طرح نگهداشت و افزایش تولید 27 مخزن

PIPELINE MATERIAL SPECIFICATION

نگهداشت و افزایش تولید میدان نفتی بینک

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AFD: Approved For Design
AFC: Approved For Construction
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1.0 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, New Gas/Condensate Pipelines (from Binak New GCS to Siahmakan GIS/Binak PU) shall be constructed.

GENERAL DEFINITION

The following terms shall be used in this document.

CLIENT:	National Iranian South Oilfields Company (NISOC)
PROJECT:	Binak Oilfield Development – Surface Facilities; Gas & Gas-Condensate Pipelines
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.

2.0 SCOPE

The purpose of this specification is to supplement the requirements for the material compnenets as specified in the requisition for BINAK Gas & Gas-Condensate Pipelines

3.0 NORMATIVE REFERENCES

3.1 LOCAL CODES AND STANDARDS

- IPS-E-TP-350(1) Engineering Standard for Linings
- IPS-M-PI-110(1) Material and Equipment Standard for Valves
- IPS-M-PI-150(2) Material Standard for Flanges and Fittings
- IPS-M-PI-190(3) Material and Equipment Standard for Line Pipe
- IPS-E-PI-140(1) Engineering Standard for Onshore Transportation Pipelines
- IPS-E-PI-221(1) Engineering Standard for Piping Material Selection
- IPS-E-PI-240(2) Engineering Standard for Plant Piping System

3.2 INTERNATIONAL CODES AND 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 Buttwelding 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 Buttwelding 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 B36.10M Welded and Seamless Wrought Steel Pipe.
- ASME B36.19M Stainless Steel Pipe
- ASME B31.8 Gas Transmission and Distribution Piping Systems
- ASME B16.36 Orifice Flanges
- ASME B16.20 Metallic Gaskets for Pipe Flanges
- ASTM A860 Standard Specification for Wrought High-Strength Low-Alloy Steel Butt Welding Fittings
- ASTM A694 Standard Specification for Carbon and Alloy Steel

	Forgings for Pipe Flanges, Fittings, Valves, and Parts for High-Pressure Transmission Service
• ASTM A516	Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service
• ASTM A216	Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service
• ASTM A193	Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
• ASTM A194	Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
• BS EN 10204	Metallic Products – Types of Inspection Documents
• API 5L	Specification For Line Pipe
• API 6D	Pipeline Valves
• API 599	Steel Plug Valves, Flanged Or Buttwelding Ends
• API 600	Steel Gate Valves, Flanged And Buttwelding 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)	Testing Of Valve Specification For Fire Type Testing Requirement
• 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	Swage 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

• ANSI/NACE MR0175/ ISO 15156-1:2009(E)	Petroleum And Natural Gas Industries - Materials For Use In H2S Containing Environments In Oil And Gas Production
• NACE TM-0284	Standard Test Method - Evaluation Of Pipeline And Pressure Vessel Steels For Resistance To Hydrogen-Induced Cracking
• NACE TM-0177	Laboratory Testing Of Metals For Resistance To Sulfide Stress Cracking And Stress Corrosion Cracking In H2s Environments

3.3 THE PROJECT DOCUMENTS

• BK-PPL-PEDCO-320-PL-CN-0001	Calculation Note For Pipeline Wall Thickness
• BK-PPL-PEDCO-320-PI-RT-0001	Corrosion Study & Material Selection Report
• BK-GNRAL-PEDCO-000-PL-DC-0001	Pipeline Design Criteria
• BK-GNRAL-PEDCO-000-PI-SP-0008	Specification For Material Requirements in Sour service

3.4 ENVIRONMENTAL DATA

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

3.5 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.

4.0 ABBREVIATIONS

AFC:	Approved for Construction
AFD:	Approved for Design
# :	CLASS
A/G:	ABOVE GROUND
ASB :	ASBESTOS
BB :	BOLTED BONNET
BC :	BOLTED COVER
BE :	BEVEL ENDS

BLE :	BEVELED LARGE END
BW :	BUTT WELDING
C.A:	CORROSION ALLOWANCE
CONC :	CONCENTRIC
CS :	CARBON STEEL
ECC :	ECCENTRIC
FB:	FULL BORE
FLGD:	FLANGED
FR :	FLAT RING
GJ. :	GASKET JOINT
GO:	GEAR OPERATED
GR. :	GRADE
HEX :	HEXAGONAL
HO:	HANDWHEEL OPERATED
LR :	LONG RADIUS
MO:	MOTOR OPERATED
NB :	NOMINAL BORE
NPS :	NOMINAL PIPE SIZE
NPT:	NOMINAL PIPE THREAD
OS&Y :	OUTSIDE SCREW & YOKE
PBE:	PLAIN BOTH END
PSE :	PLAIN SMALL END
PTFE:	POLYTETRAFLUOROETHYLENE
RB :	REDUCED BORE
RED :	REDUCER/REDUCING
RF :	RAISED FACE
S.S.:	STAINLESS STEEL
SB :	SCREWED BONNET
SCH :	SCHEDULE
SCR'D :	SCREWED
SF :	SERRATED FINISH

SG :	SCREWED GLAND
SMLS :	SEAMLESS
SPW :	SPIRAL WOUND
STD :	STANDARD
SW :	SOCKET WELDING
TBE :	THREADED BOTH ENDS
THK :	THICKNESS
THRD:	THREADED
TLE :	THEREADED LARGE END
TR :	TRIM
TSE :	THEREADED SMALL END
UB :	UNION BONNET
W.T :	WALL THICKNESS
WB :	WELDED BONNET
WN :	WELDING NECK
XS :	EXTRA STRONG
XXS :	DOUBLE EXTRA STRONG

5.0 PIPING COMPONENTS

5.1 PIPE

5.1.1 For carbon steel pipes, dimensions shall conform to ASME B36.10M or API 5L where applicable. The nominal thickness for “Stainless Steel Pipe” shall be selected in accordance with ASME B36.19M. Tolerances of pipes shall meet the requirements of IPS-M-PI-190(3).

5.1.2 End pipe for sizes 1/2” to 1 1/2” shall be plain end, for size 2”and above shall be beveled end. End of galvanized pipe shall be threaded.

5.1.3 For all Materials Carbon Content and CE=C+ (Mn/6) + (Cu+Ni)/15 + (Cr+Mo+V)/5 shall meet the requirements of IPS-M-PI-190(3). In addition, all the main piping and related materials shall be according to the requirements of NACE MR 0175 / ISO 15156 and IPS-M-PI-190(3) for sour services.

5.1.4 Pipes with sizes 1/4",3/8",1¼",2½",3½",4½",5",7”,9”,14”,18”,22",shall not be used, except as may be required by equipment connections.

5.2 FITTING

5.2.1 Dimensions and tolerances for butt-weld fitting (be normally used for nominal diameter 2" and larger) shall conform to ASME B16.9.

5.2.2 Dimensions and tolerances for Socket weld fittings and/or screwed fitting (be normally used for nominal diameter 1 1/2" and smaller) shall conform to ASME B16.11.

5.3 FLANGES

5.3.1 Machining shall be in accordance with ASME B16.5. Roughness of RF shall be between 3.2 and 6.3 micrometers (125 to 250 micro inches AARH)

5.3.2 Orifice flanges shall conform to ASME B16.36. Quantities shown on Material Requisition must be understood as "pair" of orifice flanges supplied with assembly bolting.

5.4 VALVES

5.4.1 All socket welded ball valves of nominal sizes ½” to 1 ½” shall have extended ends (Sch. 160 nipples) with an overall length of 400mm.

5.4.2 Valve trim numbers for gate, globe and check valves are as API 600 (2015) Table 8.

5.4.3 Gear operators are required for valves in sizes shown below as IPS-E-PI-221

RATING	GATE	GLOBE	BALL	BUTTERFLY	PLUG
300#	14” and larger	8” and larger	6” and larger	6” and larger	6” and larger
600#	12” and larger	6” and larger	4” and larger	4” and larger	-

5.5 GASKETS

5.5.1 Spiral wound gaskets shall conform to ASME B16.20 and Non-metallic flat gaskets shall conform to ASME B16.21.

5.6 BOLTS AND NUTS

5.6.1 Thread shall be in accordance with ASME B1.1 and Nuts shall conform to ASME B18.2.2.

5.6.2 Stud bolts shall be threaded full length and chamfered both ends. Length for standard flange assembly shall be in accordance with ASME B16.5. Stud bolts shall be supplied with 2 Heavy Hex nuts.

5.7 BRANCH CONNECTIONS

5.7.1 Branches shall be as specified in the individual line classes.

5.7.2 For pipe line to be pigged, tee or branch with 40% or more of the main line diameter shall be equipped with scraper guide bars.

5.8 UG SERVICE COATING

5.8.1 For UG services, all Pipes & Fittings Shall be Solvent Free Epoxy / Three Layer Cold Applied Plastic Tape at Field.

6.0 GENERAL TESTING REQUIRMENTS

6.1 Pressure testing of the following piping shall be in accordance with ASME B31.3 test procedures. The test pressure shall be held for a sufficient time to allow detection of any leaks and for a minimum time of 1 hour.

a) Metallic piping including carbon steel, lined carbon steel, stainless steel, corrosion resistant alloys and ductile iron but excluding copper shall normally be tested at 1.5 x the flange pressure class.

6.2 Pipelines designed to ASME B31.8 where the operating pressure results in a hoop stress greater than 30% of the specified minimum yield strength shall be hydrostatically tested or tested with air or gas. The type of test and the test pressure is dependent on Location Class as defined in ASME B31.8 Para. 841.3.2. Test duration shall be a minimum of 2 hours.

7.0 PIPING AND PIPELINE CLASSES

7.1 PIPING CLASSES NUMBERING

Each piping 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	
C	Class 300	N	Carbon Steel
F	Class 600		

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 MR 0175 / ISO 15156 Requirement**
1	ASME B 31.4 (For Liquid Pipeline)	5	3 mm	Yes
2	ASME B 31.8 (For Gas Pipeline)	7	6 mm	Yes

7.2 SUMMARY OF PIPING AND PIPELINE CLASSES

Table 1: Pipeline classes

CLASS	RATING	MATERIAL	CORROSION ALLOWANCE (mm)	DESIGN		SERVICE
				PRESS (Psig)	TEMP (°C) max	
CN15	300#	Carbon Steel NACE MR0175	3	430	85	Gas Condensate (Sour Service)
FN27	600#	Carbon Steel NACE MR0175	6	899	85	Gas (Sour Service)

CLASSES DESCRIPTION

Class CN15

CODE	SERVICE	Material	C.A.	RATING	Design	
ASME B31.4	Gas Condensate	Carbon Steel (NACE MR-0175/ ISO 15156)	3 mm	150#	TEMP (C^o)	PRESS (psig)
					-5/85	430

ITEM	SIZE	DESCRIPTION
Pipe	4''	API 5L X52, NACE, PSL2, SMLS, THK 4.8 mm, BE, ACC to API 5L, IPS-M-PI-190 & NACE MR-0175/ ISO 15156.
Fittings	4″	SMLS, BW, ASTM A860 WPHY52, AS PER PIPE THICKNESS, ACC to IPS-M-PI-150, ASME B16.9, MSS-SP-75 & NACE MR-0175/ ISO 15156.
Flanges	4″	WN, BW, 300#, RF, ASTM A694 F52, SERRATED FINISH, AS PER PIPE THICKNESS ACC to IPS-M-PI-150, ASME B16.5, MSS-SP-44 & NACE MR-0175/ ISO 15156.
Spectacle Blind	4″	Spectacle Blind, 300#, FF, ASTM A516 GR.70, ASME B16.48, MR0175/ISO 15156.
Gate Valves	4″	300#, H.O., BODY: ASTM A216 WCB, TRIM: AISI 316L+STELLITE6, OS&Y, BB, BG, FE, RF. to API 6D, IPS-MPI-110 & NACE MR-0175/ ISO 15156.
Ball Valves	4″	300 #, H.O., BODY: ASTM A216 WCB, TRIM: AISI 316L +Stellite6, FE, RF, API 6D, IPS-MPI-110 & NACE MR-0175/ ISO 15156.
Check Valves	4″	300 #, BODY:ASTM A216 WCB, TRIM:AISI 316L+STELLITE6, SWING TYPE, FE, RF, BC, ACC to API 6D, BS 1868, IPS-MPI-110 & NACE MR-0175/ ISO 15156.
Gaskets	4″	SPIRAL WOUND, 600#, SS 316 WINDING & INNER RING, C.S OUTER RING, ASME B16.20, IPS-M-PI-150 & NACE MR0175/ISO 15156
Stud Bolts & Nuts	-	STUD BOLTS ASTM A193 B7M, HEAVY HEX NUTS ASTM A194 2HM, ASME B1.1& ASME B18.2.2

Class FN27 D04

CODE	SERVICE	Material	C.A.	RATING	PRESS/TEMP.	
ASME B 31.8	Gas	Carbon Steel (NACE MR0175/ ISO 15156)	6 mm	#600	TEMP (C^o)	PRESS (Psig)
					-5/85	899

ITEM	SIZE	DESCRIPTION
PIPE	8''	SMLS, BE, API 5L X52, PSL2, THK 11.1 mm, ACC to API 5L, IPS-M-PI-190(3) & NACE MR0175/ ISO 15156
FITTINGS	8″	SMLS, BW, ASTM A860 WPHY52, as per pipe Thickness, ACC to IPS-M-PI-150, ASME B16.9, MSS-SP-75 & NACE MR0175/ ISO 15156
FLANGES	8″	WN, BW, RF, 600#, ASTM A694 F52, AS PER PIPE THICKNESS, SERRATED FINISH, ACC to IPS-M-PI-150, ASME B16.5, MSS-SP-44 & NACE MR0175/ ISO 15156
SPECTACLE BLIND	8''	SPECTACLE BLIND, 600#, RF, ASTM A516 GR.70, ASME B16.48, NACE MR0175/ ISO 15156
GATE VALVES	8″	BB, OS&Y, FLEXIBLE WEDGE, RF, 600#, H.O., BODY: ASTM A216 WCB, TRIM: AISI 316L+STELLITE6, to API 6D, IPS-M-PI-110 & NACE MR0175/ ISO 15156
BALL VALVES	8″	TRUNNION MOUNTED, RF, 600 #, 3 PIECES, G.O., BODY: ASTM A216 WCB, BALL: AISI 316L +STELLITE6, RPTFE SEAT, API 6D, IPS-M-PI-110 & NACE MR0175/ ISO 15156
CHECK VALVES	8″	SWING TYPE, RF, 600 #, BC, BODY:ASTM A216 WCB, TRIM:AISI 316L+STELLITE6, ACC to API 6D, BS 1868, IPS-M-PI-110 & NACE MR0175/ ISO 15156
GASKET	8″	SPIRAL WOUND, 600#, SS 316 WINDING & INNER RING, C.S OUTER RING, ASME B16.20, IPS-M-PI-150 & NACE MR0175/ISO 15156
STUD BOLT & NUTS	-	STUD BOLTS ASTM A193 B7M, HEAVY HEX NUTS ASTM A194 2HM, ASME B1.1& ASME B18.2.2