




CLIENT:  NISOC	Development Plan of 28 Reservoirs / BIBI HAKIMEH Oilfield (EPC)									CONTRACTOR  	
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	Vendor Document VD	Project Code BH	Work Package 00	Vendor Abbreviation KG	Facility 000	Discipline PI	Type PR	Sequence Number 2009	Rev. 02		

HARDNESS TEST PROCEDURE

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Status:

IFC: Issued For Comment





IFI: Issue for Information

IFA: Issue for Approval

AB-R: As-Built for COMPANY Review

FI: Final Issue

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1. INTRODUCTION

National Iranian South Oil Company (NISOC) plans to conduct an integrated project includes several sub-projects to preserve and increase production of Gachsaran oil fields located in south of Iran Khuzestan and Bushehr provinces as follow:

- 1) Revamping of Production and Desalting Units of Bibi Hakimeh 1&2
- 2) Fabrication & Installation a Preheater, Stripping Column and Related Equipment for Nargesi Production Unit

The purposes of first sub-project are equipping and extension of Bibihakime-2 desalting unit to achieve 110,000 SBPD desalted crude oil, and necessary modifications in Bibihakime-2 desalting & production units and Bibihakime-1 production unit so that the new plants will be able to process crude oil with 22% water cut and transfer waste water from Bibihakime-1 production unit to waste water treatment facilities in Bibihakime-1 desalting unit via installation of a none-metal pipe. Therefore, National Iranian South Oil Company (NISOC) has announced this project.

The purpose of second sub-project is crude oil sweetening in Nargesi plant by new design and necessary modifications in existing facilities. National Iranian South Oil Company (NISOC), on behalf of the National Iranian Oil Company (NIOC) is responsible to exploit oil and gas from onshore fields in the south district of Iran. According to management of planning & international affairs of National Iranian Oil Company (NIOC) pronouncement, H₂S content and RVP specification of exported oil shall be in the specified allowable range; Accordingly, NISOC has decided to fulfil a project, investigating and probing required equipment and operational conditions to meet the desired crude oil specifications of sulphur content and RVP for Nargesi production units.






2. SCOPE

Revamping of Production and Desalting Units of Bibi Hakimeh 1&2 and Fabrication & Installation a Preheater, Stripping Column and Related Equipment for Nargesi Production Unit sub-projects.

3. DEFINITIONS

Within the context of this document, the following definitions are applicable

Owner/Client	: National Iranian south oil company (NISOC)
Title	: Development Plan of 28 Reservoirs/ BIBI HAKIMEH Oilfield (EPC)
Contractor	: Mashin Sazi Arak/ Sealand Engineering and Well Services JV
Consultant	: Tehran Raymand Consulting Engineers

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- Will: Is normally used in connection with the action by the “Company” rather than by a contractor, supplier or vendor.
- May: Is used where a provision is completely discretionary
- Should: Is used where a provision is advisory only.
- Shall: Is used where a provision is mandatory.

4. TEST REQUIREMENTS





- 4.1 The diameter of the indentation shall be between 24 and 60 % of the ball diameter.
- 4.2 The Brinell hardness test is not recommended for materials above 650 HBW 10/3000.
- 4.3 Ring Joint gasket shall conform to ASME B16.20. Brinell hardness shall be 20~50 BHN less than that of corresponding flange grooves hardness.

5. TEST PIECE

- 5.1.1 There is no standard shape or size for a Brinell test specimen. The test piece on which the indentation is made should conform to the following:

5.2 Thickness - The thickness of the specimen tested shall be such that no bulge or other marking showing the effect of the test force appears on the side of the piece opposite the indentation. The thickness of the material under test should be at least ten times the depth of the indentation h (see Table below).

Minimum Specimen Thickness Based on Ten-Times the Indentation Depth								
Diameter of Indentation, d	Minimum Specimen Thickness							
	10 mm Ball		5 mm Ball		2.5 mm Ball		1 mm Ball	
	mm	in.	mm	in.	mm	in.	mm	in.
0.2							0.1	0.004
0.3							0.2	0.009
0.4							0.4	0.016
0.5							0.7	0.026
0.6					0.4	0.014	1.0	0.039
0.7					0.5	0.020		
0.8					0.7	0.026		
0.9					0.8	0.033		
1.0					1.0	0.041		
1.1					1.3	0.050		
1.2			0.7	0.029	1.5	0.060		
1.3			0.9	0.034	1.8	0.072		
1.4			1.0	0.039	2.1	0.084		
1.5			1.2	0.045	2.5	0.098		
1.6			1.3	0.052				
1.7			1.5	0.059				
1.8			1.7	0.066				
1.9			1.9	0.074				
2.0			2.1	0.082				
2.2			2.6	0.100				
2.4	1.5	0.058	3.1	0.121				
2.6	1.7	0.068	3.6	0.144				
2.8	2.0	0.079	4.3	0.169				
3.0	2.3	0.091	5.0	0.197				
3.2	2.6	0.104						
3.4	3.0	0.117						
3.6	3.4	0.132						
3.8	3.8	0.148						
4.0	4.2	0.164						
4.2	4.6	0.182						
4.4	5.1	0.201						
4.6	5.6	0.221						
4.8	6.1	0.242						
5.0	6.7	0.264						
5.2	7.3	0.287						
5.4	7.9	0.312						
5.6	8.6	0.338						
5.8	9.3	0.365						

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5.1.2 Width - The minimum width shall conform to the requirements for indentation spacing.

5.1.3 Finish - When necessary, the surface on which the indentation is to be made should be filed, ground, machined or polished flat with abrasive material so that the edge of the indentation can be clearly defined to permit the measurement of the diameter to the specified accuracy. Preparation shall be carried out in such a way that any alteration of the surface hardness of the test surface is minimized.

6. Hardness Test Procedure (by brinell hardness tester)

- 6.1 Sampling
- 6.2 Preparation according to 4.
- 6.3 Force loading to dwell time
- 6.4 Unloading
- 6.5 Brinell indentation measuring by microscope
- 6.6 Refer to table
- 6.7 Reading the BHN

7. Conversion to Other Hardness Scales or Tensile Strength Values

- The Standard Hardness Conversion Tables for Metals, E 140, give approximate conversion values for specific materials such as steel, austenitic stainless steel, nickel and high-nickel alloys, cartridge brass, copper alloys, and alloyed white cast irons.
- All working devices shall be calibrated and calibration certificate to be verified by TPA prior to commencement of work.

8. Maximum Hardness for Ring Gaskets

Table 1: Maximum Hardness for Ring Gaskets





Ring Gasket	Maximum Hardness	
	Brinell	Rockwell "B"
Soft iron [Note (1)]	90	56
Low-carbon steel	120	68
4-6 chrome 1/2Mo	130	72
Type 410	170	86
Type 304	160	83
Type 316	160	83
Type 347	160	83

NOTE: (1) May be low-carbon steel, not to exceed maximum hardness of 90 Brinell — 56 Rockwell "B."

9. Report

9.1 At a minimum, the test report shall include the following information:

9.1.1 The Brinell hardness value of the test results rounded to three significant digits in accordance with Practice E 29, for example, 125 HBW or 99.2 HBW.

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- 9.1.2 The test conditions, the applied force, ball diameter, and a 10 s to 15 s application of test force are used.
- 9.1.3 A statement that the indentation measuring device was Type A, for example.
- 9.1.4 The ambient temperature of the test.
- 9.1.5 Equipment name/model
- 9.1.6 Reference standard
- 9.1.7 Last calibration date

Brinell hardness Test Report

Customer:	Report No.:
Order No.:	Date:
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		Test Conditions
	Ref. Standards:	
	Ball Dia.:	
	Loading Force:	
	Test Duration (dwell Time):	
	Ambient temperature of the test:	
	Equipment name/ Model:	
	Last Calibration date:	

Results:

Sample	Hardness No.(HB)				Acceptance Criteria	Ref. Documents	Remark
	1	2	3	Ave.			

QC Expert:

QC Manager:

Inspected By: