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| **طرح نگهداشت و افزایش تولید 27 مخزن** | | | | | | |
| **W.P.S & P.Q.R**  **نگهداشت و افزایش تولید میدان نفتی بینک** | | | | | | |
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| V00 | Nov. 2023 | IFR | Havayar Co. | M.Fakharian | S. FARAMARZPOUR |  |
| **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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| **PAGE** | **V00** | **V01** | **V02** | **V03** | **V04** |  | **PAGE** | **V00** | **V01** | **V02** | **V03** | **V04** |
| **1** | X |  |  |  |  | **66** |  |  |  |  |  |
| **2** | X |  |  |  |  | **67** |  |  |  |  |  |
| **3** | X |  |  |  |  | **68** |  |  |  |  |  |
| **4** | X |  |  |  |  | **69** |  |  |  |  |  |
| **5** | X |  |  |  |  | **70** |  |  |  |  |  |
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| **15** | X |  |  |  |  | **80** |  |  |  |  |  |
| **16** | X |  |  |  |  | **81** |  |  |  |  |  |
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| **52** |  |  |  |  |  | **117** |  |  |  |  |  |
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| **54** |  |  |  |  |  | **119** |  |  |  |  |  |
| **55** |  |  |  |  |  | **120** |  |  |  |  |  |
| **56** |  |  |  |  |  | **121** |  |  |  |  |  |
| **57** |  |  |  |  |  | **122** |  |  |  |  |  |
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| **62** |  |  |  |  |  | **127** |  |  |  |  |  |
| **63** |  |  |  |  |  | **128** |  |  |  |  |  |
| **64** |  |  |  |  |  | **129** |  |  |  |  |  |
| **65** |  |  |  |  |  | **130** |  |  |  |  |  |

Contents

[1.0 INTRODUCTION 4](#_Toc151545930)

[2.0 GENERAL DEFINITION 4](#_Toc151545931)

[3.0 Scope 5](#_Toc151545932)

[4.0 References 5](#_Toc151545933)

[5.0 W.PS. & P.Q.R 6](#_Toc151545934)

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.

As a part of the Project, a New Gas Compressor Station (adjacent to existing Binak GCS) shall be constructed to gather of 15 MMSCFD (approx.) associated gases and compress & transfer them to Siahmakan GIS.

1. **GENERAL DEFINITION**

The following terms shall be used in this document.

|  |  |
| --- | --- |
| CLIENT: | National Iranian South Oilfields Company (NISOC) |
| PROJECT: | Binak Oilfield Development – Surface Facilities; New Gas Compressor Station |
| EPD/EPC CONTRACTOR (GC): | Petro Iran Development Company (PEDCO) |
| OWNER: | OWNER is collectively refer to National Iranian South Oil Company (NISOC) and Petro Iran Development Company (PEDCO) |
| EPC CONTRACTOR: | Joint Venture of: Hirgan Energy – Design & Inspection (D&I) Companies |
| VENDOR: | HAVAYAR Company |
| EXECUTOR: | Executor is the party which carries out all or part of construction and/or commissioning for the project. |
| THIRD PARTY INSPECTOR (TPI): | The firm appointed by EPD/EPC CONTRACTOR (GC) and approved by CLIENT (in writing) for the inspection of goods. |
| 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. |
| MAY: | Is used where a provision is completely discretionary. |

1. **Scope**

The document provides the WPS & PQR produced by HAVAYAR Industrial Group. Content of this document is briefly presented in the following table.

1. **References**

* ASME Sec. VIII Div. 1 (edition 2020)
* ASME Sec. IX (edition 2020)
* Specification for Welding Procedure (BK-GNRAL-PEDCO-000-QC-PR-0015)

1. **W.PS. & P.Q.R**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SUMMARY OF W.P.S & P.Q.R** | | | | | | | | | |
| **WPS No.** | **BASE METAL THK, RANGE** | **BASE METAL**  **P- NO.** | **MATERIAL** | **JOINT DESIGN** | **WELDING PROCESS** | **PWHT** | **IMPACT TEST** | **PQR No.** | **PARTS** |
| WPS-HY-CS-0001 | 5~30 | 1 to 1 | SA-516 GR.70 (NACE MR0175)  to  SA-516 GR.70 (NACE MR0175) | GROOVE | GTAW,  SMAW | Yes | N/A | PQR-AT-CS-01 | Shell to Shell/Head |
| WPS-HY-CS-0002 | 1.5~14 | 1 to 1 | SA-106 Gr. B (NACE MR0175)  to  SA-106 Gr. B /SA-234 WPB (NACE MR0175) | GROOVE | GTAW,  SMAW | Yes | N/A | PQR-AT-CS-02 | Pipe to Pipe/Fitting |
| WPS-HY-CS-0003 | All Thickness | 1 to 1 | SA-36/SA-283 Gr. C  (NACE MR0175)  to  SA-516 Gr.70  (NACE MR0175) | FILLET | SMAW | Yes | N/A | PQR-AT-CS-01 | C.S. Internal & External Attachments |
| WPS-HY-CS-0004 | 5~30 | 1 to 1 | SA-106 Gr. B  (NACE MR0175)  to  SA-516 Gr.70  (NACE MR0175) | GROOVE | GTAW,  SMAW | Yes | N/A | PQR-AT-CS-01 | Pipe to Shell/Head (Without Pad) |
| WPS-HY-CS-0005 | 1.5~14 | 1 to 1 | SA-105  (NACE MR0175)  to  SA-106 Gr.B  (NACE MR0175) | GROOVE | GTAW,  SMAW | Yes | N/A | PQR-AT-CS-02 | Flange to Pipe |

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| **WPS No: WPS-HY-CS-0001** | | | | | | | | **JOINTS** | | | | | | | | |
| PQR No.: PQR-AT-CS-01 | | | | | | | | Joint Design: GROOVE | | | | | | | | |
| Welding Process: GTAW + SMAW | | | | | | | | Backing: □ Yes ■ No | | | | | | | | |
| Types: ☑ Manual □ Semiautomatic □ Automatic | | | | | | | | Backing Material or Type: N/A | | | | | | | | |
| **BASE METALS** | | | | | | | | Root Opening: 1.5±0.8 mm. | | | | | | | | |
| Material Spec.  Plate to Plate:  SA-516 Gr.70 (NACE MR0175) to SA-516 Gr.70 (NACE MR0175) | | | | | | | |  | | | | | | | | |
| P-NO. :  P-No. 1 to P-No. 1 | | | | | | | |
| Thickness Range:  Groove (Max.): 5~30, Fillet: N/A,  Max Weld Thk.: GTAW ≤ 4mm, SMAW ≤ 11mm  Max Pass Thk.: □ YES ■ NO | | | | | | | |
| **FILLER METALS** | | | | | | | | **ELECTRICAL CHARACTERISTICS** | | | | | | | | |
| F No.: | | GTAW | | SMAW | | | | Current AC or DC: DC | | | | | | | | |
| 6 | | 4 | | | |
| A No.: | | 1 | | 1 | | | | Polarity, Amps. & Volts (Range): SEE BELOW TABLE | | | | | | | | |
| Spec. No.: | | 5.18 | | 5.1 | | | | Tungsten Electrode Size & Type: | | | | | | | | |
| AWS No. (Class): | | ER70S-3 | | E7018-1 | | | | Transfer Mode: | | | | | | | | |
| Size of Filler Metal: | | 2.4 | | 3.2 | | | | Wire Feed Speed: | | | | | | | | |
| Trade Name: | | AMA40-13T | | AMA1177F | | | | Heat Input (Max): SEE BELOW TABLE | | | | | | | | |
| **POSITION** | | | | | | | | **TECHNIQUE** | | | | | | | | |
| Position: 1G, 2G, 5G | | | | | | | | String or Weave Bead: STRING & WEAVE | | | | | | | | |
| Welding Progression: - | | | | | | | | Orifice Nozzle, Or Gas Cup Size: 3.2 mm | | | | | | | | |
| **PREHEAT** | | | | | | | | Initial And Inter Pass Cleaning: BRUSHING & GRINDING | | | | | | | | |
| PREHEATING & INTERPASS TEMPERATURE | | | | | | | | Oscillation: | | | | | | | | |
| Temperature Minimum: 25°C | | | | | | | | Multi or Single Pass: MULTI PASS | | | | | | | | |
| Interpass Temperature Maximum: 170°C | | | | | | | | Single or Multiple Electrodes: SINGLE | | | | | | | | |
| Preheat Maintenance: | | | | | | | |  | | | | | | | | |
| **POST WELD HEAT TREATMENT** | | | | | | | | **GAS** | | | | | | | | |
| Temperature Range (°C): | | | | | | | | Percent Composition | | | | Gas | | Mixture | | Flow Rate (Min) |
| Temp: Min. 595°C | | | | | | | | Shielding | | | | Argon | | 99.99% | | 10~15 Lit/min |
| Hold Time: 1 hr. per Inch (25mm) Thk. & 15 min minimum | | | | | | | | Backing | | | | - | | - | | - |
| Training | | | | - | | - | | - |
| **ELECTRODE** | | | | | | | | | | | | | | | | |
| Weld Layers | Welding  Processes | | Filler Metal | | | | Current: Type \Amp(A) | | | | Volt  Range (V) | | Travel Speed  Range (cm/min) | | | Other |
| Class | | Dia. (mm) | | Polar | | Range. | |
| 1~2 | GTAW | | ER 70S-3 | | 2.4 | | EP | | 70 ~ 130 | | 7-10 | | 5-10 | | | - |
| 3~n | SMAW | | E7018-1 | | 3.2 | | EP | | 80 ~ 120 | | 19 ~ 20 | | 7-15 | | | - |
|  |  | |  | |  | |  | |  | |  | |  | | |  |
| Note:  Electrode Baking Condition: 300 to 350 °C for 2 Hours or Vacuum pack.  Special Requirement: NACE (SSC RG3 + HIC) / All welds to have PWHT / NDE Test: 100% | | | | | | | | | | | | | | | | |
| Name: | ………………………….……. | | | | | ………………………….……. | | | | ………………………….……. | | | | | ………………………….…. | |
| Signature: | ………………………….……. | | | | | ………………………….……. | | | | ………………………….……. | | | | | ………………………….…… | |
| Date: | ………………………….……. | | | | | ………………………….……. | | | | ………………………….……. | | | | | ………………………….…… | |
|  | Vendor | | | | | Contractor | | | | TPA | | | | | Client | |

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| **WPS No: WPS-HY-CS-0002** | | | | | | | | **JOINTS** | | | | | | | | |
| PQR No.: PQR-AT-CS-02 | | | | | | | | Joint Design: GROOVE | | | | | | | | |
| Welding Process: GTAW + SMAW | | | | | | | | Backing: □ Yes ■ No | | | | | | | | |
| Types: ☑ Manual □ Semiautomatic □ Automatic | | | | | | | | Backing Material or Type: N/A | | | | | | | | |
| **BASE METALS** | | | | | | | | Root Opening: 1.5±0.8 mm. | | | | | | | | |
| Material Spec.  Pipe to Pipe/Fitting:  SA-106 Gr.B (NACE MR0175) to SA-106 Gr.B (NACE MR0175)/SA-234 WPB (NACE MR0175) | | | | | | | |  | | | | | | | | |
| P-NO. :  P-No. 1 to P-No. 1 | | | | | | | |
| Thickness Range:  Groove (Max.): 1.5~14, Fillet: N/A,  Max Weld Thk.: GTAW ≤ 2mm, SMAW ≤ 5mm  Max Pass Thk.: □ YES ■ NO | | | | | | | |
| **FILLER METALS** | | | | | | | | **ELECTRICAL CHARACTERISTICS** | | | | | | | | |
| F No.: | | GTAW | | SMAW | | | | Current AC or DC: DC | | | | | | | | |
| 6 | | 4 | | | |
| A No.: | | 1 | | 1 | | | | Polarity, Amps. & Volts (Range): SEE BELOW TABLE | | | | | | | | |
| Spec. No.: | | 5.18 | | 5.1 | | | | Tungsten Electrode Size & Type: | | | | | | | | |
| AWS No. (Class): | | ER70S-3 | | E7018-1 | | | | Transfer Mode: | | | | | | | | |
| Size of Filler Metal: | | 2.4 | | 3.2 | | | | Wire Feed Speed: | | | | | | | | |
| Trade Name: | | AMA40-13T | | AMA1177F | | | | Heat Input (Max): SEE BELOW TABLE | | | | | | | | |
| **POSITION** | | | | | | | | **TECHNIQUE** | | | | | | | | |
| Position: 1G, 2G, 5G | | | | | | | | String or Weave Bead: STRING & WEAVE | | | | | | | | |
| Welding Progression: - | | | | | | | | Orifice Nozzle, Or Gas Cup Size: 3.2 mm | | | | | | | | |
| **PREHEAT** | | | | | | | | Initial And Inter Pass Cleaning: BRUSHING & GRINDING | | | | | | | | |
| PREHEATING & INTERPASS TEMPERATURE | | | | | | | | Oscillation: | | | | | | | | |
| Temperature Minimum: 25°C | | | | | | | | Multi or Single Pass: MULTI PASS | | | | | | | | |
| Interpass Temperature Maximum: 170°C | | | | | | | | Single or Multiple Electrodes: SINGLE | | | | | | | | |
| Preheat Maintenance: | | | | | | | |  | | | | | | | | |
| **POST WELD HEAT TREATMENT** | | | | | | | | **GAS** | | | | | | | | |
| Temperature Range (°C): | | | | | | | | Percent Composition | | | | Gas | | Mixture | | Flow Rate (Min) |
| Temp: Min. 595°C | | | | | | | | Shielding | | | | Argon | | 99.99% | | 10~15 Lit/min |
| Hold Time: 1 hr. per Inch (25mm) Thk. & 15 min minimum | | | | | | | | Backing | | | | - | | - | | - |
| Training | | | | - | | - | | - |
| **ELECTRODE** | | | | | | | | | | | | | | | | |
| Weld Layers | Welding  Processes | | Filler Metal | | | | Current: Type \Amp(A) | | | | Volt  Range (V) | | Travel Speed  Range (cm/min) | | | Other |
| Class | | Dia. (mm) | | Polar | | Range. | |
| 1~2 | GTAW | | ER 70S-3 | | 2.4 | | EP | | 70 ~ 130 | | 7-10 | | 5-10 | | | - |
| 3~n | SMAW | | E7018-1 | | 3.2 | | EP | | 80 ~ 120 | | 19 ~ 20 | | 7-15 | | | - |
|  |  | |  | |  | |  | |  | |  | |  | | |  |
| Note:  Electrode Baking Condition: 300 to 350 °C for 2 Hours or Vacuum pack.  Special Requirement: NACE (SSC RG3 + HIC) / All welds to have PWHT / NDE Test: 100% | | | | | | | | | | | | | | | | |
| Name: | ………………………….……. | | | | | ………………………….……. | | | | ………………………….……. | | | | | ………………………….…. | |
| Signature: | ………………………….……. | | | | | ………………………….……. | | | | ………………………….……. | | | | | ………………………….…… | |
| Date: | ………………………….……. | | | | | ………………………….……. | | | | ………………………….……. | | | | | ………………………….…… | |
|  | Vendor | | | | | Contractor | | | | TPA | | | | | Client | |

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| **WPS No: WPS-HY-CS-0003** | | | | | | | | **JOINTS** | | | | | | | | |
| PQR No.: PQR-AT-CS-01 | | | | | | | | Joint Design: FILLET | | | | | | | | |
| Welding Process: SMAW | | | | | | | | Backing: □ Yes ■ No | | | | | | | | |
| Types: ☑ Manual □ Semiautomatic □ Automatic | | | | | | | | Backing Material or Type: N/A | | | | | | | | |
| **BASE METALS** | | | | | | | | Root Opening: 1.5±0.8 mm. | | | | | | | | |
| Material Spec.  Internal/External Attachments:  SA-36/SA-283 Gr.C (NACE MR0175) to SA-516 Gr.70 (NACE MR0175) | | | | | | | |  | | | | | | | | |
| P-NO. :  P-No. 1 to P-No. 1 | | | | | | | |
| Thickness Range:  Groove (Max.): -, Fillet: All Thickness  Max Weld Thk.: GTAW ≤ -, SMAW ≤ All Thickness  Max Pass Thk.: □ YES ■ NO | | | | | | | |
| **FILLER METALS** | | | | | | | | **ELECTRICAL CHARACTERISTICS** | | | | | | | | |
| F No.: | | GTAW | | SMAW | | | | Current AC or DC: DC | | | | | | | | |
| - | | 4 | | | |
| A No.: | | - | | 1 | | | | Polarity, Amps. & Volts (Range): SEE BELOW TABLE | | | | | | | | |
| Spec. No.: | | - | | 5.1 | | | | Tungsten Electrode Size & Type: | | | | | | | | |
| AWS No. (Class): | | - | | E7018-1 | | | | Transfer Mode: | | | | | | | | |
| Size of Filler Metal: | | - | | 3.2 | | | | Wire Feed Speed: | | | | | | | | |
| Trade Name: | | - | | AMA1177F | | | | Heat Input (Max): SEE BELOW TABLE | | | | | | | | |
| **POSITION** | | | | | | | | **TECHNIQUE** | | | | | | | | |
| Position: 1G, 2G, 5G | | | | | | | | String or Weave Bead: STRING & WEAVE | | | | | | | | |
| Welding Progression: - | | | | | | | | Orifice Nozzle, Or Gas Cup Size: N/A | | | | | | | | |
| **PREHEAT** | | | | | | | | Initial And Inter Pass Cleaning: BRUSHING & GRINDING | | | | | | | | |
| PREHEATING & INTERPASS TEMPERATURE | | | | | | | | Oscillation: | | | | | | | | |
| Temperature Minimum: 25°C | | | | | | | | Multi or Single Pass: MULTI PASS | | | | | | | | |
| Interpass Temperature Maximum: 170°C | | | | | | | | Single or Multiple Electrodes: SINGLE | | | | | | | | |
| Preheat Maintenance: | | | | | | | |  | | | | | | | | |
| **POST WELD HEAT TREATMENT** | | | | | | | | **GAS** | | | | | | | | |
| Temperature Range (°C): | | | | | | | | Percent Composition | | | | Gas | | Mixture | | Flow Rate (Min) |
| Temp: Min. 595°C | | | | | | | | Shielding | | | | Argon | | 99.99% | | 10~15 Lit/min |
| Hold Time: 1 hr. per Inch (25mm) Thk. & 15 min minimum | | | | | | | | Backing | | | | - | | - | | - |
| Training | | | | - | | - | | - |
| **ELECTRODE** | | | | | | | | | | | | | | | | |
| Weld Layers | Welding  Processes | | Filler Metal | | | | Current: Type \Amp(A) | | | | Volt  Range (V) | | Travel Speed  Range (cm/min) | | | Other |
| Class | | Dia. (mm) | | Polar | | Range. | |
| 1~n | SMAW | | E7018-1 | | 3.2 | | EP | | 80 ~ 120 | | 19 ~ 20 | | 7-15 | | | - |
|  |  | |  | |  | |  | |  | |  | |  | | |  |
|  |  | |  | |  | |  | |  | |  | |  | | |  |
| Note:  Electrode Baking Condition: 300 to 350 °C for 2 Hours or Vacuum pack.  Special Requirement: NACE (SSC RG3 + HIC) / All welds to have PWHT / NDE Test: 100% | | | | | | | | | | | | | | | | |
| Name: | ………………………….……. | | | | | ………………………….……. | | | | ………………………….……. | | | | | ………………………….…. | |
| Signature: | ………………………….……. | | | | | ………………………….……. | | | | ………………………….……. | | | | | ………………………….…… | |
| Date: | ………………………….……. | | | | | ………………………….……. | | | | ………………………….……. | | | | | ………………………….…… | |
|  | Vendor | | | | | Contractor | | | | TPA | | | | | Client | |

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| **WPS No: WPS-HY-CS-0004** | | | | | | | | **JOINTS** | | | | | | | | |
| PQR No.: PQR-AT-CS-01 | | | | | | | | Joint Design: GROOVE | | | | | | | | |
| Welding Process: GTAW + SMAW | | | | | | | | Backing: □ Yes ■ No | | | | | | | | |
| Types: ☑ Manual □ Semiautomatic □ Automatic | | | | | | | | Backing Material or Type: N/A | | | | | | | | |
| **BASE METALS** | | | | | | | | Root Opening: 1.5±0.8 mm. | | | | | | | | |
| Material Spec.  Pipe to Shell/Head (without Pad):  SA-106 Gr.B (NACE MR0175) to SA-516 Gr.70 (NACE MR0175) | | | | | | | |  | | | | | | | | |
| P-NO. :  P-No. 1 to P-No. 1 | | | | | | | |
| Thickness Range:  Groove (Max.): 5~30, Fillet: N/A,  Max Weld Thk.: GTAW ≤ 4mm, SMAW ≤ 11mm  Max Pass Thk.: □ YES ■ NO | | | | | | | |
| **FILLER METALS** | | | | | | | | **ELECTRICAL CHARACTERISTICS** | | | | | | | | |
| F No.: | | GTAW | | SMAW | | | | Current AC or DC: DC | | | | | | | | |
| 6 | | 4 | | | |
| A No.: | | 1 | | 1 | | | | Polarity, Amps. & Volts (Range): SEE BELOW TABLE | | | | | | | | |
| Spec. No.: | | 5.18 | | 5.1 | | | | Tungsten Electrode Size & Type: | | | | | | | | |
| AWS No. (Class): | | ER70S-3 | | E7018-1 | | | | Transfer Mode: | | | | | | | | |
| Size of Filler Metal: | | 2.4 | | 3.2 | | | | Wire Feed Speed: | | | | | | | | |
| Trade Name: | | AMA40-13T | | AMA1177F | | | | Heat Input (Max): SEE BELOW TABLE | | | | | | | | |
| **POSITION** | | | | | | | | **TECHNIQUE** | | | | | | | | |
| Position: 1G, 2G, 5G | | | | | | | | String or Weave Bead: STRING & WEAVE | | | | | | | | |
| Welding Progression: - | | | | | | | | Orifice Nozzle, Or Gas Cup Size: 3.2 mm | | | | | | | | |
| **PREHEAT** | | | | | | | | Initial And Inter Pass Cleaning: BRUSHING & GRINDING | | | | | | | | |
| PREHEATING & INTERPASS TEMPERATURE | | | | | | | | Oscillation: | | | | | | | | |
| Temperature Minimum: 25°C | | | | | | | | Multi or Single Pass: MULTI PASS | | | | | | | | |
| Interpass Temperature Maximum: 170°C | | | | | | | | Single or Multiple Electrodes: SINGLE | | | | | | | | |
| Preheat Maintenance: | | | | | | | |  | | | | | | | | |
| **POST WELD HEAT TREATMENT** | | | | | | | | **GAS** | | | | | | | | |
| Temperature Range (°C): | | | | | | | | Percent Composition | | | | Gas | | Mixture | | Flow Rate (Min) |
| Temp: Min. 595°C | | | | | | | | Shielding | | | | Argon | | 99.99% | | 10~15 Lit/min |
| Hold Time: 1 hr. per Inch (25mm) Thk. & 15 min minimum | | | | | | | | Backing | | | | - | | - | | - |
| Training | | | | - | | - | | - |
| **ELECTRODE** | | | | | | | | | | | | | | | | |
| Weld Layers | Welding  Processes | | Filler Metal | | | | Current: Type \Amp(A) | | | | Volt  Range (V) | | Travel Speed  Range (cm/min) | | | Other |
| Class | | Dia. (mm) | | Polar | | Range. | |
| 1~2 | GTAW | | ER 70S-3 | | 2.4 | | EP | | 70 ~ 130 | | 7-10 | | 5-10 | | | - |
| 3~n | SMAW | | E7018-1 | | 3.2 | | EP | | 80 ~ 120 | | 19 ~ 20 | | 7-15 | | | - |
|  |  | |  | |  | |  | |  | |  | |  | | |  |
| Note:  Electrode Baking Condition: 300 to 350 °C for 2 Hours or Vacuum pack.  Special Requirement: NACE (SSC RG3 + HIC) / All welds to have PWHT / NDE Test: 100% | | | | | | | | | | | | | | | | |
| Name: | ………………………….……. | | | | | ………………………….……. | | | | ………………………….……. | | | | | ………………………….…. | |
| Signature: | ………………………….……. | | | | | ………………………….……. | | | | ………………………….……. | | | | | ………………………….…… | |
| Date: | ………………………….……. | | | | | ………………………….……. | | | | ………………………….……. | | | | | ………………………….…… | |
|  | Vendor | | | | | Contractor | | | | TPA | | | | | Client | |

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| **WPS No: WPS-HY-CS-0005** | | | | | | | | **JOINTS** | | | | | | | | |
| PQR No.: PQR-AT-CS-02 | | | | | | | | Joint Design: GROOVE | | | | | | | | |
| Welding Process: GTAW + SMAW | | | | | | | | Backing: □ Yes ■ No | | | | | | | | |
| Types: ☑ Manual □ Semiautomatic □ Automatic | | | | | | | | Backing Material or Type: N/A | | | | | | | | |
| **BASE METALS** | | | | | | | | Root Opening: 1.5±0.8 mm. | | | | | | | | |
| Material Spec.  Flange to Pipe:  SA-105- NACE MR0175 to SA-106 Gr.B- NACE MR0175 | | | | | | | |  | | | | | | | | |
| P-NO. :  P-No. 1 to P-No. 1 | | | | | | | |
| Thickness Range:  Groove (Max.): 1.5~14, Fillet: N/A,  Max Weld Thk.: GTAW ≤ 2mm, SMAW ≤ 5mm  Max Pass Thk.: □ YES ■ NO | | | | | | | |
| **FILLER METALS** | | | | | | | | **ELECTRICAL CHARACTERISTICS** | | | | | | | | |
| F No.: | | GTAW | | SMAW | | | | Current AC or DC: DC | | | | | | | | |
| 6 | | 4 | | | |
| A No.: | | 1 | | 1 | | | | Polarity, Amps. & Volts (Range): SEE BELOW TABLE | | | | | | | | |
| Spec. No.: | | 5.18 | | 5.1 | | | | Tungsten Electrode Size & Type: | | | | | | | | |
| AWS No. (Class): | | ER70S-3 | | E7018-1 | | | | Transfer Mode: | | | | | | | | |
| Size of Filler Metal: | | 2.4 | | 3.2 | | | | Wire Feed Speed: | | | | | | | | |
| Trade Name: | | AMA40-13T | | AMA1177F | | | | Heat Input (Max): SEE BELOW TABLE | | | | | | | | |
| **POSITION** | | | | | | | | **TECHNIQUE** | | | | | | | | |
| Position: 1G, 2G, 5G | | | | | | | | String or Weave Bead: STRING & WEAVE | | | | | | | | |
| Welding Progression: - | | | | | | | | Orifice Nozzle, Or Gas Cup Size: 3.2 mm | | | | | | | | |
| **PREHEAT** | | | | | | | | Initial And Inter Pass Cleaning: BRUSHING & GRINDING | | | | | | | | |
| PREHEATING & INTERPASS TEMPERATURE | | | | | | | | Oscillation: | | | | | | | | |
| Temperature Minimum: 25°C | | | | | | | | Multi or Single Pass: MULTI PASS | | | | | | | | |
| Interpass Temperature Maximum: 170°C | | | | | | | | Single or Multiple Electrodes: SINGLE | | | | | | | | |
| Preheat Maintenance: | | | | | | | |  | | | | | | | | |
| **POST WELD HEAT TREATMENT** | | | | | | | | **GAS** | | | | | | | | |
| Temperature Range (°C): | | | | | | | | Percent Composition | | | | Gas | | Mixture | | Flow Rate (Min) |
| Temp: Min. 595°C | | | | | | | | Shielding | | | | Argon | | 99.99% | | 10~15 Lit/min |
| Hold Time: 1 hr. per Inch (25mm) Thk. & 15 min minimum | | | | | | | | Backing | | | | - | | - | | - |
| Training | | | | - | | - | | - |
| **ELECTRODE** | | | | | | | | | | | | | | | | |
| Weld Layers | Welding  Processes | | Filler Metal | | | | Current: Type \Amp(A) | | | | Volt  Range (V) | | Travel Speed  Range (cm/min) | | | Other |
| Class | | Dia. (mm) | | Polar | | Range. | |
| 1~2 | GTAW | | ER 70S-3 | | 2.4 | | EP | | 70 ~ 130 | | 7-10 | | 5-10 | | | - |
| 3~n | SMAW | | E7018-1 | | 3.2 | | EP | | 80 ~ 120 | | 19 ~ 20 | | 7-15 | | | - |
|  |  | |  | |  | |  | |  | |  | |  | | |  |
| Note:  Electrode Baking Condition: 300 to 350 °C for 2 Hours or Vacuum pack.  Special Requirement: NACE (SSC RG3 + HIC) / All welds to have PWHT / NDE Test: 100% | | | | | | | | | | | | | | | | |
| Name: | ………………………….……. | | | | | ………………………….……. | | | | ………………………….……. | | | | | ………………………….…. | |
| Signature: | ………………………….……. | | | | | ………………………….……. | | | | ………………………….……. | | | | | ………………………….…… | |
| Date: | ………………………….……. | | | | | ………………………….……. | | | | ………………………….……. | | | | | ………………………….…… | |
|  | Vendor | | | | | Contractor | | | | TPA | | | | | Client | |