

 NISOC	<p>نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض</p> <p>خرید بسته نم زدای گاز ایستگاه تقویت فشار گاز بینک (قرارداد BK-HD-GCS-CO-0010_08)</p>																	
شماره پیمان: 053 – 073 – 9184	<p>PMI PROCEDURE (TOWER, COLUMNS, REBOILER, DRUMS, FILTERS &amp; EXCHANGERS)</p> <table><tr><td>پروژه</td><td>بسته کاری</td><td>صادر کننده</td><td>تسهیلات</td><td>رشته</td><td>نوع مدرک</td><td>سریال</td><td>نسخه</td></tr><tr><td>BK</td><td>GCS</td><td>MF</td><td>120</td><td>QC</td><td>PR</td><td>0008</td><td>V00</td></tr></table>	پروژه	بسته کاری	صادر کننده	تسهیلات	رشته	نوع مدرک	سریال	نسخه	BK	GCS	MF	120	QC	PR	0008	V00	شماره صفحه : 1 از 8
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## طرح نگهداشت و افزایش تولید 27 مخزن

### PMI PROCEDURE (TOWER, COLUMNS, REBOILER, DRUMS, FILTERS & EXCHANGERS)

### نگهداشت و افزایش تولید میدان نفتی بینک

V00	APR. 2025	IFA	MFS	M.Fakharian	S.Faramarzpour	
Rev.	Date	Purpose of Issue/Status	Prepared by:	Checked by:	Approved by:	CLIENT Approval

#### Status:

IFA: Issued For Approval  
IFI: Issued For Information  
AFC: Approved For Construction

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### REVISION RECORD SHEET

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## 1. Scope

1.1 This procedure describes the PMI (positive material identification) method that is used during the fabrication of (TOWER, COLUMNS, REBOILER, DRUMS, FILTERS & EXCHANGERS) and relevant ancillaries.

## DEFINITION OF TERMS

In this specification the following definitions shall apply:

<b>CLIENT:</b>	National Iranian South Oilfields Company (NISOC)
<b>PROJECT:</b>	Binak Oilfield Development – General Facilities
<b>EPD/EPC CONTRACTOR (GC):</b>	Petro Iran Development Company (PEDCO)
<b>EPC CONTRACTOR:</b>	Joint Venture of: Hiran Energy – Design & Inspection(D&I) Companies
<b>VENDOR:</b>	MFS Co.

## REFERENCE DOCUMENTATION

- Material Standard specification for piping material specification (Doc No.: BK-GCS-PEDCO-120-PI-SP-0001-D06).
- ASME SEC II (Edition 2021).

## TEST EQUIPMENT

4.1 Non-destructive method used for verification shall be capable of identifying the material qualitatively based on alloy. Typical test equipment for non-destructive testing is listed below:

- Portable X-Ray emission analyser. **Model of Equipment: OXFORD MASTER.**

## PERSONNEL QUALIFICATION

5.1 The person performing the PMI test should be knowledgeable about all aspects of operation of PMI test equipment and the PMI test method used.

5.2 All PMI inspectors shall be appropriately qualified for the inspection to be performed.

5.3 Qualification shall be documented and shall cover:

- Ability to operate the instrument
- Ability to recognize the instrument's limitations in terms of material, surface profile and working conditions
- Ability to interpret the instrument's output and recognizes erroneous readings

## STAGE OF EXAMINATION AND MARKING

6.1 Stainless steel alloy verification shall be preferably being conducted on material almost at the same time as the equipment or component is fabricated.

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6.2 The percentage of testing will be as per bellow:

- a- Sheets/Plates, Coils, Pipes, bolting materials, flange, fittings, gasket, anchor, welding consumables – 1 point per Heat No.
- b- Finished Parts: shall be performed PMI examination of the finish weld on at least one point of each joint inside and outside for all weld joints. When access is not possible to the inside weld and/or weld size is small, examination of the outside of a weld only shall be acceptable.

6.3 Table of essential elements for positive material identification (PMI) shall be as per bellow. Verification shall include, as a minimum, the elements listed in Table (2).

Alloy	Table 1: ESSENTIAL ELEMENTS for PMI								
	Cr	Ni	Mo	Cb	Ti	Cu	W	Al	Zn
1Cr, 1/2 Mo	X		X						
1-1/4 Cr, 1/2 Mo	X		X						
2-1/4 Cr, 1Mo	X		X						
5Cr, 1/2Mo	X		X						
9Cr, 1Mo	X		X						
11-13Cr (Type 410)	X								
12Cr, 4Ni	X	X							
304	X	X	X						
308	X	X	X						
309	X	X	X						
310	X	X	X						
316	X	X	X						
317	X	X	X						
321	X	X	X		X				
347	X	X	X	X					
2205 (Duplex)	X	X	X						
Alloy 20	X	X	X	X		X			
Alloy C-276	X	X	X				X		
Alloy 600	X	X	X						
Alloy 625	X	X	X	X	X				
Alloy 800	X	X			X	X		X	
Alloy 825	X	X	X			X			
Alloy 400		X				X			
AL-6XN	X	X	X						
904L	X	X	X			X			
90/10 Cu Ni		X				X			
70/30 Cu Ni		X				X			
B466		X				X			
Monel 400		X				X			
Aluminum Brass						X		X	X

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	BK	GCS	MF	120	QC	PR	0008	
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## CALIBRATION

7.1 It is necessary to confirm total performance of PMI equipment. To check the accuracy, put the probe on the calibration block surface and read number of alloying elements. with  $\pm 2\%$  tolerance.

7.2 For calibration, Calibrated equipment and CRM blocks shall be used.

## ACCEPTABLE CRITERIA AND TOLERANCE

8.1 Acceptance criteria range for all the project material shall meet the requirements for alloying element specified in following table:

Specification-Grades	Table 2: Acceptance measured range - percent		
	Cr	Ni	Mo
SA-240-316L	16.00-18.00	10.00-14.00	2-3
SA-312-316L	16.00-18.00	10.00-14.00	2-3
SA-403 WP-316L	16.00-18.00	10.00-14.00	2-3
SA-182-F316L	16.00-18.00	10.00-15.00	2-3
SA-213-TP316L	16.00-18.00	10.00-14.00	2-3

## 8.2 Rejection

8.2.1 If any material component or weld is found to be unacceptable, all other represented materials, components, or welds shall be considered suspect and the following options are available:

- Replacing all those represented materials and components with new and tested components or filler metals (as applicable).
- Performing 100 percent examination of the remainder of the represented materials, components, or welds, and replacing each item that fails the PMI check.

8.2.2 PMI test shall be acceptable if each of the major alloy elements is detected to have a value no less than 10% below the minimum value nor more than 10% above the maximum value specified by the governing material ASME/ASTM specification/standard. Deposited production weld metal deposits shall be within  $\pm 12.5$  percent of the ranges allowed by ASME Section II Part C for each element.

## 9. SAMPLING PROCEDURE

### 9.1. PMI of Equipment at Vendor's Shop

The vendor shall perform PMI examination of the finish weld on at least one point of each joint inside and outside for all weld joints. When access is not possible to the inside weld and/or weld size is small, examination of the outside of a weld only shall be acceptable.

### 9.2. PMI of Piping Bulk Materials at Vendor's Shop

9.2.1. The vendor shall perform PMI examination of all samples chosen at random from an inspection batch. Unless otherwise specified, inspection will be carried out at random for at least 1 (one) per each heat, minimum 3

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points on each length of examined pipe, fitting and flanges. Valves inspection shall be carried out at random for at least 1(one) per each heat number of each internal part. Solid gaskets are required 100% PMI.

**9.2.2.** If any item from sample is found to be unacceptable, all remainder of that batch and two subsequent inspection batches shall be performed 20% PMI examination.

### 9.3. PMI of Welded Joints at Site

**9.3.1.** After installation on the final location at site, the color code marked on the piping systems shall be checked and recorded by the Construction Contractor.

**9.3.2.** Finished groove weld and the base metals of two side of joint, shall be examined on the one point of each joint up to 8" size and three points of each joint above 8". At least 5% of low alloy steel and at least 10% of stainless-steel weld joints shall be tested.

**9.3.3.** For higher-risk systems, the Employer/Third Party shall consider the need for employing a higher percentage of examination (up to 100%) rather than random sampling which may be more appropriate for lower-risk systems.

**9.3.4.** Finished groove weld of alloy equipment assembled at site shall be examined at least 5% of low alloy steel and at least 10% of stainless-steel weld joints.

### 9.4. PMI of Components at Site


PMI of equipment and its piping components such as pipes, fittings & flanges is not required at site since PMI examination of these components be done at Vendor's shop. Piping components (Bulk Materials) should be PMI tested at site, randomly when it seemed required by inspector, before their installation. The related welding shall be PMI verified after installation or after spool prefabrication. Meanwhile, All Repair/Replacement of materials for any non-conformance found during the subsequent PMI testing at site will be at the care and cost of the VENDOR. The reports of any verification performed at VENDOR shop shall be included in the material certification. Tube for shell/tube and air-cooled exchangers and fired boilers; 10 tubes or 10%, whichever is greater, from every heat number shall be selected at random and tested prior to installation.

## 10. REPORT SHEET

10.1 After PMI acceptance, all pieces and welds shall immediately be marked by means of roll marking, low stress die stamping, pen, paint marks or ink stamp to denote PMI conformance (Steel die stamps shall not be used on light wall-less than 5 mm thick- alloy material). Marking materials shall be used which are not detrimental to the materials being marked.

10.2 Refer to the attachment.

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		<p align="center"><b>PMI REPORT</b></p>						
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<p><b>REVISION NO.:05</b></p>		<p><b>REVISION NO.:03</b></p>						
<p><b>FORM CODE:FR-2024-05-29</b></p>		<p><b>REVISION DATE:2024-05-29</b></p>						
Project:		Client:		Report No.:				
Project:		OWNER:						
Reference:		Equipment No.:		DWG No.:				
ITP No:		Report Date:		Page:				
Acceptable Criteria (%)								
Alloy		Cr	Ni	Mo	Mn			
RO.	Item Description	Material	Chemical composition (Ave %)				Results	Remark
			Cr	Ni	Mo	Mn		
V:		C:		TPI:		O:		
