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| **طرح نگهداشت و افزایش تولید 27 مخزن** | | | | | | | |
| **Hardness Test Procedure**  **نگهداشت و افزایش تولید میدان نفتی بینک** | | | | | | | |
| V01 | Oct.2023 | | IFR | Beh Koosh Vista | M.Fakharian | S.Faramarz pour |  |
| V00 | Aug.2023 | | IFR | Beh Koosh Vista | M.Fakharian | A.M.Mohseni |  |
| **Rev.** | **Date** | | **Purpose of Issue/Status** | **Prepared by:** | **Checked by:** | **Approved by:** | **Client Approval** |
|  | | |  | | | | |
| **Status:** | | |  | | --- | | **IFA: Issued for Approval**  **IFR: Issued for Review**  **IFI: Issued for Information**  **AFC: Approved for Construction** | | | | | | |

# Revision Record Sheet

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| **SHEET** | **V00** | **V01** | **V02** | **V03** | **V04** | **V05** | **V06** | **V07** |
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# Introduction

The purpose of this document is Implementation Hardness Measurement Method and cover macro hardness test of Pig Launcher and Pig Receiver Trap with item No: PL-3201, PR-3201 which are designed and fabricated by Vista Company.

The following terms shall be used in this document.

|  |  |
| --- | --- |
| Client: | * National Iranian South Oilfields Company (NISOC) |
| Project: | * Binak Oilfield Development – Manufacturing (w/Engineering & Material Supply) of Pig traps |
| EPD/EPC Contractor (GC): | * Petro Iran Development Company (PEDCO) |
| EPC Contractor/Purchaser: | * Joint Venture of: Hirgan Energy – Design & Inspection(D&I) Companies |
| Vendor: | * Nam Avaran Beh Koosh Vista |
| Executor: | * Executor is the party which carries out all or part of construction and/or commissioning for the project. |
| TPI: | * Third Party Inspector |

# Reference Documents

Unless stated otherwise all codes and standards referenced in this procedure shall be of the latest issue (including revisions – addenda and supplements) and the following documents shall be referred to along with this procedure.

|  |  |
| --- | --- |
| a) ASTM-E10 - 2021 | - Standard test method for Brinell hardness of metallic materials. |
| b) ASTM-E110 - 2021 | - Standard test method for indentation hardness of metallic materials by portable hardness testers. |
| c)ASTM-E140 - 2021 | - Hardness standard conversion for metals. |
| d) NACE MR 0175/ISO 15156-2020 |  |
| e) ASTM E92 | - Standard Test Methods for Vickers Hardness and Knoop Hardness of Metallic Materials |
| EN1043-1 – 2019 | * Hardness testing of weld in metallic materials. |
| ASME BPVC Sec. VIII, Div.1 - 2019 | - Boiler & Pressure Vessels code |
| Project specifications |  |

# Calibration

Instrument calibration shall be performed according to the requirements of ASTM E92.

Calibration shall be done according to the instrument manual and certification of calibration shall not be

expired. The standard block shall be calibrated in the periodic program. (5 years)

The instrument calibration shall be inserted to test report.

# Surface Preparation

Prior to hardness examination, the surface to be examined and all adjacent area shall be dry and free of all dirt, grease, welding flux and spatter, oil or other extraneous matter that could interfere with the examination. The spots shall be cleaned properly to remove rust, scale, and other foreign matters by means of wire brushing or grinding.

Grinding shall be conducted in such a manner that overheating of the material is prevented. then hardness testing of the weld is required, the weld cap shall be ground so that the indention ball can be placed in the center of the weld.

The test is normally carried out at ambient temperature within the limits of 10 to 35 ºC

# Hardness test Procedure

Hardness testing shall be carried out as ASTM E92.

Hardness test instrument shall be with small identification and digital display of hardness value.

Hardness test shall be done on base metal, HAZ & weld area at or near the center of the weld.

Measurement shall be applied for at least 3 points in every test location. Average data shall be considered.

For each set of hardness, the minimum spacing between the indent points shall be 2mm. Hardness shall not be carried out on the same test point.

The hardness report shall indicate actual hardness reading for the test.

Method, type of hardness tester, personnel conducting hardness test, type of material, and calibration shall be reported.

The surface of piece shall be grinded. Too big roughness of the measured surface could cause measure error. So, the measured surface must be metallic luster, smoothing and polish, without oil stain.

Hardness test shall be performed as below:

a) Minimum four test for each longitudinal weld line.

b) Minimum four test for each circumferential weld line (12,3,6,9 o'clock position).

c) Minimum four test for each nozzle and other attachment to main body (12,3,6,9 o'clock position).

d) Minimum four test for each nozzle to flange (12,3,6,9 o'clock position).

e) According to client's inspector.

If repair welding is performed after PWHT, hardness testing shall be carried out on repaired section.

# Acceptance criteria:

Acceptance criteria of hardness test is 22 HRC.

# Reporting

Results of measurements shall be written on the attached form.

Hardness testing results shall be expressed in ROCKWELL numbers.

# Appendix-1 PWHT Report Sample

