|  |
| --- |
| **طرح نگهداشت و افزایش تولید 27 مخزن** |
| **W.P.S & P.Q.R****نگهداشت و افزایش تولید میدان نفتی بینک** |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| 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**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **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** |  |  |  |  |  |
| **6** | X |  |  |  |  | **71** |  |  |  |  |  |
| **7** | X |  |  |  |  | **72** |  |  |  |  |  |
| **8** | X |  |  |  |  | **73** |  |  |  |  |  |
| **9** | X |  |  |  |  | **74** |  |  |  |  |  |
| **10** | X |  |  |  |  | **75** |  |  |  |  |  |
| **11** | X |  |  |  |  | **76** |  |  |  |  |  |
| **12** | X |  |  |  |  | **77** |  |  |  |  |  |
| **13** | X |  |  |  |  | **78** |  |  |  |  |  |
| **14** | X |  |  |  |  | **79** |  |  |  |  |  |
| **15** | X |  |  |  |  | **80** |  |  |  |  |  |
| **16** | X |  |  |  |  | **81** |  |  |  |  |  |
| **17** | X |  |  |  |  | **82** |  |  |  |  |  |
| **18** | X |  |  |  |  | **83** |  |  |  |  |  |
| **19** | X |  |  |  |  | **84** |  |  |  |  |  |
| **20** | X |  |  |  |  | **85** |  |  |  |  |  |
| **21** | X |  |  |  |  | **86** |  |  |  |  |  |
| **22** | X |  |  |  |  | **87** |  |  |  |  |  |
| **23** | X |  |  |  |  | **88** |  |  |  |  |  |
| **24** | X |  |  |  |  | **89** |  |  |  |  |  |
| **25** | X |  |  |  |  | **90** |  |  |  |  |  |
| **26** | X |  |  |  |  | **91** |  |  |  |  |  |
| **27** | X |  |  |  |  | **92** |  |  |  |  |  |
| **28** |  |  |  |  |  | **93** |  |  |  |  |  |
| **29** |  |  |  |  |  | **94** |  |  |  |  |  |
| **30** |  |  |  |  |  | **95** |  |  |  |  |  |
| **31** |  |  |  |  |  | **96** |  |  |  |  |  |
| **32** |  |  |  |  |  | **97** |  |  |  |  |  |
| **33** |  |  |  |  |  | **98** |  |  |  |  |  |
| **34** |  |  |  |  |  | **99** |  |  |  |  |  |
| **35** |  |  |  |  |  | **100** |  |  |  |  |  |
| **36** |  |  |  |  |  | **101** |  |  |  |  |  |
| **37** |  |  |  |  |  | **102** |  |  |  |  |  |
| **38** |  |  |  |  |  | **103** |  |  |  |  |  |
| **39** |  |  |  |  |  | **104** |  |  |  |  |  |
| **40** |  |  |  |  |  | **105** |  |  |  |  |  |
| **41** |  |  |  |  |  | **106** |  |  |  |  |  |
| **42** |  |  |  |  |  | **107** |  |  |  |  |  |
| **43** |  |  |  |  |  | **108** |  |  |  |  |  |
| **44** |  |  |  |  |  | **109** |  |  |  |  |  |
| **45** |  |  |  |  |  | **110** |  |  |  |  |  |
| **46** |  |  |  |  |  | **111** |  |  |  |  |  |
| **47** |  |  |  |  |  | **112** |  |  |  |  |  |
| **48** |  |  |  |  |  | **113** |  |  |  |  |  |
| **49** |  |  |  |  |  | **114** |  |  |  |  |  |
| **50** |  |  |  |  |  | **115** |  |  |  |  |  |
| **51** |  |  |  |  |  | **116** |  |  |  |  |  |
| **52** |  |  |  |  |  | **117** |  |  |  |  |  |
| **53** |  |  |  |  |  | **118** |  |  |  |  |  |
| **54** |  |  |  |  |  | **119** |  |  |  |  |  |
| **55** |  |  |  |  |  | **120** |  |  |  |  |  |
| **56** |  |  |  |  |  | **121** |  |  |  |  |  |
| **57** |  |  |  |  |  | **122** |  |  |  |  |  |
| **58** |  |  |  |  |  | **123** |  |  |  |  |  |
| **59** |  |  |  |  |  | **124** |  |  |  |  |  |
| **60** |  |  |  |  |  | **125** |  |  |  |  |  |
| **61** |  |  |  |  |  | **126** |  |  |  |  |  |
| **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**

|  |
| --- |
| **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)toSA-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)toSA-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)toSA-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)toSA-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)toSA-106 Gr.B(NACE MR0175) | GROOVE | GTAW,SMAW | Yes | N/A | PQR-AT-CS-02 | Flange to Pipe |

|  |  |
| --- | --- |
| **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 ≤ 11mmMax 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 | WeldingProcesses | Filler Metal | Current: Type \Amp(A) | VoltRange (V) | Travel SpeedRange (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 |

|  |  |
| --- | --- |
| **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 ≤ 5mmMax 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 | WeldingProcesses | Filler Metal | Current: Type \Amp(A) | VoltRange (V) | Travel SpeedRange (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 |

|  |  |
| --- | --- |
| **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 | WeldingProcesses | Filler Metal | Current: Type \Amp(A) | VoltRange (V) | Travel SpeedRange (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 |

|  |  |
| --- | --- |
| **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 ≤ 11mmMax 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 | WeldingProcesses | Filler Metal | Current: Type \Amp(A) | VoltRange (V) | Travel SpeedRange (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 |

|  |  |
| --- | --- |
| **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 ≤ 5mmMax 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 | WeldingProcesses | Filler Metal | Current: Type \Amp(A) | VoltRange (V) | Travel SpeedRange (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 |