FB floating type, Split Body, 800# SW API 6D/BS 5351 ASTM A105/ASTM A216-WCB, Trim: SS316, PTFE, Lever OP; pup end with length 100mm for each end connection. Pup end material shall be according to piping material specification						EA	6	0	6	Process
3	AA21	Ball Valve	4	150#	Ball valve RB floating type, Split Body, 150# RF API 6D ASTM A105/ASTM A216-WCB, Trim: SS316, PTFE, Lever OP						EA	4	0	4	Process
4	AA21	Check Valve	2	150#	Check valve swing type 150# RF API 6D ASTM A105/ASTM A216-WCB, Trim: A-410/A-316 Stellite 6 in compliance with ASME B16.34						EA	3	0	3	Process
5	AA21	Check Valve	3	150#	Check valve swing type 150# RF API 6D ASTM A105/ASTM A216-WCB, Trim: A-410/A-316 Stellite 6 in compliance with ASME B16.34						EA	1	0	1	Process
6	AA21	Check Valve	4	150#	Check valve swing type 150# RF API 6D ASTM A105/ASTM A216-WCB, Trim: A-410/A-316 Stellite 6 in compliance with ASME B16.34						EA	2	0	2	Process
7	AA21	Check Valve	6	150#	Check valve swing type 150# RF API 6D ASTM A105/ASTM A216-WCB, Trim: A-410/A-316 Stellite 6 in compliance with ASME B16.34						EA	2	0	2	Process
8	AA21	Gate Valve	1	800#	Gate valve OS&Y with rising stem, Bolted bonnet, 800# SW, API 602/BS5352 ASTM A105, Hand-wheel OP, Trim: A-410/A-316, Stellite 6 in compliance with ASME B16.34						EA	31	3	34	Process
9	AA21	Gate Valve	1 1/2	800#	Gate valve OS&Y with rising stem, Bolted bonnet, 800# SW, API 602/BS5352 ASTM A105, Hand-wheel OP, Trim: A-410/A-316, Stellite 6 in compliance with ASME B16.34						EA	6	0	6	Process
10	AA21	Gate Valve	1/2	800#	Gate valve OS&Y with rising stem, Bolted bonnet, 800# SW, API 602/BS5352 ASTM A105, Hand-wheel OP, Trim: A-410/A-316, Stellite 6 in compliance with ASME B16.34						EA	7	0	7	Process
11	AA21	Gate Valve	2	150#	Gate valve OS&Y with rising stem, Bolted bonnet, 150# RF API 600 ASTM A105/A-216 WCB Hand-wheel OP, Trim: A-410/A-316 Stellite 6 in compliance with ASME B16.34						EA	28	2	30	Process
12	AA21	Gate Valve	3	150#	Gate valve OS&Y with rising stem, Bolted bonnet, 150# RF API 600 ASTM A105/A-216 WCB Hand-wheel OP, Trim: A-410/A-316 Stellite 6 in compliance with ASME B16.34						EA	9	0	9	Process
13	AA21	Gate Valve	3/4	800#	Gate valve OS&Y with rising stem, Bolted bonnet, 800# SW, API 602/BS5352 ASTM A105, Hand-wheel OP, Trim: A-410/A-316, Stellite 6 in compliance with ASME B16.34						EA	41	10	51	Process
14	AA21	Gate Valve	4	150#	Gate valve OS&Y with rising stem, Bolted bonnet, 150# RF API 600 ASTM A105/A-216 WCB Hand-wheel OP, Trim: A-410/A-316 Stellite 6 in compliance with ASME B16.34						EA	10	0	10	Process
15	AA21	Gate Valve	6	150#	Gate valve OS&Y with rising stem, Bolted bonnet, 150# RF API 600 ASTM A105/A-216 WCB Hand-wheel OP, Trim: A-410/A-316 Stellite 6 in compliance with ASME B16.34						EA	8	0	8	Process
16	AA22	Gate Valve	1	800#	Gate valve OS&Y with rising stem, Bolted bonnet, 800# NPT-F, API 602/BS5352 ASTM A105, Hand-wheel OP, Trim: A-410/A-316, Stellite 6 in compliance with ASME B16.34						EA	2	0	2	Compressor Air
17	AA21	Ball Valve	2	150#	Ball valve RB floating type, Split Body, 150# RF API 6D ASTM A105/ASTM A216-WCB, Trim: SS316, PTFE, Lever OP						EA	1	0	1	Nitrogen
18	AA22	Ball Valve	2	150#	Ball valve RB floating type, Split Body, 150# RF API 6D ASTM A105/ASTM A216-WCB, Trim: SS316, PTFE, Lever OP						EA	1	0	1	Nitrogen
19	AA21	Gate Valve	2	150#	Gate valve OS&Y with rising stem, Bolted bonnet, 150# RF API 600 ASTM A105/A-216 WCB Hand-wheel OP, Trim: A-410/A-316 Stellite 6 in compliance with ASME B16.34						EA	1	0	1	Nitrogen
20	AA21	Gate Valve	1/2	800#	Gate valve OS&Y with rising stem, Bolted bonnet, 800# SW, API 602/BS5352 ASTM A105, Hand-wheel OP, Trim: A-410/A-316, Stellite 6 in compliance with ASME B16.34						EA	2	0	2	Ventilation
21	AA22	Gate Valve	1	800#	Gate valve OS&Y with rising stem, Bolted bonnet, 800# NPT-F, API 602/BS5352 ASTM A105, Hand-wheel OP, Trim: A-410/A-316, Stellite 6 in compliance with ASME B16.34						EA	3	0	3	Firefighting
22	AA22	Gate Valve	3/4	800#	Gate valve OS&Y with rising stem, Bolted bonnet, 800# NPT-F, API 602/BS5352 ASTM A105, Hand-wheel OP, Trim: A-410/A-316, Stellite 6 in compliance with ASME B16.34						EA	5	0	5	Firefighting
23	AA22	Gate Valve	4	150#	Gate valve OS&Y with rising stem, Bolted bonnet, 150# RF API 600 ASTM A105/A-216 WCB Hand-wheel OP, Trim: A-410/A-316 Stellite 6 in compliance with ASME B16.34						EA	5	0	5	Firefighting

Notes

- 1 Original Certificate of Origin & Original Certificate of Quality issued by manufacturer
- 2 PMI shall be applied for Stainless steel material
- 3 Certificate/ test report requirement:
  - Original Certificate of Origin & Original Certificate of Quality issued by manufacturer.
  - Mill test cert to EN 10204 Type 3.1
- 4 All requirements for Valve will be indicated in doc no.: HP02-00-PI-SPC-001\_Piping Material Specification
- 6 Painting for Valve shall be referred to HP02-00-PI-SPC-002\_Painting Specification





## **ATTACHMENT #2**

### TECHNICAL SPECIFICATION

No	Doc. No.	Rev.	Description	Remark
1	HP02-00-PI-SPC-0001	0	Piping Material Specification	
2	HP02-00-PI-SPC-0002	A	Painting Specification	
3	PTSC-COM-PS-008	A	Vendor Data Control Procedure	

## PIPING MATERIAL SPECIFICATION

### HP02-00-PI-SPC-0001

0	07-Nov-2023	Issued for Approval		H.D.T	T.Q.T	N.T.S V.L.T
A	17-Oct-2023	Issued for Review		H.D.T	T.Q.T	N.T.S V.L.T
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# CLARIFICATION SHEET

Project Name:

Hai Phong 02 Project

Owner:

The Branch of Top Solvent (Vietnam) Limited Liability Company – HaiPhong Terminal

Clarification No.:

HP02-00-PI-SPC-0001-CL-01

Document Name:

Piping Material Specification\_Rev.A

Rev.:



A

Date:

7-Nov-23



ITEM	DATE	TOPIC	1ST CLARIFICATION	1ST RESPONSE	2ND CLARIFICATION	2nd RESPONSE	DISCIPLINE CONCERNED	STATUS	REMARK
TSV-01	18-Oct-23	Piping Material Specification	Xem lại tất cả các số trang của từng heading	Noted. It have been updated					
TSV-02	18-Oct-23	Piping Material Specification	Remove section Project Overview	Noted. It have been updated					
TSV-03	18-Oct-23	Piping Material Specification	Delete các chữ "s" này ra trong section Project Document	Noted. It have been updated					
TSV-04	18-Oct-23	Piping Material Specification	Correct: Hydrocarbon by Hydrocarbon/Chemical solvent	Noted. It have been updated					



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## 1. GENERAL



### 1.1. Document Purpose

This document defines the material requirements for all Piping Material System to be installed on Hai Phong 2 Project.

### 1.2. Definition and Abbreviation

#### 1.2.1. Definition



Definitions used in this document are described below:

PROJECT	HAIPHONG 2 PROJECT
OWNER	The Branch of Top Solvent (Vietnam) Limited Liability Company – HaiPhong Terminal
EPC CONTRACTOR	PTSC Thanh Hoa Technical Services Company

#### 1.2.2. Abbreviation

Abbreviations used in this document are described below:

DCC	Document Control Centre
PID	Piping and Instrument Diagram
CS	Carbon steel
SS	Stainless steel
FF	Flat face
FNPT	Female National Pipe Thread
GALV.	Galvanized
LR	Long radius
RF	Raised face
RTJ	Ring type joint
SO	Slip -on
SMLS	Seamless
ITP	Inspection and Testing Plan
RT	Radiographic Test
UT	Ultrasonic test
DN	Nominal Diameter
GTAW	Gas tungsten arc welding



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PE	Plain End
BE	Bevel End
TE	Thread End
SW	Socket weld

### 1.3. Codes and Standards

VENDOR shall consider the most recent issue of the applicable Codes and Standards listed below as part of the technical requirements for the equipment items to be supplied.

API SPEC 6D	Specification for Pipeline Valves
API STD 594	Check Valves: Flanged, Lug, Wafer and Butt Welding
API STD 598	Valve Inspection & Testing
API STD 599	Metal Plug Valves – Flanged, Threaded and Welding Ends
API STD 600	Steel Gate Valves – Flanged and Butt-welding Ends, Bolted Bonnets
API STD 602	Steel Gate, Globe and Check Valves for Sizes NPS 4 (DN 100) and smaller for the Petroleum and Natural Gas Industries
API STD 607	Fire Test for Quarter-turn Valves and valves equipped with Non-metallic Seats
API STD 608	Metal Ball Valves – Flanged, Threaded and Welding Ends
API STD 609	Butterfly valves: Double Flanged, Lug & Wafer Type
ASME B1.20.1	Pipe Threads, General Purpose (Inch)
ASME B16.5	Pipe Flanges and Flanged Fittings NPS ½ through NPS 24 Metric/Inch Standard
ASME B16.9	Factory-Made Wrought Steel Butt-welding Fittings
ASME B16.10	Face to Face & End to End Dimensions of Valves
ASME B16.11	Forged Steel Fittings, Socket-Welding and Threaded
ASME B16.20	Metallic Gaskets for Pipe Flanges: Ring-Joint, Spiral Wound, and Jacketed
ASME B16.21	Non Metallic Flat Gaskets for Pipe Flanges
ASME B16.25	Butt Welding Ends
ASME B16.28	Wrought Steel Butt-welding Short Radius Elbows and Returns
ASME B16.34	Valves – Flanged, Threaded & Welding End
ASME B16.36	Orifice Flanges



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ASME B16.47	Large Diameter Steel Flanges – NPS 26 through NPS 60 Metric/Inch Standard
ASME B16.48	Line Blanks
ASME B18.2.1	Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head and Lag Screws (Inch Series)
ASME B18.2.2	Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange and Coupling Nuts (Inch Series)
ASME B31.3	Process Piping
ASME B36.10M	Welded & Seamless Wrought Steel Pipe
ASME B36.19M	Stainless Steel Pipe
MSS-SP-97	Integrally Reinforced Forged Branch Outlet Fittings – Socket Welding, Threaded and Butt-welding Ends
EN 10204	Metallic products – Types of Inspection Documents

## 2. REFERENCES

Project Documents:

No.	Doc. No.	Rev	Document/Drawing Title
1	HP02-00-PR-PID-0001	A	P&ID – Legend and Symbol 1
2	HP02-00-PR-PID-0002	A	P&ID – Legend and Symbol 2
3	HP02-00-PR-PID-0003	A	P&ID – Jetty and Manifold
4	HP02-00-PR-PID-0004	A	P&ID – Hydrocarbon solvent system 1
5	HP02-00-PR-PID-0005	A	P&ID – Chemical solvent system 1
6	HP02-00-PR-PID-0006	A	P&ID – Chemical solvent system 2
7	HP02-00-PR-PID-0007	A	P&ID – Hydrocarbon solvent system 2
8	HP02-00-PR-PID-0008	A	P&ID – Blending system 1
9	HP02-00-PR-PID-0009	A	P&ID – Blending system 2
10	HP02-00-PR-PID-0010	A	P&ID –Gantry Area
11	HP02-00-PR-PID-0011	A	P&ID – Active Carbon Ventilation
12	HP02-00-PR-PID-0012	A	P&ID – Compressor Air and Nitrogen
13	HP02-00-PR-PID-0013	A	P&ID – Filling Area
14	HP02-00-PR-PID-0014	A	P&ID – Hydrocarbon solvent system 3
15	HP02-00-PR-PID-0015	A	P&ID – Chemical solvent system 3
16	HP02-00-PR-PID-0016	A	P&ID – Blending system 3

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### 3. PIPING CLASSIFICATION BY SERVICE

Piping Class	Material	Service	ASME B16.5 Flange Rating	CA (mm)
AA21	CS	Hydrocarbon/ <b>Chemical solvent</b> – Non Corrosive, Inert Gas, Ventilation	150 RF	1 mm
AA22	CS (Galv.)	Instrument Air, Portable Water, Fire Fighting (Dry system)	150 RF	1 mm
AA23	CS	Water, Fire Fighting (Wet system)	150 RF	1 mm
AA24	HDPE	Fire Fighting (Underground)	150 RF	0 mm
AA31	CS	Hydrocarbon/ <b>Chemical solvent</b> – Non Corrosive	300 RF	1 mm

### 4. REQUIREMENTS

#### 4.1 Carbon steel

Carbon steel containing carbon content more than 0.35% shall not be used in construction which involves welding or shaping by oxygen cutting or thermal cutting process.

#### 4.2 Pipes

Pipe dimensions shall be in accordance with ASME B36.10M for wrought steel and wrought iron pipe and with ASME B36.19M for stainless steel pipe, unless otherwise specified.

Pipe made by acid Bessemer process shall not be acceptable. Steel pipe shall be made by open hearth, electric furnace or basic oxygen process. Hot dip galvanized process shall be done (refer to ASTM A53).

All pipes wall thickness specified in individual pipe classes shall be suitable for the full range of pressure / temperature combinations tabulated.



Pipe thickness shall be calculated in accordance with ASME B31.3.

The thickness of threaded nipples shall be calculated in accordance with ASME B31.3.

Pipe tolerances shall be in accordance with applicable material code.

Butt-welding end preparation shall be in accordance with ASME B16.25.

Polyethylene coated pipes shall be manufactured in accordance with Manufacturer's standard subject to Owner approval.

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The use of threaded joints and unions (where permitted by the Pipe Class) shall be kept to a minimum consistent with ease of pipework fabrication, installation and maintenance.

### 4.3 Fittings

All fittings shall be as follows:

- Forged steel socket welding and threaded fittings ASME B16.11
- Butt-welding fittings and stud ends ASME B16.9
- Butt-welding short radius elbows and returns ASME B16.28
- Steel flanged fittings ASME B16.5

End preparation of the pipe butt-welding fittings shall be in accordance with ASME B16.25.

When butt-welding fittings are specified with a wall thickness larger than that of the pipe and this results in misalignment greater than 1.6mm between the inside surface of the parts to be joined, the fitting shall be taper bored per ASME B16.25.

All lines which connect to another line or header (including instrument connections, vents and drains) are considered as branch connections. The basis for design of branch connection is the applicable ASME code. Reinforcement requirements shall be determined by ASME B31.3.

**Branches** shall be made with un-reinforced or reinforced tub-ins with the following exceptions.



- Full size tees shall be used in all pressure ratings.
- Reducing tees shall be used where specified in the job specification.
- Branches 1" – 1 ½" and smaller shall be made with integrally reinforced fittings.

Special consideration shall be taken for branch connection in cyclic service such as temperature cycling.

### 4.4 Flanges

Flanges shall be as follows:

- ASME class 150 – 900 (1/2" – 24") ASME B16.5

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Unless otherwise specified, steel flange faces shall be in accordance with ASME B16.5. Flange facing finish shall be per ASME B16.5 unless otherwise stated in project specification.

Flanges not conforming to ASME B16.5 shall be specified on drawings.

Sizes for reducing or blind flanges are indicated by nominal pipe sizes.

End preparation of welding neck flange shall be in accordance with ASME B16.25. The bore of welding neck flanges shall correspond to the inside diameter of the connecting pipe or fitting, permitting a thickness difference up to 1.6mm, when the difference in wall thickness between the two component having the heavier wall per ASME B16.25.

Flat face flanges with full-face gaskets shall be used against flat face cast iron equipment and valve flanges.

#### 4.5 Gaskets

Gaskets shall be of the type specified on the individual piping classes.

Asbestos or asbestos containing materials shall not be used.

All gaskets shall be as follows:

- Spiral wound gaskets ASME B16.20
- No-metallic gaskets ASME B16.21
- Ring-joint gaskets ASME B16.20
- Gaskets not conforming above codes shall be specified on drawings.

#### 4.6 Bolting

For normal temperature, the material of stud for Carbon Steel shall comply with ASTM A193 Grade B7; and nuts (heavy hexagon series) shall be ASTM A194 Grade 2H. Each stud bolts shall be supplied with two nuts.



##### Normal Temperature

Carbon Steel - ASTM A193-B7/A194-2H with Hot Dip Galvanized

Bolts and nuts shall be Hot Dip Galvanized.

Bolt diameter and length shall be as per ASME B16.5.

Threads shall be UNC up to size 1" diameter. Sizes 1 1/8" and larger shall have 8 threads per inch (8-UN).

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Bolts shall be threaded to ASME B1.1 class 2A fit. Nuts shall be heavy hexagonal series threaded to ASME B1.1 class 2B fit. Dimensions for nuts shall be in accordance with ASME B18.2.2. Dimensions for stud bolts shall be in accordance with ASME B16.5.

#### 4.7 Valves

Forged steel gate, globe and check valves (socket welding or threaded ends) shall be in accordance with API 602 for class 800, unless otherwise specified.

Cast steel gate, globe and check valves (flanged or butt welding) shall be in accordance with API 600, unless otherwise specified.

Pressure seal for gate, globe and check valves shall be in accordance ASME B16.34, if required.

Ball valves shall conform to API 6D

Ball valves shall be split body (minimum pieces) construction, full or reduced bore. Ball valves shall be of trunnion mounted design for Class 150 valves DN200 and larger, Class 300 valves DN150 and larger

Butterfly valves shall conform to API 609; wafer type check valves shall conform to API 594.

Corrosion resistant values (normally austenitic stainless steel) shall be in accordance with API 603, unless otherwise specified.

Bronze valves shall conform to MSS SP-80: “Gate, Globe, Angle and check valves”; API 6D: “Ball Valve”; API 609: “Butterfly Valve”.



Face-to-face and end-to-end dimensions of steel valves shall conform to ASME B16.10 to the extent covered. Valve supplier shall furnish certified dimension drawings for all valves.

Butt-welding end valves shall be furnished with ends to match pipe schedule. End preparation shall be in accordance with ASME B16.25.

End connection of threaded valves shall be in accordance with ASME B1.20.1. End connection of socket welding valves shall be in accordance with ASME B16.11.

Bonnet gasket materials shall be compatible with the gasket materials specified in the individual material class, unless otherwise specified.



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Features not covered by the valve descriptions shall be in accordance with Manufacturer's standard suitable for the intended application.

Bonnet, cap or gland bolts are normally furnished with ASTM A307, unless otherwise specified in the individual class.

Where carbon steel bonnet, cap or gland bolts are normally furnished with ASTM A193 grade B7, they shall be furnished in the liquid quenched and tempered condition.

Unless otherwise specified in the individual class, manual gear operators shall be supplied for the following sizes and larger (see table). When the operating force at half opening position of the hand wheel or lever exceeds 35kgf, the valves shall be equipped with gear operator.



ASME Class	Gate	Globe	Ball	Plug	Butterfly
150	14"	10"	8"	4"	8"
300	12"	8"	6"	4"	-
600	8"	6"	6"	-	-

The gate valve with 2-piece or split wedge shall not be used, unless specific approval is obtained. The gate valve with 2-piece or split wedge shall not be used in steam service.

Swing check valves shall be provided with a boss at location "G" when the wall thickness is insufficient to permit a drain tap (3/4" for valve size 2" and larger). Bosses and taps shall comply with the requirements of para. 6.3 of ASME B16.34. Valves shall not be tapped, unless otherwise specified on the purchase order.

Swing check valves shall be provided with limit stop to prevent disc from remaining in the open position and also suitable for horizontal as well as vertical installation.

The operating levers or handles on ball valves and plug valves shall indicate, by their position, whether the valve is open or closed. The open position shall be indicated when the lever or handle points in a direction parallel to the flow through the valve. In addition, it shall be impossible to reserve the indicating position inadvertently during re-assembly of the valve.

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Lubricated plug valves shall not be used, unless otherwise specified.

Fire-safe ball valves design shall be in accordance with API 607, where fire-safe design specified in the individual material class.

All valve tested according to API 598 or API 6D

## 5. MARKING

Marking which identifies the material, type and dimension of individual piping components shall be accomplished in accordance with related codes and standards.

## 6. INSPECTION AND TEST

Inspection and tests of individual piping components shall be accomplished in accordance with related codes & standard.

## 7. RECORDS AND CERTIFICATION

All tests and inspection shall be reported. Test reports and certificates shall be submitted to Owner in the Manufacturer's data book when production has been completed. All certificates shall be originals or copies authenticated by the Owner's authorized agent, be legible and in the English language

## 8. APPENDICES

### 8.1 Appendix 1: Pipe wall thickness Calculation

### 8.2 Appendix 2: Piping Class Data Sheet

### 8.3 Appendix 3: Bolt Dimension Table

### 8.4 Appendix 4: Branch Connection

**APPENDIX 1: PIPE WALL THICKNESS CALCULATION**
**1 PIPING CLASS AA21, AA22 (Galv.), AA23**

Design Code : ASME B31.3

Piping Spec. Code : AA21, AA22 (Galv.), AA23  
 ASME Class : 150  
 Pipe Material Standard: ASTM A 106 Gr. B (Galv for AA22)  
 Material Type : CS, Ferritic Steel  
 Design Pressure, P : 19.6 barg 1.96 MPa 20.70 Mpa  
 Design Temperature, T : 38.0 °C  
 S @ 38.0 °C : 138 MPa  
 c : 1 mm  
 Y @ 38.0 °C : 0.4  
 E : 1.00  
 Mill Tolerance : 12.50 (seamless)

Temp (°C)	P (barg)	S (MPa)
-29/0	19.60	138
38.0	19.60	138
50.0	19.20	138
100.0	17.70	138
150.0	15.80	138
200.0	13.80	138

Ref Design Code: ASME B31.3 Eqn. (3a)  
 $t = (P \times D) / [2 \times \{(S \times E) + (P \times Y)\}]$  ; ( Valid for  $t < D/6$ ; or  $D/t > 6$  )  
 where as defined in clause 4.a of this document

Pipe	Pipe OD		t	t <sub>m</sub>	Sch1	t <sub>Sch1</sub>	T'	T''	Sch	Ratio	Validation	
NPS	( in )	(mm)	(mm)	(mm)		(mm)	(mm)	(mm)		D/t >6	Calculation	Thickness
0.5	0.84	21.3	1.51	2.51	40	2.77	3.26	3.73	80	14.13	Valid	Valid
0.75	1.05	26.7	1.89	2.89	80	3.91	3.42	3.91	80	14.13	Valid	Valid
1	1.32	33.4	0.24	1.24	5	1.65	3.98	4.55	80	141.62	Valid	Valid
1.5	1.90	48.3	0.34	1.34	5	1.65	4.45	5.08	80	141.62	Valid	Valid
2	2.38	60.3	0.43	1.43	40	3.91	3.42	3.91	40	141.62	Valid	Valid
3	3.50	88.9	0.63	1.63	40	5.49	4.80	5.49	40	141.62	Valid	Valid
4	4.50	114.3	0.81	1.81	40	6.02	7.49	8.56	40	141.62	Valid	Valid
6	6.63	168.3	1.19	2.19	40	7.11	6.22	7.11	40	141.62	Valid	Valid
8	8.63	219.1	1.55	2.55	20	6.35	7.16	8.18	40	141.62	Valid	Valid
10	10.75	273.1	1.93	2.93	20	6.35	5.56	6.35	20	141.62	Valid	Valid
12	12.75	323.9	2.29	3.29	20	6.35	5.56	6.35	20	141.62	Valid	Valid
14	14.00	355.6	2.51	3.51	10	6.35	6.93	7.92	20	141.62	Valid	Valid
16	16.00	406.4	2.87	3.87	10	6.35	6.93	7.92	20	141.62	Valid	Valid
18	18.00	457.2	3.23	4.23	10	6.35	6.93	7.92	20	141.62	Valid	Valid
20	20.00	508.0	3.59	4.59	STD	9.53	8.34	9.53	20	141.62	Valid	Valid
22	22.00	558.8	3.95	4.95	STD	9.53	8.34	9.53	20	141.62	Valid	Valid
24	24.00	609.6	4.30	5.30	STD	9.53	8.34	9.53	20	141.62	Valid	Valid

**LEGEND:**

 Sch1= Schedule selected as next higher of t<sub>m</sub>, as per ASME dimensional standard.

 t<sub>Sch1</sub> = Wall thickness in mm of Sch1, as per ASME dimensional standard.

T'' = Selected wall thickness as per ASME B36.10M / ASME B36.19 M.

Sch = Selected schedule for the pipe diameter.

T' = Wall thickness after deducting mill tolerance from T''

**APPENDIX 1: PIPE WALL THICKNESS CALCULATION**
**2 PIPING CLASS AA31**

Design Code : ASME B31.3

Piping Spec. Code : AA31  
ASME Class : 300  
Pipe Material Standard: : ASTM A 106 Gr. B  
Material Type : CS, Ferritic Steel

Design Pressure, P : 51.1 barg 5.11 MPa 20.7 Mpa  
Design Temperature, T : 38.0 °C  
S @ 38.0 °C : 138 MPa  
c : 1 mm  
Y @ 38.0 °C : 0.4  
E : 1.00  
Mill Tolerance : 12.50 (seamless)

Temp (°C)	P (barg)	S (MPa)
-29/0	51.10	138
38.0	51.10	138
50.0	50.10	138
100.0	46.60	138
150.0	45.10	138

Ref Design Code: ASME B31.3 Eqn. (3a)

$$t = (P \times D) / [2 \times \{(S \times E) + (P \times Y)\}] ; \quad (\text{Valid for } t < D/6; \text{ or } D/t > 6)$$

where as defined in clause 4.a of this document

Pipe	Pipe OD		t	t <sub>m</sub>	Sch1	t <sub>Sch1</sub>	T'	T''	Sch	Ratio	Validation	
NPS	( in )	(mm)	(mm)	(mm)		(mm)	(mm)	(mm)		D/t >6	Calculation	Thickness
0.5	0.84	21.3	1.51	2.51	40	2.77	3.26	3.73	80	14.15	Valid	Valid
0.75	1.05	26.7	1.89	2.89	80	3.91	3.42	3.91	80	14.15	Valid	Valid
1	1.32	33.4	0.61	1.61	5	1.65	3.98	4.55	80	54.81	Valid	Valid
1.5	1.90	48.3	0.88	1.88	10	2.77	4.45	5.08	80	54.81	Valid	Valid
2	2.38	60.3	1.10	2.10	10	2.77	3.42	3.91	40	54.81	Valid	Valid
3	3.50	88.9	1.62	2.62	10	3.05	4.80	5.49	40	54.81	Valid	Valid
4	4.50	114.3	2.09	3.09	30	4.78	7.49	8.56	40	54.81	Valid	Valid
6	6.63	168.3	3.07	4.07	40	7.11	6.22	7.11	40	54.81	Valid	Valid
8	8.63	219.1	4.00	5.00	20	6.35	7.16	8.18	40	54.81	Valid	Valid
10	10.75	273.1	4.98	5.98	20	6.35	8.11	9.27	40	54.81	Valid	Valid
12	12.75	323.9	5.91	6.91	30	8.38	9.02	10.31	40	54.81	Valid	Valid
14	14.00	355.6	6.49	7.49	20	7.92	9.74	11.13	40	54.81	Valid	Valid
16	16.00	406.4	7.41	8.41	30	9.53	11.11	12.70	40	54.81	Valid	Valid
18	18.00	457.2	8.34	9.34	30	11.13	12.49	14.27	40	54.81	Valid	Valid
20	20.00	508.0	9.27	10.27	30	12.70	13.20	15.09	40	54.81	Valid	Valid
24	24.00	609.6	11.12	12.12	30	14.27	15.30	17.48	40	54.81	Valid	Valid

**LEGEND:**



Sch1= Schedule selected as next higher of t<sub>m</sub>, as per ASME dimensional standard.

t<sub>Sch1</sub> = Wall thickness in mm of Sch1, as per ASME dimensional standard.

T'' = Selected wall thickness as per ASME B36.10M / ASME B36.19 M.

Sch = Selected schedule for the pipe diameter.



T' = Wall thickness after deducting mill tolerance from T''

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## APPENDIX 2



### PIPING CLASS DATA SHEET

- 1- Class AA21
- 2- Class AA22
- 3- Class AA23
- 4- Class AA24
- 5- Class AA31



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PIPING CLASS DATA SHEET	
AA21	
ITEM	DESCRIPTION
Design Code	ASME B31.3
Rating	150# RF
Service	Hydrocarbon/ <b>Chemical Solvent</b> - Non Corrosive, Inert gas, Ventilation
Corrosion Allowance	1 mm unless otherwise stated
Temperature Range	0 Deg C to 100 Deg C
Pressure Range	Per ASME B16.5, 19 Barg max allowable at the temperature up to 100 Deg. C
PIPE (ASME B36.10)	Material: ASTM A-106 Gr. B Seamless ½” – 1.1/2”: Schedule 80, PE 2” – 8”: Schedule 40, BE 10” – 24”: Schedule 20, BE
FLANGE (ASME B16.5)	Material: ASTM A-105 N Specification: ASME Class 150#, Forged - ½” – 1.1/2”: Socket weld - 2” and Larger: Welding Neck Surface: Raised Face, Serest finish Thickness : According to Piping Thickness
SPECTACLE BLIND (ASME B16.48)	Material : ASTM A-516 Gr. 60/65/70
FITTING: CAP, 45 DEG ELBOW, 90 DEG ELBOW, EQUAL TEE, RED TEE, CON RED, ECC RED. (ANSI B16.11)	Material: ASTM A105 N Class: 3000# End: Socket Weld Size: 1 1/2" and Smaller
FITTING: CAP, 45 DEG ELBOW, 90 DEG ELBOW, EQUAL TEE, RED TEE, CON RED, ECC RED. (ANSI B16.9)	Material: ASTM A-234 WPB Thickness: According to Piping Thickness End: Butt welded end Size: 2" and Larger
BRANCH FITTING	Material: ASTM A-105 N, Forged Thickness : According to Piping Thickness
GLOBE VALVE API 602/BS5352 (1.1/2 and Smaller)  API 600 (2 and Larger)	Material & Specification: 1-1/2” and Smaller - Class 800#, Socket weld - Body: A-105, Forged - OS&Y, Bolted bonnet - Trim: A-410/A-316, Stellite 6 in compliance with ASME B16.34 2” and Larger - Flanged type, Class 150# RF



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PIPING CLASS DATA SHEET	
AA21	
ITEM	DESCRIPTION
	<ul style="list-style-type: none"> <li>- Body: A-105/A-216 WCB/WCC</li> <li>- OS&amp;Y, Bolted bonnet</li> <li>- Trim: A-410/A-316 Stellite 6 in compliance with ASME B16.34</li> </ul>
GATE VALVE API 602/BS5352 (1.1/2 and Smaller)  API 600 (2 and Larger)	Material & Specification: 1-1/2" and Smaller <ul style="list-style-type: none"> <li>- Class 800#, Socket weld</li> <li>- Body: A-105, Forged</li> <li>- OS&amp;Y with rising stem, Bolted bonnet</li> <li>- Trim: A-410/A-316, Stellite 6 in compliance with ASME B16.34</li> </ul> 2" and Larger <ul style="list-style-type: none"> <li>- Flanged type, Class 150# RF</li> <li>- Body: A-105/A-216 WCB/WCC</li> <li>- OS&amp;Y with rising stem, Bolted bonnet</li> <li>- Trim: A-410/A-316 Stellite 6 in compliance with ASME B16.34</li> </ul>
CHECK VALVE API 602/BS5352 (1.1/2 and Smaller)  API 6D/BS1868 (2 and Larger)	Material & Specification: 1-1/2" and Smaller <ul style="list-style-type: none"> <li>- Class 800#, Socket weld</li> <li>- Body: A-105, Forged</li> <li>- Piston Check Valve, Bolted cap</li> <li>- Trim: A-410/A-316, Stellite 6 in compliance with ASME B16.34</li> </ul> 2" and Larger <ul style="list-style-type: none"> <li>- Flanged type, Class 150# RF</li> <li>- Body: A-105/A-216 WCB/WCC</li> <li>- Trim: A-410/A-316 Stellite 6 in compliance with ASME B16.34</li> <li>- Swing Check Valve, Bolted cap</li> </ul>
BALL VALVE API 6D/BS 5351 (1.1/2" and Smaller)  API 6D (2" and Larger)	Material & Specification: 1-1/2" and Smaller <ul style="list-style-type: none"> <li>- Class 800#, Socket Weld</li> <li>- Split Body, Full bore, Body: ASTM A-105/A-216 WCB/WCC</li> <li>- Bolted bonnet</li> <li>- Trim: SS316, PTFE</li> </ul> 2" and Larger <ul style="list-style-type: none"> <li>- Flanged type, Class 150# RF</li> <li>- Split Body, Full bore or Reducer Bore, Body: ASTM A-105/A-216 WCB/WCC (See note 1)</li> <li>- Bolted bonnet</li> <li>- Trim : SS316 , PTFE</li> </ul>
BOLTING (ASME B18.2.1 and ASME	A-193 B7 Stud Bolts full length threaded with Hot Dip Galvanized A-194 2H nuts with Hot Dip Galvanized

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PIPING CLASS DATA SHEET	
AA21	
ITEM	DESCRIPTION
B18.2.2)	Numbers and Dimensions referred to Appendix 3
GASKET (ASME B16.20)	SS316 Spiral wound with inner ring in accordance with ASME B16.20 Non asbestos filling material
BRANCH CONNECTION	Refer to Appendix 4

Note 1: Full bore or Reducer bore type shall be indicated MTO and P&ID.





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PIPING CLASS DATA SHEET	
AA22	
ITEM	DESCRIPTION
Design Code	ASME B31.3
Rating	150# RF
Service	Instrument Air, Portable Water, Fire Fighting (dry system)
Corrosion Allowance	1 mm unless otherwise stated
Temperature Range	0 Deg C to 90 Deg C
Pressure Range	Per ASME B16.5, 16 Barg max allowable at the temperature up to 90 Deg. C
PIPE (ASME B36.10)	Material: ASTM A-106 Gr. B Seamless (galvanized in accordance with ASTM A53) 1/2" - 1-1/2": Schedule 80, TE 2" - 8": Schedule 40, BE 10" - 24" : Schedule 20, BE
FLANGE (ASME B16.5)	Material: ASTM A-105 N (Galvanized) Specification: ASME Class 150#, Forged, - 1/2" – 1.1/2": Threaded - 2" and Larger: Slip-on Surface: Raised Face, Serest finish Thickness : According to Piping Thickness
SPECTACLE BLIND (ASME B16.48)	Material : ASTM A-516 Gr. 60/65/70 (Galvanized)
FITTING: CAP, 45 DEG ELBOW, 90 DEG ELBOW, EQUAL TEE, RED TEE, CON RED, ECC RED. (ANSI B16.11)	Material: ASTM A105 (Galvanized) Class: 3000# End: Threaded Size: 1 1/2" and Smaller
FITTING: CAP, 45 DEG ELBOW, 90 DEG ELBOW, EQUAL TEE, RED TEE, CON RED, ECC RED. (ANSI B16.9)	Material: ASTM A-234 WPB (Galvanized) Thickness: According to Piping Thickness End: Butt welded end Size: 2" and Larger
BRANCH FITTING	Material: ASTM A-105 N (Galvanized), Forged Thickness : According to Piping Thickness
GATE VALVE API 602/BS5352 (1.1/2 and Smaller)  API 6D	Material & Specification: 1-1/2" and Smaller - Class 800#, NPT-F - Body: ASTM A-105, Forged - OS&Y with rising stem, Bolted bonnet - Trim: A-410/ SS316, Stellite 6 in compliance with ASME B16.34 2" and Larger

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PIPING CLASS DATA SHEET	
AA22	
ITEM	DESCRIPTION
(2 and Larger)	<ul style="list-style-type: none"> <li>- Flanged type, Class 150# RF</li> <li>- Body: A-105/A-216 WCB/WCC)</li> <li>- OS&amp;Y with rising stem, Bolted bonnet</li> <li>- Trim: A-410/SS316 Stellite 6 in compliance with ASME B16.34</li> </ul>
BALL VALVE API 6D/BS 5351 (1.1/2 and Smaller)  API 6D (2 and Larger)	Material & Specification: 1-1/2" and Smaller <ul style="list-style-type: none"> <li>- Class 800#, NPT-F</li> <li>- Split Body, Full bore, Body: ASTM A-105/A-216 WCB/WCC</li> <li>- Bolted bonnet</li> <li>- Trim: SS316, PTFE</li> </ul> 2" and Larger <ul style="list-style-type: none"> <li>- Flanged type, Class 150# RF</li> <li>- Split Body, Reducer Bore, Body: ASTM A-105/A-216 WCB/WCC</li> <li>- Bolted bonnet</li> <li>- Trim : SS316 , PTFE</li> </ul>
CHECK VALVE API 602 (1.1/2 and Smaller)  API 594 (2 and Larger)	Material & Specification: 1-1/2" and Smaller <ul style="list-style-type: none"> <li>- Class 800#, NPT-F</li> <li>- Body: A-105/A-216 WCB/WCC</li> <li>- Piston Check Valve</li> <li>- Trim: A-410/A-316</li> </ul> 2" and Larger <ul style="list-style-type: none"> <li>- Flanged type, Class 150# RF</li> <li>- Body: A-105/A-216 WCB/WCC</li> <li>- Dual plate lug Check Valve</li> <li>- Trim : A-316 / A-410</li> </ul>
BOLTING (ASME B18.2.1 and ASME B18.2.2)	A-193 B7 Stud Bolts full length threaded with Hot Dip Galvanized A-194 2H nuts with Hot Dip Galvanized Numbers and Dimensions referred to Appendix 3
GASKET (ASME B16.20)	SS316 Spiral wound with inner ring in accordance with ASME B16.20 Non asbestos filling material
BRANCH CONNECTION	Refer to Appendix 4

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PIPING CLASS DATA SHEET	
AA23	
ITEM	DESCRIPTION
Design Code	ASME B31.3
Rating	150# RF
Service	Water, Fire fighting (wet system)
Corrosion Allowance	1 mm unless otherwise stated
Temperature Range	0 Deg C to 90 Deg C
Pressure Range	Per ASME B16.5, 16 Barg max allowable at the temperature up to 90 Deg. C
PIPE (ASME B36.10)	Material: ASTM A-106 Gr. B Seamless ½” – 1-1/2”: Schedule 80, PE 2” – 8”: Schedule 40, BE 10” – 24” : Schedule 20, BE
FLANGE (ASME B16.5)	Material: A-105 N Specification: ASME Class 150#, Forged, - ½” – 1.1/2”: Socket weld - 2” and Larger: Slip-on Surface: Raised Face, - Serest finish Thickness : According to Piping Thickness
SPECTACLE BLIND (ASME B16.48)	Material : ASTM A-516 Gr. 60/65/70
FITTING: CAP, 45 DEG ELBOW, 90 DEG ELBOW, EQUAL TEE, RED TEE, CON RED, ECC RED. (ANSI B16.11)	Material: ASTM A105 Class: 3000# End: Socket Weld Size: 1 1/2" and Smaller
FITTING: CAP, 45 DEG ELBOW, 90 DEG ELBOW, EQUAL TEE, RED TEE, CON RED, ECC RED. (ANSI B16.9)	Material: ASTM A-234 WPB Thickness: According to Piping Thickness End: Butt welded end Size: 2" and Larger
BRANCH FITTING	Material: ASTM A-105 N, Forged Thickness : According to Piping Thickness
GLOBE VALVE API 602/BS5352 (1.1/2 and Smaller)  API 600	Material & Specification: 1-1/2” and Smaller - Class 800#, Socket weld - Body: A-105, Forged - OS&Y, Bolted bonnet - Trim: A-410/A-316, Stellite 6 in compliance with ASME B16.34 2” and Larger

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PIPING CLASS DATA SHEET	
AA23	
(2 and Larger)	<ul style="list-style-type: none"> <li>- Flanged type, Class 150# RF</li> <li>- Body: A-105/A-216 WCB/WCC</li> <li>- OS&amp;Y, Bolted bonnet</li> <li>- Trim: A-410/A-316 Stellite 6 in compliance with ASME B16.34</li> </ul>
BALL VALVE API 6D/BS 5351 (1.1/2" and Smaller)  API 6D (2" and Larger)	Material & Specification: 1-1/2" and Smaller <ul style="list-style-type: none"> <li>- Class 800#, Socket Weld</li> <li>- Split Body, Full bore, Body: ASTM A-105/A-216 WCB/WCC</li> <li>- Bolted bonnet</li> <li>- Trim: SS316, PTFE</li> </ul> 2" and Larger <ul style="list-style-type: none"> <li>- Flanged type, Class 150# RF</li> <li>- Split Body, Reducer Bore, Body: ASTM A-105/A-216 WCB/WCC (Galvanized)</li> <li>- Bolted bonnet</li> <li>- Trim : SS316 , PTFE</li> </ul>
BUTTERFLY VALVE API 609	Material & Specification: 3" and Larger <ul style="list-style-type: none"> <li>- Lug type, Class 150# RF</li> <li>- Body: A536 60-40-18</li> <li>- Trim: A-410/A-316 Stellite 6 in compliance with ASME B16.34</li> <li>- Lining : EPDM</li> </ul>
CHECK VALVE API 602 (1.1/2 and Smaller)  API 594 (2 and Larger)	Material & Specification: 1-1/2" and Smaller <ul style="list-style-type: none"> <li>- Class 800#, Socket weld</li> <li>- Body: A-105, Forged</li> <li>- Piston check valve, Bolted cap</li> <li>- Trim: A-410/A-316, Stellite 6 in compliance with ASME B16.34</li> </ul> 2" and Larger <ul style="list-style-type: none"> <li>- Flanged type, Class 150# RF</li> <li>- Body: A-105/A-216 WCB/WCC</li> <li>- Trim: A-410/A-316 Stellite 6 in compliance with ASME B16.34</li> <li>- Swing Check Valve, Bolted cap</li> </ul> 3" and Larger <ul style="list-style-type: none"> <li>- Flanged type, Class 150# RF</li> <li>- Body: A-105/A-216 WCB/WCC</li> <li>- Dual plate lug Check Valve</li> </ul> Trim : A-410/A-316 Stellite 6 in compliance with ASME B16.34
GATE VALVE API 602 (1.1/2 and Smaller)	Material & Specification: 1-1/2" and Smaller <ul style="list-style-type: none"> <li>- Class 800#, Socket weld</li> </ul>

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<b>PIPING CLASS DATA SHEET</b>	
<b>AA23</b>	
API 600 (2 and Larger)	<ul style="list-style-type: none"> <li>- Body: A-105, Forged</li> <li>- OS&amp;Y with rising stem, Bolted bonnet</li> <li>- Trim: A-410/A-316, Stellite 6 in compliance with ASME B16.34</li> </ul> 2" and Larger <ul style="list-style-type: none"> <li>- Flanged type, Class 150# RF</li> <li>- Body: A-105/A-216 WCB/WCC</li> <li>- OS&amp;Y with rising stem, Bolted bonnet</li> <li>- Trim: A-410/A-316 Stellite 6 in compliance with ASME B16.34</li> </ul>
<b>BOLTING</b> (ASME B18.2.1 and ASME B18.2.2)	A-193 B7 Stud Bolts full length threaded with Hot Dip Galvanized A-194 2H nuts with Hot Dip Galvanized Numbers and Dimensions referred to Appendix 3
<b>GASKET</b> (ASME B16.20)	SS316 Spiral wound with inner ring in accordance with ASME B16.20 Non asbestos filling material
<b>BRANCH CONNECTION</b>	Refer to Appendix 4

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PIPING CLASS DATA SHEET	
AA24	
ITEM	DESCRIPTION
Design Code	ASME B31.3
Rating	150# RF
Service	Service Fire Fighting (underground)
Corrosion Allowance	0 mm unless otherwise stated
Temperature Range	0 Deg C to 85 Deg C
Pressure Range	Per ASME B16.5, 16 Barg max allowable at the temperature up to 85 Deg. C
PIPE (MFR)	Material : HDPE (PE100/PN16) Thickness : By MFR
FLANGE (ASME B16.5)	Material: HDPE (PE100) with A-105N ring (galvanized) Specification: ASME Class 150#, Lab Joint Surface: Raised Face, - Serest finish Thickness : According to Piping Thickness
SPECTACLE BLIND (ASME B16.48)	Material : ASTM A-516 Gr. 60/65/70 (Galvanized)
FITTING: CAP, 45 DEG ELBOW, 90 DEG ELBOW, EQUAL TEE, RED TEE, CON RED, ECC RED. (MFR)	Material: HDPE (PE100) Thickness : According to Piping Thickness
BRANCH FITTING	Material : HDPE (PE100) Thickness : According to Piping Thickness
BALL VALVE API 6D (2 and Smaller)	Material & Specification: 2" and Smaller <ul style="list-style-type: none"> <li>- Flanged type, Class 150# RF</li> <li>- Split Body, Reducer Bore, Body: ASTM A-105/A-216 WCB/WCC</li> <li>- Bolted bonnet</li> <li>- Trim : SS316, PTFE</li> </ul>
CHECK VALVE API 594	Material & Specification: 2" and Smaller <ul style="list-style-type: none"> <li>- Flanged type, Class 150# RF</li> <li>- Body: A-105/A-216 WCB/WCC</li> <li>- Swing Check Valve</li> <li>- Trim: A-410 / A-316</li> </ul> 3" and Larger <ul style="list-style-type: none"> <li>- Lug type FF, Class 150#</li> <li>- Body: A-216 WCB/WCC</li> <li>- Dual plate lug Check Valve</li> <li>- Trim : A410 / A-316, FKM</li> </ul>
BOLTING (ASME B18.2.1 and ASME B18.2.2)	A-193 B7 Stud Bolts full length threaded with Hot Dip Galvanized A-194 2H nuts with Hot Dip Galvanized

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PIPING CLASS DATA SHEET	
AA24	
ITEM	DESCRIPTION
	Numbers and Dimensions referred to Appendix 3
GASKET	EPDM, hardness 70+/-5 shore A
BRANCH CONNECTION	Refer to Appendix 4

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PIPING CLASS DATA SHEET	
AA31	
ITEM	DESCRIPTION
Design Code	ASME B31.3
Rating	300# RF
Service	Hydrocarbon/ <b>Chemical Solvent</b> - Non Corrosive
Corrosion Allowance	1 mm unless otherwise stated
Temperature Range	0 Deg C to 100 Deg C
Pressure Range	Per ASME B16.5, 46 Barg max allowable at the temperature up to 100 Deg. C
PIPE (ASME B36.10)	Material: ASTM A-106 Gr. B Seamless ½” – 1-1/2”: Schedule 80, PE 2” – 6”: Schedule 40, BE 8” – 24” : Schedule 40, BE
FLANGE (ASME B16.5)	Material: ASTM A-105 N Specification: ASME Class 300#, Forged - ½” – 1.1/2”: Socket weld - 2” and Larger: Welding Neck Surface: Raised Face, Serest finish Thickness : According to Piping Thickness
SPECTACLE BLIND (ASME B16.48)	Material : ASTM A-516 Gr. 60/65/70
FITTING: CAP, 45 DEG ELBOW, 90 DEG ELBOW, EQUAL TEE, RED TEE, CON RED, ECC RED. (ANSI B16.11)	Material: ASTM A105 Class: 3000# End: Socket Weld Size: 1 1/2" and Smaller
FITTING: CAP, 45 DEG ELBOW, 90 DEG ELBOW, EQUAL TEE, RED TEE, CON RED, ECC RED. (ANSI B16.9)	Material: ASTM A-234 WPB Thickness: According to Piping Thickness End: Butt welded end Size: 2" and Larger
BRANCH FITTING	Material: ASTM A-105 N, Forged Thickness : According to Piping Thickness
GLOBE VALVE API 602/BS5352 (1.1/2 and Smaller)  API 600	Material & Specification: 1-1/2” and Smaller - Class 800#, Socket weld - Body: A-105, Forged - OS&Y, Bolted bonnet - Trim: A-410/A-316, Stellite 6 in compliance with ASME B16.34 2” and Larger

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PIPING CLASS DATA SHEET	
AA31	
ITEM	DESCRIPTION
(2 and Larger)	<ul style="list-style-type: none"> <li>- Flanged type, Class 300# RF</li> <li>- Body: A-105/A-216 WCB/WCC</li> <li>- OS&amp;Y, Bolted bonnet</li> <li>- Trim: A-410/A-316 Stellite 6 in compliance with ASME B16.34</li> </ul>
GATE VALVE API 602 (1.1/2 and Smaller)  API 600 (2 and Larger)	Material & Specification: 1-1/2" and Smaller <ul style="list-style-type: none"> <li>- Class 800#, Socket weld</li> <li>- Body: A-105, Forged</li> <li>- OS&amp;Y, Bolted bonnet</li> <li>- Trim: A-410/A-316, Stellite 6 in compliance with ASME B16.34</li> </ul> 2" and Larger <ul style="list-style-type: none"> <li>- Flanged type, Class 300# RF</li> <li>- Body: A-105/A-216 WCB/WCC</li> <li>- OS&amp;Y, Bolted bonnet</li> <li>- Trim: A-410/A-316 Stellite 6 in compliance with ASME B16.34</li> </ul>
CHECK VALVE API 602 (1.1/2 and Smaller)  API 594 (2 and Larger)	Material & Specification: 1-1/2" and Smaller <ul style="list-style-type: none"> <li>- Class 800#, Socket weld</li> <li>- Body: A-105, Forged</li> <li>- Piston Check Valve, Bolted cap</li> <li>- Trim: A-410/A-316, Stellite 6 in compliance with ASME B16.34</li> </ul> 2" and Larger <ul style="list-style-type: none"> <li>- Flanged type, Class 300# RF</li> <li>- Body: A-105/A-216 WCB/WCC</li> <li>- Trim: A-410/A-316 Stellite 6 in compliance with ASME B16.34</li> <li>- Swing Check Valve, Bolted cap</li> </ul>
BALL VALVE API 6D/BS 5351 (1.1/2" and Smaller)  API 6D (2" and Larger)	Material & Specification: 1-1/2" and Smaller <ul style="list-style-type: none"> <li>- Class 800#, Socket Weld</li> <li>- Split Body, Full bore, Body: ASTM A-105/A-216 WCB/WCC</li> <li>- Bolted bonnet</li> <li>- Trim: SS316, PTFE</li> </ul> 2" and Larger <ul style="list-style-type: none"> <li>- Flanged type, Class 300# RF</li> <li>- Split Body, Full bore or Reducer bore, Body: ASTM A-105/A-216 WCB/WCC (See note 1)</li> <li>- Bolted bonnet</li> <li>- Trim: SS316, PTFE</li> <li>- Inside Diameter is match with Inside Diameter of pipe</li> </ul>
BOLTING	A-193 B7 Stud Bolts full length threaded with Hot Dip Galvanized

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PIPING CLASS DATA SHEET	
AA31	
ITEM	DESCRIPTION
(ASME B18.2.1 and ASME B18.2.2)	A-194 2H nuts with Hot Dip Galvanized Numbers and Dimensions referred to Appendix 3
GASKET (ASME B16.20)	SS316 Spiral wound with inner ring in accordance with ASME B16.20 Non asbestos filling material
BRANCH CONNECTION	Refer to Appendix 4

Note 1: Full bore type shall be indicated MTO and P&ID.

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## APPENDIX 3

### BOLT DIMENSION

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# 1. Table 1: Bolt Dimension (150LB)

Bolt for standard flange class 150 lb

Pipe Size	Diameter of Bolt Holes (mm)	Number of Bolts	Diameter of Bolts	Stud Bolts Length (mm)
1/2	15	4	1/2	60
3/4	15	4	1/2	70
1	15	4	1/2	70
1-1/2	15	4	1/2	80
2	19	4	5/8	90
3	19	4	5/8	100
4	19	8	5/8	100
6	22	8	3/4	110
8	22	8	3/4	110
10	25	12	7/8	120
12	25	12	7/8	120
14	29	12	1	140
16	29	16	1	140
18	32	16	1-1/8	150
20	32	20	1-1/8	160
24	35	20	1-1/4	180

Bolt for EN 593 water lug



Pipe Size	Diameter of Bolt Holes (mm)	Number of Bolts	Diameter of Bolts	Stud Bolts Length (mm)
2	15	4	5/8	60
3	15	4	5/8	70
4	15	8	5/8	70
6	15	8	3/4	80
8	19	8	3/4	90
10	19	12	7/8	100

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## 2. Table 1: Bolt Dimension (300LB)

Bolt for standard flange class 300 lb



Pipe Size	Diameter of Bolt Holes (mm)	Number of Bolts	Diameter of Bolts	Stud Bolts Length (mm)
1/2	15	4	1/2	70
3/4	19	4	5/8	80
1	19	4	5/8	80
1-1/2	22	4	3/4	100
2	19	8	5/8	100
3	22	8	3/4	110
4	22	8	3/4	120
6	22	12	3/4	130
8	25	12	7/8	140
10	29	16	1	160
12	32	16	1 1/8	180
14	32	20	1 1/8	180
16	35	20	1 1/4	190
18	35	24	1 1/4	200
20	35	24	1 1/4	210
24	40	24	1 1/2	240

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## APPENDIX 4



### BRANCH CONNECTION

- 1- Branch Connection for Class AA21, AA23 and AA31
- 2- Branch Connection for Class AA22
- 3- Branch Connection for Class AA24

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## 1. Branch Connection for Class AA21, AA23 and AA31

		Branch (DN)																									
		10	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450	500	550	600	650	800	900	1100	
Header (DN)	10	S																									
	15	ST	S																								
	20	ST	ST	S													<u>Legend :</u>										
	25	ST	ST	ST	S											T: Butt Weld Tee (Equal )											
	32	ST	ST	ST	ST	S										S: Socked Weld Tee (Equal )											
	40	ST	ST	ST	ST	ST	S									RT: Butt Weld Reducing Tee											
	50	SK	SK	SK	T+S/RT	T+S/RT	T+S/RT	T								ST: Socket Weld Reducing Tee											
	65	SK	SK	SK	T+S/RT	T+S/RT	T+S/RT	RT	T							SK: Sockolet											
	80	SK	SK	SK	SK	SK	T+S/RT	RT	RT	T						W : Weldolet											
	100	SK	SK	SK	SK	SK	SK	RT	RT	RT	T					T+R: Butt Weld Tee (Equal or Reducing) + Reducer											
	125	SK	SK	SK	SK	SK	SK	RT	RT	RT	RT	T				T+S: Butt Weld Tee (Equal or Reducing) + Swage											
	150	SK	SK	SK	SK	SK	SK	W	RT	RT	RT	RT	T														
	200	SK	SK	SK	SK	SK	SK	W	W	W	RT	RT	RT	T													
	250	SK	SK	SK	SK	SK	SK	W	W	W	RT	RT	RT	RT	T												
	300	SK	SK	SK	SK	SK	SK	W	W	W	W	RT	RT	RT	RT	T											
	350	SK	SK	SK	SK	SK	SK	W	W	W	W	T+R	RT	RT	RT	RT	T										
	400	SK	SK	SK	SK	SK	SK	W	W	W	W	T+R	RT	RT	RT	RT	RT	T									
	450	SK	SK	SK	SK	SK	SK	W	W	W	W	T+R	T+R	RT	RT	RT	RT	RT	T								
	500	SK	SK	SK	SK	SK	SK	W	W	W	W	T+R	T+R	RT	RT	RT	RT	RT	RT	T							
	550	SK	SK	SK	SK	SK	SK	W	W	W	W	T+R	T+R	T+R	RT	RT	RT	RT	RT	RT	T						
	600	SK	SK	SK	SK	SK	SK	W	W	W	W	T+R	T+R	T+R	RT	RT	RT	RT	RT	RT	RT	T					
	650	SK	SK	SK	SK	SK	SK	W	W	W	W	T+R	T+R	T+R	T+R	RT	RT	RT	RT	RT	RT	RT	T				
	800	SK	SK	SK	SK	SK	SK	W	W	W	W	T+R	T+R	T+R	T+R	T+R	T+R	RT	RT	RT	RT	RT	RT	T			
	900	SK	SK	SK	SK	SK	SK	W	W	W	W	T+R	T+R	T+R	T+R	T+R	T+R	RT	RT	RT	RT	RT	RT	RT	T		
	1100	SK	SK	SK	SK	SK	SK	W	W	W	W	T+R	T+R	T+R	T+R	T+R	T+R	T+R	T+R	RT	RT	RT	RT	RT	RT	RT	T

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## 2. Branch Connection for Class AA22

		Branch (DN)																					
		10	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450	500	550	600	
Header (DN)	10	N																					
	15	NT	N																				
	20	NT	NT	N										Legend :									
	25	NT	NT	NT	N									T: Butt Weld Tee (Equal )									
	32	NT	NT	NT	NT	N								N: NPT Tee (Equal)									
	40	NT	NT	NT	NT	NT	N							RT: Butt Weld Reducing Tee									
	50	TH	TH	TH	T+S/RT	T+S/RT	T+S/RT	T						NT: NPT Reducing Tee									
	65	TH	TH	TH	T+S/RT	T+S/RT	T+S/RT	RT	T					TH: Threadolet / Haft coupling									
	80	TH	TH	TH	TH	TH	T+S/RT	RT	RT	T				W : Weldolet									
	100	TH	TH	TH	TH	TH	TH	RT	RT	RT	T			T+R: Butt Weld Tee (Equal or Reducing) + Reducer									
	125	TH	TH	TH	TH	TH	TH	RT	RT	RT	RT	T		T+S: Butt Weld Tee (Equal or Reducing) + Swage									
	150	TH	TH	TH	TH	TH	TH	W	W	RT	RT	RT	T										
	200	TH	TH	TH	TH	TH	TH	W	W	W	RT	RT	RT	T									
	250	TH	TH	TH	TH	TH	TH	W	W	W	RT	RT	RT	RT	T								
	300	TH	TH	TH	TH	TH	TH	W	W	W	W	RT	RT	RT	RT	T							
	350	TH	TH	TH	TH	TH	TH	W	W	W	W	T+R	RT	RT	RT	RT	T						
	400	TH	TH	TH	TH	TH	TH	W	W	W	W	T+R	RT	RT	RT	RT	RT	T					
	450	TH	TH	TH	TH	TH	TH	W	W	W	W	T+R	T+R	RT	RT	RT	RT	RT	T				
	500	TH	TH	TH	TH	TH	TH	W	W	W	W	T+R	T+R	RT	RT	RT	RT	RT	RT	T			
	550	TH	TH	TH	TH	TH	TH	W	W	W	W	T+R	T+R	T+R	RT	RT	RT	RT	RT	RT	T		
	600	TH	TH	TH	TH	TH	TH	W	W	W	W	T+R	T+R	T+R	RT	RT	RT	RT	RT	RT	RT	T	







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A	17-Oct-2023	Issued for Review		H.D.T	T.Q.T	N.T.S V.L.T
REV. NO.	DATE	DESCRIPTION		PREP'N	CHECK	REVIEW APPROVAL
REV. NO.	DISCIPLINE	PREPARATION	CHECK	REVIEW		APPROVAL
A	PIPING					
		H.D.T	T.Q.T	N.T.S		V.L.T

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## 1. GENERAL

### 1.1. Document Purpose

This specification covers the minimum requirements for the supply of painting and the painting work for the piping system, equipment, instrument equipment, structure and supports on Hai Phong 2 Project.

### 1.2. Definition and Abbreviation

#### 1.2.1. Definition

Definitions used in this document are described below:

PROJECT	HAIPHONG 2 PROJECT
OWNER	The Branch of Top Solvent (Vietnam) Limited Liability Company – HaiPhong Terminal
EPC CONTRACTOR	PTSC Thanh Hoa Technical Services Company



## 2. REFERENCES

Project Documents:

No.	Doc. No.	Rev	Document/Drawing Title
1	HP02-00-PI-SPC-0001	A	Piping Material Specification

## 3. DESIGN

- a. Paint shall be in a consistency ready for use (as far as single component paints are concerned). Paint shall brush easily at 20 oC and shall be suitable for spraying after diluting with the appropriate thinner.
- b. Painting shall show no thickening, hard sediments or sinning after being stored in a full, tightly covered container from the date of delivery until application; during this period they shall be suitable for easy application.  
Residues shall be easily and completely remixible.
- c. The paints shall show possess good coverage and good levelling without sagging on vertical surfaces. In general, curing of paints shall provide optimum smoothing of the paint film.
- d. Shop applied primer shall be resistant to seawater and condensation and shall be suitable for sea transport either on deck or below deck.
- e. The temporary corrosion protection shall not be removed from items to be insulated.
- f. Paint shall be supplied in tightly-covered sheet metal containers.  
Containers shall be labeled or marked as follows:
  - Manufacturer's name
  - Type of paint and related thinner

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- Color
- Weight
- Filling date

#### 4. SURFACE PREPARATION

##### 4.1 Pre-Cleaning

- Prior to the blast cleaning and to any painting operation, the surface shall be dry, free of any contamination and all loose rust scale removed.
- All bolt-holes should be solvent cleaned prior to the commencement of blast cleaning.
- Welding flux, spatter, slivers, laminations and underlying mill scale not removed during fabrication and exposed before and during blast cleaning operations shall be removed by mechanical means so that edges are smooth or rendered flush.

##### 4.2 Cleaning of surfaces

- The surfaces of carbon steel work shall be blast-cleaned to the visual standard of Sa 2.5 in accordance with ISO 8501.
- The surface preparation for touch-up painting of welds (including field welds) and corroded and damaged areas with less than 50 cm<sup>2</sup> shall be cleaned as a minimum by power tool cleaning to obtain the required profile.

##### 4.3 Surface finish grades



The surface finish grades

Surface finish grade	ISO 8501
White metal	Sa 3
Near-white metal	Sa 2.5
Sweep blast cleaning	Sa 1
Solvent cleaning	-
Hand tool cleaning	St 2
Power tool cleaning	St 3
Power tool cleaning to bare metal	-

#### 5. SYSTEM NUMBER AND COATING SYSTEM

##### 5.1 System number – Carbon Steel

ITEM	OPERATING TEMP. (Deg. C)	SUBSTRATE	SYSTEM NUMBER
EXTERNAL COATING			

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ITEM	OPERATING TEMP. (Deg. C)	SUBSTRATE	SYSTEM NUMBER
Piping, Vessels, Tank	< 120	Carbon steel	1
Bottom Plate Tank		Carbon steel	1 (Primer Only)
Wetted System for fire water and foam system	< 120	Carbon steel	1
Steel Structure, Pipe Support, etc.	-	Carbon steel	1
Steel floors	-	Carbon steel	2
<b>Dry</b> System for fire water and foam system	< 120	Hot dipped galvanized	3
Ladders, Handrail	-	Hot dipped galvanized	3
Submerged zone	-10 Deg. C to 50 Deg. C	Carbon steel	6
<b>INTERNAL COATING</b>			
Vessels (Air receiver)	< 130 Deg. C, < 30 bar	Carbon steel	4
Tank (Hydrocarbon)	< 120	Carbon steel	5
Tank (Chemical Solvent)	< 120	Carbon steel	5
Note: Internal coating is not required for Blending Tank			

## 5.2 Coating System – Carbon Steel

- External coating system for carbon steels

SYSTEM NUMBER	SURFACE PREPARATION	COATING SYSTEM		
		Primer	Inter-Coat	Top-Coat
1	Sa 2.5	Inorganic zinc silicate / zinc rich epoxy primer DFT 75 microns	High build epoxy sealer DFT 150 microns	High build polyurethane DFT 75 microns
2	Sa 2.5	Zinc rich epoxy primer DFT 75 microns	High build epoxy sealer DFT 200 microns	High build Polyurethane DFT 75 microns

- External coating system for galvanised surfaces  
Shall be applied for uninsulated galvanised steel surfaces in a severe corrosive environment on offshore locations.

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SYSTEM NUMBER	SURFACE PREPARATION	COATING SYSTEM		
		Primer	Inter-Coat	Top-Coat
3	Hot dip Galvanised	Zinc-rich epoxy primer DTF 125 microns	-	High build polyurethane DFT 75 microns

- Internal coating system for carbon steels  
Shall be used for the selection of coating systems for internal surfaces of carbon steel storage tanks based on exposure to specific fluid service.

SYSTEM NUMBER	SURFACE PREPARATION	COATING SYSTEM		
		Primer	Inter-Coat	Top-Coat
4	Sa 2.5	Epoxy phenolic coating DTF 125 microns	-	Epoxy phenolic coating DFT 125 microns
5 (*) and (**)	Sa 2.5	Inorganic zinc silicate epoxy primer DFT 100 microns	-	



Notes:

(\*) Hydrocarbon tank shall be painted 1.5m from bottom plate tank and bottom plate tank.

(\*\*) Chemical solvent tank shall be full painted internal plate tank.

- “External coating systems for steel surfaces in the submerged zone”  
Shall be applied for the items submerged in subsea zone including, structures, valves, flanges, pipe supports, risers and piping.

SYSTEM NUMBER	SURFACE PREPARATION	COATING SYSTEM		
		Primer	Inter-Coat	Top-Coat
6	Sa 2.5	Immersion grade solvent free high build epoxy DTF 250 microns	-	Immersion grade solvent free high build epoxy FT 200 microns

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## 6. TOP COAT COLORS

The topcoat colors are list below. The letter and number code refers to the worldwide standard for paint.

- Maximum allowable working temperature up to and include 80 Deg. C

Description	Color	RAL No.
Piping (See para “top coat colors for piping” in below)		
Firefighting piping and Equipment	Flame Red	3000
Valve	White Aluminum	9006
Hand Wheels	Jet Black	9005
Pressure Vessels	White Aluminum	9006
Tank, Storage Drum	White	9016
Pump, Compressors	Silver Grey	7001
Electrical switch board, other	Pebble Grey	7032
Motors	Blue	5017
Instrument switch board, control panel	Light Grey	7035
Handrails, Ladder	Lemon Yellow	1028
Railings, Stanchions	Lemon Yellow	1028
Steel Structure	Reseda Green	6011
Steel floor	Jet Black	9005



- Maximum allowable working temperature over 81 Deg. C

Description	Color	RAL No.
All Equipment	White Aluminum	9006

- Top coat colors for piping.

Description	Color	RAL No.
Air	Sky Blue	5015
Water (Cooling, Water supply)	Signal Green	6032
Fire water	Flame Red	3000
Foam	Safety Yellow	1018
Process	Grey	7040
Exhaust gases (Emission)	Signal Brown	8002
Drainage System (Above ground)	Jet Black	9005



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## 7. JOB PROCEDURE FOR COATING WORK

OBJECT TO BE COATED	JOB PROCEDURE				
	S	PC	IC	FC	TU
Piping & Fitting (Note 1)	O	O	O	O/X	X
Valve & Specially	O	O	O	O	X
Pressure Vessels	O	O	O	O	X
Tank, Storage Drum	O	O	X	X	X
Pump, Compressors, Instrument Valve	O	O	O	O	X
Electrical Switch board, Other	O	O	O	O	X
Motors	O	O	O	O	X
Instrument switch board, other	O	O	O	O	X
Handrails, Ladder	O	O	-	O	X
Railings, Stanchions	O	O	O	O	X
Steel Structure	O	O	O	O	X

### NOTE:

O	Shop Applicable	S	Surface Preparation
X	Field Application	PC	Prime Coat
		IC	Intermediate Coat
		FC	Finish Coat
		TU	Touch Up

Note 1: Spool pipe drawing shall be painted Finish coat in Shop and Final coat for Field weld joint shall be painted at Field

## 8. INSPECTION AND TESTING

Before painting activities commence the contractor shall submit an inspection procedure report indicating inspections and tests to be conducted during preparation and application of the paint system for approval.



The following coating inspections and tests shall be applied:

### 8.1 Thickness

- The thickness of the coating or metallizing treatment at all points on the surfaces shall conform to the minimum requirements specified in coating system.
- The number of parts requiring a thickness test should be determined by the sampling plan as given in sampling plan.
- The thickness measurement should be made with an uncertainty of less than 10 %.

#### “Sampling plan”

Number of parts in a batch	Number of parts sampled
0 – 19	All

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20 - 199	20
200 and Over	50

## 8.2 Holiday Testing

Holiday testing shall be conducted in accordance with ASTM D5162 on equipment where the continuity of the coating is important, for example internal tank linings which are subjected to corrosive conditions... The Principal shall specify the maximum number of holidays permissible.

## 8.3 Inspection Records and Reports

The Principal shall have the right to inspect the paint work at all stages of preparation and to reject any tools, instruments, materials, equipment or work which do not conform to this specification.

Prior to final acceptance of the paint work an inspection shall be made. The Contractor and the Principal shall both be represented and they shall sign an agreed inspection report.

These reports shall include:

### General

- Names of the Contractor and the responsible personnel,
- Dates when work was carried out.

### Materials preparation

- Equipment and techniques used.
- Materials receipt condition.
- Type and calibration of instruments used.

### Environmental conditions

- Weather and ambient conditions.
- Painting periods

### Surface preparation

- Condition of surface before preparation.
- Tools and methods used to prepare surface.
- Condition after preparation.

### Paints and painting

- Information on systems being applied.
- Mixing and testing prior to application.
- Paint application techniques.

### Testing

- Type of quality control checks carried out, and results.
- Compliance or otherwise with specification.

## 9. WARRANTY

All coating work shall be warranty for a period of 5 years

## **ATTACHMENT #3**

### **VENDOR DATA REQUIREMENTS**

<b>VENDOR DATA REQUIREMENTS</b>
---------------------------------

The Vendor Data shall be supplied in accordance with PTSC-COM-PS-008 Vendor Data Control Procedure

VDRL Code (Final)	DESCRIPTION	NOTES	TENDER	FOR ACCEPTANCE		CERTIFIED (Note B)	
			INFO REQ	INFO REQ	WEEKS AFTER AWARD	INFO REQ	WEEKS AFTER AWARD
<b>A</b>	<b>CONTROL DOCUMENTS</b>						
C01	Document schedule	A,CVD	E	4P or E	2		
C02	Fabrication / Production Schedule		E	4P or E	As specified in contract		
C10	Progress reports			4P or E	Monthly		
C08	Sub-suppliers and bought out items list		E	4P or E	Monthly		
R04	Table of contents (IOM)	B, C		4P or E	before del.		IOM
R05	Table of contents (MDR)	B, C		4P or E	before del.		MDR
G05	Special tool list		E	4P or E	8		IOM
-							
<b>B</b>	<b>INTERFACE &amp; ARRANGEMENT DRAWINGS</b>						
M23	General Arrangement Drawings	C	E	4P or E	6	-	IOM
M24	Assembly Drawings (include in D01)			4P or E	6	-	IOM
M24	Shop Details			4P or E	6	-	IOM
M31	Installation Drawings (As Applicable)			4P or E	6	-	IOM
<b>C</b>	<b>DESIGN &amp; OPERATIONAL DATA</b>						
M19/M21	Valve data sheets (incl. Weight )	C		4P or E	6		IOM
-							
<b>D</b>	<b>GENERAL DETAILS &amp; SUBASSEMBLY DRAWINGS</b>						
M25/M29	Cross-Section drawing & bill of materials	B		4P or E	6		IOM
M33	Nameplate Details	B		4P or E	6		IOM
M24	Fabrication drawings						
-							
<b>F</b>	<b>CALCULATIONS &amp; PERFORMANCE DATA</b>						
-	Mechanical calculation for heat exchanger	-	-	-	-	-	-
-	Process calculations	-	-	-	-	-	-
-	Structural support including lifting lugs	-	-	-	-	-	-
-	Performance guarantee	-	-	-	-	-	-
<b>G</b>	<b>HANDLING, INSTALLATION &amp; PRE- COMMISSIONING</b>						
Q25	Erection and installation procedure	-	-	-	-	-	-
G09	Unpacking and preservation procedure	B		4P or E	8		
G15	Handling and shipping procedure			4P or E	8		
-	Pre-commissioning / commissioning procedure	-	-	-	-	-	-
-	Slings / Lifting arrangement	-	-	-	-	-	-
<b>H</b>	<b>MANUFACTURING &amp; QUALITY PROCEDURES</b>						
Q01	Quality management system certificate	C	E	4P or E	2		MDR
Q02	Quality Plan	C		4P or E	2		MDR
Q04	Inspection and Test Plan	B,C	E	4P or E	4		MDR
Q07	Hydro test procedure	B,C		4P or E	8		MDR
-	Helium leak test procedure	-	-	-	-	-	-
<b>J</b>	<b>MAINTENANCE &amp; SPARES DATA</b>						
G04	Recommended installation, start-up and commissioning spares		E	4P or E	6		IOM
G03	Recommended spares for 02-year-operation		E	4P or E	6		IOM

<b>VENDOR DATA REQUIREMENTS</b>
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The Vendor Data shall be supplied in accordance with PTSC-COM-PS-008 Vendor Data Control Procedure

VDRL Code (Final)	DESCRIPTION	NOTES	TENDER	FOR ACCEPTANCE		CERTIFIED (Note B)	
			INFO REQ	INFO REQ	WEEKS AFTER AWARD	INFO REQ	WEEKS AFTER AWARD
<b>K</b>	<b>PERFORMANCE &amp; DESIGN</b>						
Q08	Hydro test record						MDR
Q30	Dimensional record						MDR
-							
<b>L</b>	<b>TEST &amp; INSPECTION REPORTS</b>						
Q09	Mill / Material Certificates	B,C		4P or E	On receipt		MDR
Q31	Welder performance qualification certificate	B,C		4P or E	Prior fab.		MDR
Q53	Hardness test records	B,C		4P or E	Prior fab.		MDR
Q34	NDT records	B,C		4P or E			MDR
Q14	Heat treatment records	B,C		4P or E			MDR
Q35	Material traceability records	B,C		4P or E			MDR
-	Name plate rubbings/photos			4P or E			MDR
Q51	Positive material identification records	B,C		4P or E			MDR
-							
<b>N</b>	<b>CALIBRATION DATA</b>						
-	Instrument test and calibration certificate	-	-	-	-	-	-
-	Exchanger code certificates	-	-	-	-	-	-
Q36	Certificate of compliance	B,C		4P or E			MDR
-							
<b>P</b>	<b>MATERIALS ENGINEERING DATA</b>						
Q03	WPS/PQR	-	-	-	-	-	-
Q18	Non destructive examination procedure	B,C		4P or E	prior to test		
-	Manufacturer procedure including heat treatment	-	-	-	-	-	-
Q17	Surface preparation and painting procedure	B,C		4P or E	8		
Q43	Chemical cleaning and pickling procedure	B,C		4P or E	8		
-	Diffusion bonding procedure	-	-	-	-	-	-
-	Hardness test procedure	-	-	-	-	-	-
<b>R</b>	<b>MANUALS / OTHERS</b>						
G01	Dispatch dossier	B,C		2 BC+E	Before delivery	4 BC & CDR	Delivery
R01	Installation, Operation and Maintenance Manual (IOM)	B,C		2 BC+E		4 BC & CDR	Delivery +2
R02	Manufacturer's Data Report (MDR)	B,C		2 BC+E		4 BC & CDR	Delivery +2
-							
<b>INFORMATION REQUIRED LEGEND:</b>							
P : FOLDED PRINTS		IOM : INSTALLATION & OPERATIONS MANUAL					
BC : BOUND COPIES		MDR : MANUFACTURER'S DATA REPORT					
CDR : CDROM TO APPROVED FORMAT		E : ELECTRONIC COPY					

<b>VENDOR DATA REQUIREMENTS</b>
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The Vendor Data shall be supplied in accordance with PTSC-COM-PS-008 Vendor Data Control Procedure

VDRL Code (Final)	DESCRIPTION	NOTES	TENDER	FOR ACCEPTANCE		CERTIFIED (Note B)	
			INFO REQ	INFO REQ	WEEKS AFTER AWARD	INFO REQ	WEEKS AFTER AWARD
NOTES LEGEND:							
CVD	CRITICAL VENDOR DATA – Data required to progress design of associated equipment and interfaces. This shall show a complete list of documents required to be submitted / supplied by the Vendor together with the dates they are to be submitted. Each document and drawing shall be assigned with a different number for identification, referencing the VDRL Code requirement.						
A.	The document is to be included in the Manufacturer Data Report and shall be submitted in indexed folders and shall be forwarded within 2 weeks after the shipment. Original hard copy shall be required.						
B.	Documentation to be available for inspection purposes. The 4 weeks indicated is from issued of complete isometric and data package to Seller for analysis. Completion of package is as agreed between Seller and Purchaser. Seller will progressively issue recommendations, section by section.						
C.	The 8 weeks indicated is for finalisation of implementation as agreed between Seller and Purchaser. The formal report will be issued 2 weeks thereafter.						
D.	This document is to be included in all manuals.						
E.							

## **ATTACHMENT #4**

### **QUALITY, INSPECTION AND TEST REQUIREMENT**

<b>QUALITY, INSPECTION AND TESTING REQUIREMENTS</b>			Rev. No.:		
			Date:		
Item Description:  MANUAL VALVES			Req'n.:		
			P.O. No.		
INSPECTION LEVEL REQUIREMENTS:					
<i>R : Review Documents; RI: Random Inspection; W: Witness; M: Monitoring; H: Hold Point;  D: Document provided ; V: Verify</i>					
SERIAL NO.	INSPECTION ITEM	INSPECTED BY			
		VENDOR / MFR	PURCHASER	CA*	COMPANY
1	Quality Audit	D	R	-	-
2	Pre- Fabrication Meeting (when required)	D	H	-	H
3	Positive Material Identification for stainless steel	D	R	R	R
4	Material Test Reports & Certificates	D	R	R	R
5	Incoming Material Inspection	D	V	R	V/M
6	Welding Procedure (WPS/PQR)	D	R	W	R
7	NDE procedure	D	R	R	R
8	Non-Destructive Examinations (NDE) (such as RT,UT,MT,PT) in accordance with Specification	D	R	R	W/R
9	Hydrostatic Test	D	W/R	W	W
10	Visual Check	D	W/R	-	W/M
11	Dimensional Check	D	W/R	-	W/M
12	Impact Test, if applicable	D	W/R	R	R
13	Hardness Test, If applicable	D	W/R	R	R
14	Blasting / Painting	D	W/R	-	W/M
15	Pickling & Passivation	D	W/R	-	M
16	Holiday Test for painting, if applicable	D	W/R	-	W/M
17	Review of Design Documents and Drawings	D	R	-	R
18	Final Inspection & Inspection Release certificates	D	H	W	H
19	Final Certificate of Compliance By CA	D	R	D	R
20	Final Documentation as per SDRL and Specifications	D	R	D	R
21	Shipping Inspection & Shipping Release Notice	D	H	-	H
22	Other tests as required by CODE/STANDARDS/ COMPANY Specification/ Requisition	As per ITP	As per ITP		As per ITP

## NOTE:

- The inspection points as specified in this Inspection and Testing Requirements (ITR) shall be the minimum required. Purchaser has the right to request for additional inspection points where it is deemed required.



## **ATTACHMENT #5**

### **PURCHASER'S FORMAT**

- Deviation list
- Spare parts list for Installation, commissioning
- Spare parts list for 2-year operation
- Special tool list

<b>Deviation from Purchaser's Specification</b>	<b>Project</b>	Hai Phong 2 Project	<b>Vendor</b>	
	<b>PTSC Project No.</b>		<b>Vendor Project No.</b>	
	<b>Item No.</b>		<b>Contract No.</b>	
	<b>Service</b>			

<b>Spec. No.</b>	<b>Paragraph No.</b>	<b>Deviation</b>	<b>PTSC Justification</b>	<b>Client Conclusion</b>	<b>Remarks</b>	<b>Cost Effect When Deviation is Applied</b>





SPECIAL TOOL LIST	Project	Hai Phong 2 Project	Vendor	
	PTSC Project No.		Vendor Project No.	
	Item No.		Contract No.	
	Service			

No.	Tool name	Q'ty	Sketch	Unit price	Total price