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| **طرح نگهداشت و افزایش تولید 27 مخزن** | | | | | | | |
| **Quality Control Plan (QCP)**  **نگهداشت و افزایش تولید میدان نفتی بینک** | | | | | | | |
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| **Status:** | **IFA: Issued For Approval**  **IFI: Issued For Information**  **AFC: Approved For Construction** | | | | | |

**REVISION RECORD SHEET**

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**1. SCOPE**

This Quality Manual describes inspection procedure on Air cooler for **the project.**

**2. DEFINITION AND ABBREVIATION**

Project Title: **خرید پکیج کولرهای هوایی ایستگاه تقویت فشار گاز بینک**

PLANT: Means an integrated New Polyethylene Plant with Design Capacity of Product consisting of Process Unit/Units, Utilities and Offsite Facilities and interconnections.

Project: Means the performance of all work for implementation of the PLANT inclusive of all WORK.

CONTRACT: Agreement Between OWNER and its CONTRACTOR MANAGING CONTRACTING

VENDOR: Aban Air Cooler

**3. REFERENCES**

• ASME Sec. VIII Div.1, Ed. 2023

• ASME Sec. II Part A, C, Ed. 2023

• ASME Sec. IX, Ed. 2023

• API 661, Ed 2013, Add 2018

**4. RESPONSIBILITY OF ORGANIZATIONAL QUALITY MANAGEMENT SYSTEM**

QHSE Manager is responsible for the preparation, issue and distribution of the QCP.

QCP will apply to the activities of the project to ensure that all works, supplies and services for the project are carried out in a planned and systematic manner based on the guidelines of this QCP.

Documents will be under constant review and will be amended.

**5. MATERIAL INSPECTION**

5.1 Manufacturer shall, prior to fabrication of Air cooler, check the heat number and the following items for the materials of pressure retaining parts:

1) Chemical composition and mechanical properties.

2) Heat treatment, if applicable.

3) Ultrasonic examination of the base metal shall be according to relevant procedure & NDT map and with the following criteria:

(1) Plate material and thickness over 30mm: in accordance with ASME code Section V and SA 578 level II(periphery and grid pattern).

(2) Forging material, plate-like one such as tube sheet, forging shell, and thickness over 100mm: ASTM A578

(3) Forging material not included in (2) above, and thickness over 100mm: ASTM A508 Par.7.3Rl

4) Impact test as per Code requirement & project specification.

5.2 Materials shall be free from injurious defects, such as surface flaw and lamination and these shall be visually inspected.

5.3 If material identification number will be disappeared due to cutting, the same identification marks shall be transferred to cut member.

**6. WELDING PROCEDURE & WELDER PERFORMANCE QUALIFICATION**

6.1 Welding Procedure Specification

All welding procedure specifications shall be prepared.

6.2 Procedure Qualification Record

Test procedures and acceptance standards of welding procedure qualification shall be in accordance with the requirement, in ASME Sec. lX.

6.3 Welding shall be performed by the welders qualified in accordance with the requirements in ASME Sec. IX.

**7. INSPECTION AND TEST OF WELDS**

7.1 Confirmation of Work under Welding Procedure

1) It shall be confirmed that all welders are qualified and that they are welding within the limits of their qualifications.

2) Kind of welding rod, condition of its dryness and other welding conditions shall be within the limits of welding procedure specification**.** should be considered by vendor.

7.2 Fit-up Inspection

1) Plates which are being welded shall be fitted, aligned and retained in position during the welding operation.

2) Tack welds used to secure alignment shall either be removed completely when they have served their purpose or their stopping and starting ends shall be properly prepared by grinding or other suitable means so that they may be satisfactorily incorporated into the final weld.

All tack welds shall be made in accordance with a previously approved welding procedure and shall be performed by qualified welders. Tack welds shall be of sufficient cross-section and length in order to avoid cracks, especially on high strength steel materials.

All harmful defects shall be removed or repaired.

3) Removable starting and stopping tabs shall be used for longitudinal welding where automatic welding processes are used.

4) Weld bevels shall be made by machining, grinding or thermal cutting, and the surfaces shall be reasonably smooth and true.

5) On manual flame cutting, metal shall be ground-off to sound, smooth surface to allow for proper welding.

6) Materials which require preheat for welding shall be preheated in the same manner for thermal cutting or arc-air gouging.

7) All surfaces and edges to be welded shall be smooth, uniform and free from cracks, tears, gouges and other discontinuities which could adversely affect the quality or strength of the weld.

7.3 Welding inspection

1) The surface of the parts to be welded shall be clean and free of scale, oil, grease and other deleterious foreign material for a distance of at least 1/12 inch from edge of the joint.

2) Joint preparation for welding shall be performed by machining, grinding, thermal cutting or combinations thereof.

Excessively deep or sharp irregularities in the joint edge shall be removed by machining or by grinding. Joint edge shall be free of cracks and laminations prior to welding.

3) The cut and gouged surfaces shall be ground to remove all slag, oxide, and surface irregularities greater than 1/16 inch in depth to obtain a bright, shiny finish.

4) Fillet size

Fillet welded joints are those of approximately triangular cross section, joining two surfaces at

approximately right angles to each other. The fillet sizes shall be measured with the welding

and shall not be less than the specified sizes on drawings.

5) The surface of welds shall be free of coarse ripples, grooves, overlaps, undercuts, abrupt ridges

or valleys and merge smoothly with the surface joined.

**8. VISUAL AND DIMENSIONAL INSPECTION (Acceptance Criteria for Dimensional Check)**

8.1 Visual Inspection

1) After completion of welding, the following items shall be visually inspected to be within the acceptance criteria.

a) Crack not permitted, remove if any

b) Undercut not to exceed 0.8mm

c) Bead width uniformity not to exceed 5.0mm

d) Bead height un-uniformity not to exceed 1.5mm

e) Incomplete penetration and lack of fusion not permitted

f) Insufficient toe length of fillet weld Add welding

g) Crater Remove

h) Bead dripping remove

i) Spatter Remove

j) Slag and porosity not exposed

k) Fittings and welded spots for temporary assembly

I) Eccentricity of weld seam not abnormal

m) Deformation due to welding stress not abnormal

2) Drain, vent and draw off nozzles shall be trimmed flush with the inside surface of the Header

8.2-Dimensional Inspection

1) Dimensions of the Headers and its parts shall be checked to meet vendor's drawing as approved by Owner, and their records shall be submitted to Owner.

2) Dimensional tolerance for Headers submits according to API 661

3) Bolt holes of bolted connections shall straddle the centerline of the vessel for nozzles located in shell, and the north - south centerline for nozzles located in heads.

**9. NON-DESTRUCTIVE EXAMINATION (According to approved NDT procedure & NDT map)**

9.1 Radiographic examination (RT)

Radiographic examination shall be performed in accordance with ASME Code Sec.Vlll, Div.1 Para. UW-51 and UW-52.

The acceptance criteria shall be accordance with the ASME Code Sec. Vlll, Div.1, Para.UW-51 Degree of radiographic examination shall be as shown in drawing.

1) Butt welded joints of nozzle neck with steel plate shall be fully radiographed.

9.2 Magnetic particle & Ultrasonic examination

Magnetic particle examination and acceptance criteria shall be per ASME Code Sec.V Article 7 per ASME Code Sec.V Article 7 and ASME Code Sec. VIII, Appendix 6 for MT

9.3 Liquid penetrant examination (PT)

Liquid penetrant examination and acceptance criteria shall be per ASME Code Sec.V Article 6 and ASME Code Sec. VIII Appendix 8 and ASTM E165 for PT.

1) Back chipped surface of Carbon steel and thickness of base metal is 50mm and over.

2) Welding surface after hydrostatic test. Inspection shall be on all accessible interior and exterior surfaces of Carbon steel which thickness of base metal is 38mm and over, or Full RT (100%) is specified.

3) All area where temporary attachment was welded and is removed shall be examined by MT or PT.

9.4 Ultrasonic Examination (UT) and Magnetic particle examination.

Ultrasonic examination and acceptance criteria for all corner joints shall be per ASME Code Sec.V Article 5 and ASME Code Sec. VIII, Appendix 12.

- Plates 30 mm and thicker shall be ultrasonically examined in accordance with ASME code Section V and SA 578 level II (periphery and grid pattern).

**10. PAINTING & RUST PREVENTATION INSPECTION**

Painting to be performed according to approved painting procedure,

10.1 Surface Preparation

1) All surfaces to be painted shall be cleaned and free of all dirt, dust, grease, oil or other containment.

2) All weld spatter, rough welds, sharp edges; etc. shall be ground smooth prior to shot blasting.

3) All exposed flange faces and other machined surfaces shall be coated with a readily removable rust preventative painting and covered to prevent damage of surfaces and entrance of foreign materials.

4) All bolts and nuts shall be coated with rust preventative oil

10.2 Climate

No painting operation shall be done in the following weather condition on the working area.

1) Rain, snow, fog or mist

Weather is expected to become adverse before the paint has been dried.

2) Dust effects adversely due to high wind.

3) Relative humidity is 85% or more

4) At temperature over 50 C

10.3 The first coat of paint shall be applied as soon as possible after, but in any case, on the same day, as the surface preparation has been completed.

10.4 Dry film thickness shall not less than the minimum dry film thickness specified in approved procedure and spec.

10.5 Check shall be made to uniformly and all the areas to be painted are completely painted.

10.6 Nozzle shall be painted on the flange edges, inside bolt holes, and up to the gasket surface.

**11. TUBE to Tube Sheet Joint**

For slight and firm expanding of tube / tube sheet connections, the following expanding equipment is available:

1) one-unit type NFAB-H for the mechanical / hydraulic expanding procedure, manufacture: Techno Data.

11.1 Evaluation of rolling quality

Quality department is responsible for controlling the rolling quality by random sample visual check.

11.2 Determination of rolling parameters (working sequence)

For setting the rolling parameters and determining the actual tube bulging, the

Following proceeding is necessary for fabrication.

1. Min. 10 bores per equipment to be marked and measured exactly and values to be entered on the rolling report.

2. Outside diameter of the tubes to be mounted are to be measured and values to be enter on the rolling report.

3. Bundle assembly, i.e. mounting of tubes into product distribution equipment.

4. Calculation of the inside diameter required for the tube bulging of the individual expansion, for the 10 bores measured.

5. Setting of machine parameters on the first tube so that when reaching the required inside diameter for this expansion, the rolling machine turns off, rounds off and drives back automatically.

6. The second tube to be rolled with these parameters, the set values to be checked and modifies, if required.

7. Rolled of complete tube bundle and control of tube bulging on the remaining 8 bores measured before.

All tubes holes for expanded joints shall be machined with at least one groove.

The tube expansion shall extend over a depth corresponding to 9/10th of the tube sheet thickness but with a maximum depth of 60mm.

After expansion, the tube ends shall protrude by 3 mm (+0, -1.5) from the tube sheet surface unless otherwise specified (vertical …).

After expansion, the tube sheet shall exhibit a flat surface to within ±0.8 mm.

Firm Expanding:4-5% firm expand mechanically the tubes with bulging,

11.3 DOCUMENTATION

It has to be documented:

- Tube sheet boring diameter H

- Tube outside diameter (od)

- Tube inside diameter (id) prior to rolling

- Tube inside diameter after rolling (d2)

- Tube bulging HA

**12. HYDROSTATIC TEST**

All pressure tests to be performed according to approved hydrostatic test.

1) Hydrostatic test pressure shall be as specified in the approved drawing.

2) Final visual and dimensional inspection shall be performed after hydrostatic test.

3) When carbon and low alloy steel materials are exposed to test water, chloride content in the water shall be less than 250ppm

4) The temperature of test water shall be at least 17°C above MDMT.

5) The hydrostatic test pressure shall be held at least 1 hour

6) No repair, welding or heat treatment shall be carried out after the hydrostatic test without permission.

12.1 Test Gauges

1) Two pressure gauges shall be used for hydrostatic test.

One is connected directly to the Headers for correct indication of the test pressure.

The other is connected where it will be visible to the operator throughout the duration of the test.

2) The pressure gauges shall be selected such that the intended maximum test pressure falls in the midrange of the instrument, but in no case shall the range be less than 1.5 nor more than 4 times the test pressure.

12.2 Emptying the Headers

After successful completion of the hydrostatic test, all test water shall be drained and internals shall be dried and inject with VCI

Dimensional inspection and specification should be controlled recording to owner data sheet.

**13. PACKING AND SHIPPING INSPECTION**

Packing and shipment to be performed according to approved packing, Packing and Shipping Procedure and Packing list

13.1 All Headers shall dry, thoroughly cleaned inside and outside and free of all dirt excess oil and loose foreign materials and charged with VCI

13.2 All flange openings shall be provided with bolted steel cover of minimum 4.5mm thickness with gasket.

Number of bolting is one fourth of the service bolt but not less than 4sets.

13.3 Volatile shall be applied for carbon steel Headers.

13.4 Spare parts shall be supplied separately boxed and properly identification.

13.5 No Headers shall be released for shipment from vendor's shop until it has been approved by purchaser's inspector.

**14. DOCUMENTATION**

1) Material Test Certificate

2) Non-Destructive examination report

3) Dimensional & Visual inspection report as per attached.

4) Hydrostatic test report

5) Paint inspection report







