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| **طرح نگهداشت و افزایش تولید 27 مخزن** |
| **PIPELINE MATERIAL SPECIFICATION****نگهداشت و افزایش تولید میدان نفتی بینک** |
| D05 | SEP. 2023 | AFD | M.Noori | M.Fakharian | S.Faramarzpour |  |
| D04 | OCT. 2022 | AFD | M.Noori | M.Fakharian | M.Mehrshad |  |
| D03 | AUG. 2022 | AFD | F.Mosayebnejad | M.Fakharian | M.Mehrshad |  |
| D02 | MAY. 2022 | IFA | F.Mosayebnejad | M.Fakharian | M.Mehrshad |  |
| D01 | DEC. 2021 | IFA | H.Shahrokhi | M.Fakharian | M.Mehrshad |  |
| D00 | OCT. 2021 | IFC | H.Shahrokhi | M.Fakharian | M.Mehrshad |  |
| **Rev.** | **Date** | **Purpose of Issue/Status** | **Prepared by:** | **Checked by:** | **Approved by:** | **CLIENT Approval** |
| **Class: 2** | **CLIENT Doc. Number: F0Z-707360** |
| **Status:** | **IDC: Inter-Discipline Check****IFC: Issued For Comment** **IFA: Issued For Approval****AFD: Approved For Design** **AFC: Approved For Construction** **AFP: Approved For Purchase****AFQ: Approved For Quotation** **IFI: Issued For Information****AB-R: As-Built for CLIENT Review** **AB-A: As-Built –Approved** |

**REVISION RECORD SHEET**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **1** | **x** | **x** | **x** | **x** | **x** | **x** | **66** |  |  |  |  |  |  |
| **2** | **x** | **x** | **x** | **x** | **x** | **x** | **67** |  |  |  |  |  |  |
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| **4** | **x** |  |  |  |  |  | **69** |  |  |  |  |  |  |
| **5** | **x** | **x** | **x** |  |  |  | **70** |  |  |  |  |  |  |
| **6** | **x** | **x** | **x** |  |  |  | **71** |  |  |  |  |  |  |
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| **10** | **x** | **x** | **x** | **x** | **x** |  | **75** |  |  |  |  |  |  |
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| **13** | **x** | **x** |  |  |  |  | **78** |  |  |  |  |  |  |
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# INTRODUCTION

Binak oilfield in Bushehr province is a part of the southern oilfields of Iran, is located 20 km northwest of Genaveh city.

With the aim of increasing production of oil from Binak oilfield, an EPC/EPD Project has been defined by NIOC/NISOC and awarded to Petro Iran Development Company (PEDCO). Also PEDCO (as General Contractor) has assigned the EPC-packages of the Project to "Hirgan Energy - Design and Inspection" JV.

As a part of the Project, construction of well location, access roads, wellhead facilities for 6 new wells (with electric power supply for 2 of them) and required modifications on 4 workover wells (with electric power supply) shall be done. In addition, construction of 6 new flowlines from new wells to Binak B/C unit (with extension of relevant manifold) are in the Project scope of work.

**GENERAL DEFINITION**

The following terms shall be used in this document.

|  |  |
| --- | --- |
| CLIENT:  | National Iranian South Oilfields Company (NISOC)  |
| PROJECT: | Binak Oilfield Development – Construction of New Well Locations, Modifications on Workover Wells, Wellhead Facilities, Electrification Facilities, Flowlines and Extension of Binak B/C Manifold  |
| EPD/EPC CONTRACTOR (GC): | Petro Iran Development Company (PEDCO) |
| EPC CONTRACTOR: | Joint Venture of : Hirgan Energy – Design & Inspection (D&I) Companies |
| VENDOR: | The firm or person who will fabricate the equipment or material. |
| EXECUTOR:  | Executor is the party which carries out all or part of construction and/or commissioning for the project. |
| THIRD PARTY INSPECTOR (TPI): | The firm appointed by EPD/EPC CONTRACTOR (GC) and approved by CLIENT (in writing) for the inspection of goods. |
| SHALL: | Is used where a provision is mandatory. |
| SHOULD: | Is used where a provision is advisory only. |
| WILL:  | Is normally used in connection with the action by CLIENT rather than by an EPC/EPD CONTRACTOR, supplier or VENDOR. |
| MAY:  | Is used where a provision is completely discretionary. |

# SCOPE

This specification covers the general requirements to be implemented in the selection materials of pipelines, fittings, flanges, valves and other pipeline components to be used for "Construction of flowlines and wellhead Facilities for BINAK Oil Field" Project.

# REFERENCES

Throughout this Specification the latest editions of the following standards and codes are referred to:

## LOCAL CODES AND STANDARDS

|  |  |
| --- | --- |
| IPS-E-PI-140 | Engineering Standard for Onshore Transportation Pipelines |
| IPS-C-PI-140 | Construction Standard for Transportation Pipelines (Onshore) |
| IPS-E-PI-240 | Engineering Standard For Plant Piping Systems |
| IPS-E-PI-221 | Engineering Standard For Piping Material Selection (on plot piping) |
| IPS-G-PI-280 | General Standard for Pipe Supports |
| IPS-M-PI-110 | Material and Equipment Standard for Valves |
| IPS-M-PI-150 | Material Standard for Flanges and Fittings |
| IPS-M-PI-190 (3) | Material and Equipment Standard for Line Pipe |
| NOSIC-S5L-9002-0010  | 5000API/3000 API Oil Well Production Wellhead Fittings 6” |

##  INTERNATIONAL CODES & STANDARDS

|  |  |
| --- | --- |
| ASME B1.20.1 | Pipe Threads General Purpose (Inch). |
| ASME B16.5 | Steel Pipe Flanges And Flanged Fittings |
| ASME B16.9  | Factory–Made Wrought Steel Butt welding Fittings |
| ASME B16.10 | Face To Face And End To End Dimension Of Valve |
| ASME B16.11 | Forged Steel Fittings, Socket Welding And Threaded |
| ASME B16.21 | Nonmetallic Flat Gaskets For Pipe Flanges |
| ASME B16.25 | Butt-Welding Ends |
| ASME B16.34 | Steel Valves, Flanged And Butt-welding Ends |
| ASME B16.48 | Steel Line Blanks |
| ASME B18.2.1 | Square And Hex. Bolts And Screws, Inch Series |
| ASME B18.2.2 | Square And Hex. Nuts |
| ASME B31.3  | Process Piping |
| ASME B31.4  | Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids |
| ASME B31.8 | Gas Transmission and Distribution Piping Systems |
| ASME B36.10MASME B16.20 | Welded and Seamless Wrought Steel PipeMetallic Gaskets for Pipe Flanges |
| API 5L | Specification For Line Pipe |
| API 6D | Pipeline Valves |
| API 6A  | Specification for Wellhead and Christmas Tree Equipment |
| API 599 | Steel Plug Valves, Flanged Or Butt-welding Ends |
| API-600 | Steel Gate Valves, Flanged And Butt-welding Ends |
| API 601 | Metallic Gaskets For Piping, Double-Jacketed, Corrugated And Spiral Wound |
| API-602 | Compact Steel Gate Valves |
| API 6FA | Specification for Fire Test For Valves |
| API 608 | Metal Ball Valves-Flanged, Threaded, and Welding End |
| BS-1868 | Flanged And Butt-Welding Ends Steel Check Valves For Petroleum And Petrochemical Industries |
| BS-1873 | Flanged And Butt-Welding Ends Steel Globe Valves For Petroleum And Petrochemical Industries |
| BS EN ISO 17292:2015 | Metal ball valves for petroleum, petrochemical and allied industries |
| BS EN ISO 15761:2002 | Steel gate, globe and check valves for sizes DN 100 and smaller, for the petroleum and natural gas industries |
| BS 6775 (PART 2)BS EN 10204 | Testing Of Valve Specification For Fire Type Testing RequirementMetallic Products-Type of Inspection Documents |
| MSS-SP-44  | Steel Pipeline Flanges |
| MSS-SP-45 | By pass and drain connection standard |
| MSS-SP-75 | High-Strength, Wrought, Butt Welding Fittings |
| MSS SP-83 | Class 300 and 6000 pipe unions, socket welding and threaded |
| MSS SP-80 | Bronze Gate, globe angle and check valves |
| MSS SP-95 | Swadge Nipples And Ball Plugs |
| MSS SP-97 | Forged Carbon Steel Branch Olet Fittings |
| MSS SP-120 | Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends |
| NACE MR0175/ ISO 15156NACE TM-0284NACE TM-0177 | Petroleum And Natural Gas Industries - Materials For Use In H2S Containing Environments In Oil And Gas ProductionStandard Test Method - Evaluation Of Pipeline And Pressure Vessel Steels For Resistance To Hydrogen-Induced CrackingLaboratory Testing Of Metals For Resistance To Sulfide Stress Cracking And Stress Corrosion Cracking In H2s Environments |

## THE PROJECT DOCUMENTS

BK-GNRAL-PEDCO-000-PL-DC-0001 Pipeline Design Criteria

BK-GNRAL-PEDCO-000-PR-DB-0001 Process Basis of Design

BK- GNRAL-PEDCO-000-PL-SP-0002 Specification for Line Pipe

BK-SSGRL-PEDCO-110-PL-CN-0001 Pipeline Wall Thickness Calculation

## ENVIRONMENTAL DATA

Refer to "Process Basis of Design; Doc. No. BK-GNRAL-PEDCO-000-PR-DB-0001".

## ORDER OF PRECEDENCE

In case of any conflict between requirements specified herein & the requirements of any other referenced document, this subject shall be reflected to CLIENT and the final decision will be made by CLIENT.

# DESIGN CODES

The design of pipeline systems and production facilities shall conform to ASME B31.4 latest edition.

The design of all process gas and natural gas distribution pipeline systems shall conform to ASME B31.8 latest edition.

All material for sour services shall meet the supplementary requirements of NACE MR-0175/ ISO 15156 latest edition.

# GENERAL NOTES

Notes pertinent to a particular pipeline class appear directly on this relevant class.

* 1. All pipes shall be supplied in accordance with IPS-M-PI-190(3) & API.5L.
	2. Pipe wall thickness is calculated in accordance with ASME B31.8 & ASME B31.4.
	3. Butt-weld ends shall be beveled to ASME B 16.25.
	4. Stud-bolts shall be threaded, full length to ASME B 1.1 and supplied with two hexagonal heavy type nuts to ASME B 18.2.2.
	5. The hardness of all material including welds in sour services shall be as per requirements of NACE STD MR-0175/ ISO 15156.
	6. Welded branch connection on steel pipes must meet the requirements of ASME B31.4 & B31.8 respectively.
	7. *Deleted.*
	8. All flanges and fittings shall be supplied in accordance with IPS-M-PI-150.
	9. All valves shall be supplied in accordance with IPS-M-PI-110 and API 6A.

# LIST OF ABBREVIATIONS

|  |  |
| --- | --- |
| BB | Bolted Bonnet |
| BC | Bolted Cover |
| BG | Bolted Gland |
| BW | Butt-weld |
| CA | Corrosion Allowance |
| CS | Carbon Steel |
| FE | Flanged End |
| OS&Y | Outside Screw and Yoke |
| RF | Raised Face |
| RTJ | Ring Type Joint |
| SMLS | Seamless |
| SPW | Spiral Wound |
| WN | Welding Neck |

# PIPELINE MATERIAL CLASSES

## IDENTIFICATION OF PIPELINE CLASSES

Each pipeline class is identified from two alphabetical characters which precede a two digit figure. The first alphabetical character indicates pressure rating of flange and the second alphabetical character indicates material as follows:

|  |  |
| --- | --- |
| 1st alphabetical character | 2nd alphabetical character |
| A | Class 150  | N | Carbon Steel |
| C | Class 300  | S | Stainless Steel |
| F | Class 600  | X | Non Metal Pipe |
| G | Class 900  | Z | Galvanized Carbon Steel |
| H | Class 1500  |  |  |
| L | API 3000  |  |  |
| M | API 5000  |  |  |

The third figure indicates the design code and the forth figure indicates corrosion allowance for metallic as follows:

|  |  |
| --- | --- |
| **3rd figure** | **4th figure****for metal pipe** |
| **Fig.** | **Design standard** | **Fig.** | **C.A.** | **NACE 175 Requirement** |
| **0** | **ASME B 31.3** **(For Inside of Plant)**  | **0** | **0 mm**  | **No** |
| **1** | **1 mm**  | **No** |
| **1** | **ASME B 31.4** **(For Liquid Pipeline)** | **2** | **1 mm**  | **Yes** |
| **4** | **3 mm**  | **No** |
| **2** | **ASME B 31.8** **(For Gas Pipeline)** | **5** | **3 mm**  | **Yes** |
| **6** | **6 mm**  | **No** |
|  |  | **7** | **6 mm**  | **Yes** |

## SUMMARY OF PIPELINE CLASSES

| **Class** | **Rating** | **Base****Material** | **C.A****(mm)** | **Design****Code** | **Design Temp. (°C)** | **Design Pressure (psig)** | **Fluid** | **Symbol**  | **State** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Face** | **Max.** | **Max.** |

|  |
| --- |
| **Flow line** |
| LN15 | LN15 | C.S | 3 | ASME B31.4 | 85 | 1035 | Crude Oil  | CRD | Liquid |
| RTJ |

**Class LN15**

| **CODE** | **SERVICE** | **Material** | **C.A.** | **RATING** | **Design** |
| --- | --- | --- | --- | --- | --- |
| ASME B31.4A1 | Oil | Carbon Steel(NACE MR-0175/ ISO 15156) | 3 mm | API 3000 | TEMP (Co) | PRESS (psig) |
| -5/85 | 1035 |
| ITEM | SIZE | DESCRIPTION |
| Pipe | 1/2" To 1 1/2" | API 5L GR.B- SCH 160-NACE-PSL2-SMLS-PE–acc to ASME B36.10M& NACE MR-0175/ ISO 15156. |
| 2”-3'' | API 5L X52, NACE, PSL2, SMLS, SCH.40 BE, ACC to API 5L, IPS-M-PI-190 & NACE MR-0175/ ISO 15156. |
| 4”-6'' | API 5L X52, NACE, PSL2, SMLS, THK 7.9 mm BE, ACC to API 5L, IPS-M-PI-190 & NACE MR-0175/ ISO 15156. |
| Fittings | 1/2" To 1 1/2" | 6000#, SW, ASTM A105,NACE, acc to IPS-M-PI-150, ASME B 16.11 & NACE MR-0175/ ISO 15156. |
| 2″ To 6'' | CS to ASTM A860 WPHY52, NACE, BW, ACC to MSS-SP-75 & NACE MR-0175/ ISO 15156. |
| Flanges | 1/2" To 1 1/2" | 1500#, RTJ, SW, ASTM A105 NACE, acc. to IPS-M-PI-150, ASMEB16.5 & NACE MR-0175/ ISO 15156. |
| 2'' To 6''(2 1/16'' To 7 1/16'') | TYPE 6B, WN, BW, RTJ, API60K, NACE, ACC to NACE MR-0175/ ISO 15156. |
| Gate Valves | 1/2" To 1 1/2" | 1500 #, SW, BODY:ASTM A105, TRIM:AISI 316L+STELLITE6,OS&Y, BB, Solid Wedge, acc to API 602, IPS-MPI-110 & NACE MR-0175/ ISO 15156. |
| 2'' To 6''(2 1/16'' To 7 1/16'') | API 3000, Material Class EE, Body: API 60K, Trim: API 75K, BB, FE, RTJ, ACC to API 6A & NACE MR-0175/ ISO 15156. |
| Ball Valves | 1/2" To 1 1/2" | 1500 #, Floating Ball, SW, Body: ASTM A105, Ball: AISI 316(L), Trim: Soft Seat-CS ENP-75 micron-PTFE, acc to DIN EN ISO 17292, IPS-MPI-110 & & NACE MR-0175/ ISO 15156. |
| 2'' To 6''(2 1/16'' To 7 1/16'') | API 3000, Material Class EE, Body: API 60K, Trim: API 75K, FE, RTJ, ACC to API 6A & NACE MR-0175/ ISO 15156. |
| Check Valves | 1/2" To 1 1/2" | 1500 #, SW, Body: ASTM A105, Trim: AISI 316L+STELLITE6, Horizontal Piston lift ,acc to API 602 & NACE MR0175/ISO 15156. |
| 2'' To 6''(2 1/16'' To 7 1/16'') | API 3000, Material Class EE, Body: API 60K, Trim: API 75K, BC, FE, RTJ, ACC to API 6A & NACE MR-0175/ ISO 15156. |
| Gaskets | 1/2" To 1 1/2" | 1500#, RTJ, 316SS acc to ASME B 16.20 & NACE MR-0175/ ISO 15156. |
| 2'' To 6'' | API3000, RTJ, SS316 ACC to NACE MR-0175/ ISO 15156.  |
| Stud Bolts & Nuts | - | Stud bolts ASTM A193 grade B7M, HH nuts ASTM A194 grade 2HM, Thread: bolts class 2A, nuts class 2B |

**Note 1:**

Final thickness of flowlines will be 7.9mm. So considering design pressure of 1035 psi (Approved by NISOC), the actual corrosion allowance would be 5~5.5 mm which is sufficient for the corrosion calculations.