طرح نگهداشت و افزایش تولید ۲۷ مخزن

SURFACE PREPARATION AND COATING/PAINTING PROCEDURE

نگهداشت و افزایش تولید میدان نفتی بینک

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Status:

IDC: Inter-Discipline Check
IFC: Issued For Comment
IFA: Issued For Approval
AFD: Approved For Design
AFC: Approved For Construction
AFP: Approved For Purchase
AFQ: Approved For Quotation
IFI: Issued For Information
AB-R: As-Built for CLIENT Review
AB-A: As-Built –Approved

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BK	GNRAL	PEDCO	000	QC	PR	0019	D00

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1 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.

GENERAL DEFINITION

The following terms shall be used in this document.

CLIENT:	National Iranian South Oilfields Company (NISOC)
PROJECT:	Binak Oilfield Development – General Facilities
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.
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.

2 SCOPE

This specification covers the minimum requirements for the surface preparation and paint application to the unprotected steel in the atmosphere, in water and in soil is subject to corrosion that may lead to damage, and the use of the above document in the development project of Binak oil field.

It shall be used in conjunction with data/requisition sheets for present document subject.

3 NORMATIVE REFERENCES

3.1 Local Codes and Standards

IPS-E-TP-100 Rev.2009	ENGINEERING STANDARDS FOR PAINTS
IPS-E-TP-270 Rev.2009	ENGINEERING STANDARD FOR PROTECTIVE COATINGS FOR BURIED AND SUBMERGED STEEL STRUCTURES

3.2 International Codes and Standards

ISO 8501-1:1988	Preparation of steel substrates before application of paints and related products — Visual assessment of surface cleanliness
SSPC-VIS-1	Visual Standard for Abrasive Blast Cleaned Steel (Standard Reference Photographs)
ASTM D3359	Standard Test Methods for Rating Adhesion by Tape Test
NACE RP0287	Field Measurement of Surface Profile of Abrasive Blast-Cleaned Steel Surfaces Using a Replica Tape
NACE RP0188	Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates
BS EN ISO 1461	Hot dip galvanized coatings on fabricated iron and steel articles — Specifications and test methods
SSPC-SP10	Near-White Metal Blast Cleaning (NACE NO. 2)

SSPC-SP11	Surface Preparation Standard No. 11 Power-Tool Cleaning to Bare Metal
SSPC-SP13	Joint Surface Preparation Standard NACE No. 6 Surface Preparation of Concrete
ASTM A123	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM D3359	Standard Test Methods for Rating Adhesion by Tape Test
SSPC-SP1	Surface Preparation Standard No. 1 Solvent Cleaning
SSPC-SP5	NACE No. 1/SSPC-SP 5 White Metal Blast Cleaning
NACE TM0170	STANDARD TEST METHOD VISUAL STANDARD FOR SURFACES OF NEW STEEL AIRBLAST CLEANED WITH SAND ABRASIVE
SIS 05 5900	Surface preparations standards for painting steel surface
NACE RP0288	Inspection of Linings on Steel and Concrete

3.3 The Project Documents

- BK-GNRAL-PEDCO-000-PI-SP-0006 SPECIFICATION FOR PAINTING
- BK-SSGRL-PEDCO-110-PI-SP-0001 Piping Material Specification
- BK-PPL-PEDCO-320-PI-SP-0001 Piping Material Specification
- BK-GCS-PEDCO-120-PI-SP-0001 Piping Material Specification
- BK-GNRAL-PEDCO-000-PI-SP-0004 Specification for Metallic pipes
- BK-GNRAL-PEDCO-000-PI-SP-0005 Specification For Fittings, Flanges, Gaskets and Bolts
- BK-GNRAL-PEDCO-000-PI-SP-0017 Specification For Cleaning and Flushing

3.4 Order of Precedence

In case of any conflict between the contents of this document or any discrepancy between this document and other project documents or reference standards, this issue must be reported to the CLIENT. The final decision in this situation will be made by CLIENT

4 SURFACE PREPARATION

4.1 Abrasive Material

The abrasive used in document is Metallic abrasives such as copper slag, cast steel or chilled iron shot or grit shall be used as abrasives for blast cleaning of steel surfaces.

4.2 Preparation Before Blast Cleaning

All rough cuts and welds, weld spatters, indentation. All surfaces and protrusions must be ground to smooth out the contour before the surface is prepared for painting. Any grinding performed after blast cleaning, must be rebated to require.

All bolt holes shall be drilled and blunted before blasting.

Prior to surface preparation, the surface shall be inspected for spotting oil and grease deposits or pollution on the surface. If any, the deposits of oil or grease shall be removed from the surface by solvent cleaning prior to further surface preparation.

4.3 Required Cleanliness

All surfaces prepared for coatings shall satisfy:

- SA 2.5 of the Swedish standard SIS 05 5900 or
- Near White Metal Blast cleaning of the surface preparation specification SP-10-63 T of the steel structures painting council or
- NACE No. 2 Near white blast cleaned surface finish in accordance with the NACE STANDARD TM-01-70.

4.4 Miscellaneous Standards

The latest edition of the following standards shall apply:

ASTM A 123 Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products- 2002 Edition

ASTM D3359 Test Method for Measuring Adhesion by Tape (According to clause 4.4). Test 2002 Edition

PR0188 Discontinuity (Holiday) Testing of protective coatings- 1999 Edition NACE Standard RP0287 Field Measurement of surface profile of abrasive blast cleaned steel surfaces using a replica tape-2002 edition

NACE Standard RP0288 Inspection of linings on steel and concrete (with drawn 2003) BS EN ISO 1461 Hot dip galvanized coatings on iron and steel articles specifications and test methods- 1999 edition

SSPC-SP10 Near white metal blast cleaning-2000 edition SSPC-SP11 Power tool cleaning to bare metal-2000 edition SSPC-SP13 Surface preparation concrete-1997 edition

SSPC-SP1 SP5 Specifications of the steel structures painting council

4.5 Required Roughness

All surfaces shall be blast cleaned to obtain a total angular roughness RT included: Between 30~50 microns when total thickness of the coats of paint applied is less than 400 microns. Between50~80 microns when total thickness of the coats of paint applied is greater than400 microns.

Only dry blasting techniques are allowed. Compressed air for abrasive blasting shall not contain any trace of oil or water. Blasting nozzle pressure shall not be less than 6.2 bar (90 psi g) the use of SPONGF JET process with the proper equipment is approved.

Except for very light shadows, very slight streaks or slight discoloration caused by rust stain, mill scale oxide or slight tight residues of paint or coating that may remain.
The reference standards are:

*** SA2- ½ * SP 10- 63 * NACE # 2 Standard preparation grade**	**Surface preparation method**	**Essential features of prepared surface**
Sa2	Blast Cleaning	Most of mill scale, rust, paint coatings and foreign matter is removed.
Sa2- 1/2		Mill scale, rust, paint coating and foreign matter are removed; any remaining traces of contamination shall show only as slight in the form.
Sa3		Mill scale, rust, paint coatings and foreign matter are removed. The surface shall have a uniform metallic color.

General Notes:
1- Compressed air for dry sand blasting shall contain no liquid and, in particular shall be without water and oil. Air compressor therefore shall be accordingly complete with proper liquid separator.

2- Precaution shall be taken to avoid sand entering inside equipment and piping.

The prime coat shall be applied as soon as possible after the blasting preparation is finished and always before the surface starts to rust. No sandblasting surface shall stand overnight before coating

4.6 Precautions

- Surface preparation by blasting techniques shall not be performed if:
  - The surface is likely to humid after surface preparation and before painting.
  - The surface temperature is less than 3 °C above the surrounding air dew point.
  - The airs relative humidity is greater than 80% [According to “Specification for Painting”]
- Surface preparation operations shall be terminated early enough during the day to permit application of the adopted primer on the prepared surface before the sun sets and rust in. Cleaned surfaces shall never be left overnight prior to coating, in such case re-blasting or re- cleaning is necessary. The prepared surface shall be wiped the next morning they shall be freshened with light blasting before the primer applied. A 50 mm wide strip along the perimeter of the blasted surface shall be left unprimed unless adjacent surfaces have already been coated or if it the last part of the surface to be prepared. Surface preparation shall be extended at least 25 mm to the interior of coated adjacent surfaces.
- During surface preparation, care shall be taken not damage or alter identification plates. Machined surfaces and parts coated in the factory. These parts shall be properly protected.
- Any oil grease, dust or foreign body present on the surface after surface preparation operations shall be removed before painting. If rust reappears on the surface, the surface shall be re blasted as per clauses 2.2 & 2.4.
- Copper slag or coal slag shall not be authorized for preparation of surfaces located in submerged or splash zones or for surface preparation of stainless steels.

4.7 Surfaces Not Blast Cleaned

Surface to be painted, which cannot be blast, cleaned due to inaccessibility or impracticality (e.g. oil instrument air tubing) may be cleaned either mechanically or chemically upon the approval of the Employer/Buyer's representative.

5 APPLICATION OF PAINT

5.1 Paint Systems

- Type number of coats and thickness must be in accordance with Specification for Painting, Doc. No. : BK-GNRAL-PEDCO-000-PI-SP-0006
- The primer to finishing coat paint shall be from the same manufacture for each system to ensure compatibility.
- Manufacturer recommendations and safety instructions form part this specification.
- In case of conflict, the manufacturers recommendations lake precedence.

5.2 Application

- Paint shall not be applied surfaces:
  - During rain, snow, fog or when dust is in suspension in the air, In the case of exterior locations, painting may also be suspended due to wind speed at the discretion of Owner. [According to “Specification for Painting”]
  - In areas where harmful particles are in suspension
  - When the metal surface temperature is less than 3 °C above the ambient dew point
  - When relative humidity is greater than 85% (95% when applying inorganic zinc silicate)
  - When temperature is below 5ºC
- Blast cleaned surfaces shall be primed as quickly as possible and at the latest during the day they shall be blast cleaned. The primer coat shall end 5 cm from a surface to be prepared on the same panel.
- As far as possible, each coat of paint shall be applied in a continuous, even coat free of holiday. Any area which has not been properly coated or missed be repainted.
- Each coat must cure or dry properly before application of the next coat. The applicator shall follow manufactures introductions.

- When several coat of the same type of paint have been specified, alternate coats of paint shall be tinted as much as possible to make sure that the surface is completely covered. If a colorant is added, it shall be compatible with the paint and not alter its service life.

5.3 Application By Pneumatic Spray Gun

Application by pneumatic spray gun must satisfy the following conditions:

- Equipment used shall be capable of spraying the paint properly. It shall be fitted with pressure indicators and regulators adapted to service. Nozzles and needles shall be those recommended by the equipment manufacturer for the paint being used. Equipment shall be maintained in good working order.

- Traps or separators shall be installed to trap oil or water condensed in the air. Traps or separators shall be of adequate capacity and drained regularly. Air from the spray gun impinging against the surface shall not deposit any oil or condensed water.

- Continuous mechanical agitation shall keep paint mixture in spray pots or containers at proper consistency.

- Pressure on the product in the spray pot and air in the gun shall be adjusted to obtain optimum atomization. Pressure on the product in the pot shall be set, if necessary, to accommodate gun height with respect to the can height. Air pressure in the gun shall be high enough to atomies paint without forming excessive mist or causing excessive evaporation of solvent.

- Spray equipment shall be kept clean so that dust, dry paint or other foreign matter are not deposited in the coat of paint.

- Any solvent left in the spray equipment shall be completely removed before applying the paint to the surface.

- Paint shall be applied in uniform coats with total spray pattern coverage. Spray patterns shall be such that paint is evenly applied.

- Drips or excess thickness shall be removed with a brush or the surface cleaned and repainted.

- Surfaces inaccessible by spray gun shall be brush painted. If they are inaccessible by brush, a sheep skin shall be used. Brushes shall be used to work paint into cracks. Crevices or other areas not properly coated by spraying.

- Special precaution shall be taken when inorganic zinc is applied. These are given the manufacturer's instructions.

6 INSPECTION/TESTS

6.1 Humidity Check

The air's relative humidity shall be measured with a psychomotor. Surface preparation and/or paint application operations shall not commence until relative humidity is less than the limits set in clauses 4.5 and 5.2.1. Relative humidity shall be measured and recorded a minimum of six (6) times a day whence two (2) times before commencement of work. Moisture on the surface being prepared or painted shall be measured every day with surface moisture indicator before beginning surface preparation operations or applying a coat of paint.

6.2 Roughness Check

Electronic roughness tester (Perth meter type or equivalent) a minimum of one measurement or impression shall be made per square meter of prepared surface.

6.3 Thickness Check

Dry paint thickness shall be measured with a magnetic probe, such as micro test or Elcometer or equivalent. It is imperative that the magnetic probe be calibrated for each thickness of coating steel support with a non-magnetic block whose thickness is as close as possible to the coating being cheeked.

Each coat's thickness and total thickness shall be checked. Make five (5) separate spot measurements spaced evenly over each section of the structure 10 square meters in area (divide the entire surface in 10 square meter areas).

On each spot, Make 3 readings by moving the probe a short distance for each new gage reading. Discard any unusually high or low gage reading that cannot be repeated consistently. Take the average of the three (3) gage readings as the spot measurement.

6.4 Adherence Check

Paint adherence shall be checked as per ASTM method D 3359. Method A (X cut) shall be used for paint film thicker than 125 microns. Method B (lattice pattern) shall be used for paint films up to 125 microns. Test method A: An X-cut is made in the film to the substrate; pressure-sensitive tape is applied over the cut and then removed. Acceptable rating are 5A (No peeling or removal) or 4A (Trace peeling or removal along incisions or at their intersections).Test

Method B: A lattice pattern with either six or eleven cuts in each direction (cross cut) is made in the film to the substrate, pressure-sensitive tape is applied over the lattice and then removed, and adhesion is evaluated by comparison with descriptions and illustrations. Spacing between the cut lines shall be 1mm for film thicknesses up to 50 microns and 2 mm for film thicknesses from 50 to 125 microns. Acceptable results are rate 5B (The edges of the cuts are completely smooth; none of the squares of the lattice is detached) or 4B (Small flakes of the coating are detached at intersections; less than 5% of the area is affected if the test is unsatisfactory. The entire surface shall be blast cleaned and repainted. Recoating after this destructive test is at the applicator's expense.

7 STORAGE MIXING AND THINING OF PRODUCTS

7.1 Storage Condttion

- All paint and thinner containers shall be kept closed before use and stored under shelter.
- Any paint which has gelled or settled during storage shall not be used.
- Any paint for which the shelf life is expired shall not be used.

7.2 Mixing

- All the ingredients in each container shall be thoroughly mixed and homogenized.
- Mechanical mixing shall be such that all pigments or other agents are held in solution during application.
- Paint mixing in the original container shall not be transferred until all settled particles have been remixed with the medium. This does not imply temporary removal of the medium to facilitate mixing.
- Paint shall not be mixed or held in solution with air bobbles.
- If a skin has formed in the container, it shall be cut and removed. If the skin is thicker that 1mm, the paint shall not be used.
- All pigmented product shall be strained after mixing unless applicator equipment is provided with adequate strainers. Strainers must allow all pigments to pass through, but not any skin.

7.3 Thinning

- No thinners are to be added unless necessary for proper application. Thinning must never exceed manufacturer recommendation.
- Thinners used must be those suggested by the manufacturer.
- When use of thinner is authorized by the manufacturer, it shall be added during mixing. Applicators shall not add thinner after the paint has been thinned to the proper consistency. Thinners must be added under the guidance of a specialist who is thoroughly familiar with the quantity and type of the added thinner.

8 REPAIR OF DAMAGED PAINT AREAS

When factory painted or paint surfaces have been marked in handling. The damaged paint and non-adherent paint shall be removed and the surface thoroughly cleaned. The edges of the damaged area shall be smoothed. Surface preparation shall extend. The primer and finishing coats shall be applied.

10. ATTACHMENT

ATTACHMENT#1: INSPECTION REPORT FOR BLASTING AND PAINTING

INSPECTION REPORT FOR BLASTING AND PAINTING

NOTIFICATION NO. : _____ DATE: _____

REPORT NO.: _____ SUBCONTRACTOR: _____

LOCATION: _____ REF. DWG. NO.: _____

DESCRIPTION: _____

Applied parts/Products: Paint system No.: Painting Method:	Surface Preparation : Method (prime coated only) Roughness:
Check	☐ Primer ☐Intermediate ☐ Final
Weather and Surface Conditions Ambient Temperature: ☐Accept ☐Reject Cleaning condition: ☐Accept ☐Reject Surface Temperature: ☐Accept ☐Reject Dew point: ☐Accept ☐Reject Relative Humidity(%): ☐Accept ☐Reject Others:	
Painting Material applied Product Name & No.: Manufacturer: Batch No.: A: B: Thinner:	
Inspection Result: ☐Accept ☐Reject	

NOTE:
Actual Dry Film Thickness (D.F.T.) to be recorded using an individual inspection report.
Adhesion Test Result to be reported separately.

SUBCONTRACTOR	HIRGAN-DI	PEDCO	NISOC
DATE: SIGN:	DATE: SIGN:	DATE: SIGN:	DATE: SIGN: