

Số: 064/CH-PNP2

V/v đề nghị chào giá cung cấp vật tư Tee -
Strainer phục vụ công tác thi công Dự án
PVOIL New Pumps giai đoạn 2.

Thanh Hóa, ngày 11 tháng 6 năm 2024

Kính gửi: **Quý công ty**

Công ty Cổ phần Dịch vụ Kỹ thuật PTSC Thanh Hóa (PTSC Thanh Hóa) hiện đang có nhu cầu mua vật tư T-Strainer phục vụ thi công Dự án PVOIL New Pumps giai đoạn 2, cụ thể như sau:

Stt	Nội dung	Số lượng	Ghi chú
1	PIPING SPECIALTY COMPONENT (STRAINER TEE TYPE BW) - DN300	04	

Công ty PTSC Thanh Hóa xin mời Quý Công ty tham gia chào giá cung cấp dịch vụ nói trên với các điều khoản về kỹ thuật như sau:

1. Điều kiện thanh toán:

- Bằng chuyển khoản
- Đồng tiền thanh toán: Đồng Việt Nam

2. Yêu cầu kỹ thuật:

- Yêu cầu xuất xứ: Non - China, India, Taiwan
- Chi tiết xin xem tài liệu đính kèm

3. Đơn giá chào hàng:

- Đề nghị giá chào bao gồm giá trị hàng hóa, thuế giá trị gia tăng, các loại thuế, phí nhập khẩu, chi phí giao hàng, và các chi phí khác (nếu có) để thực hiện công việc.

4. Thời gian giao hàng:

- Đề nghị chào thời gian giao hàng sớm nhất mà Quý Công ty có thể cung cấp, tuy nhiên không trễ hơn 10 tuần kể từ khi có đơn đặt hàng.

5. Thời gian và Hình thức nhận thư chào giá:

- Thời gian: Bảo đảm PTSC Thanh Hóa nhận được thư chào giá trước 11 giờ ngày 15/6/2024
- Hình thức nhận chào giá: Bằng phong bì kín
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6. Điều kiện xem xét trúng thầu:

- Báo giá được tiếp nhận trước 11 giờ ngày 15/6/2024;
- Hiệu lực báo giá tối thiểu 30 ngày;
- Đáp ứng yêu cầu kỹ thuật;
- Có giá đánh giá thấp nhất và thấp hơn dự toán đã được phê duyệt.

Xin chân thành cảm ơn./.

NSRP Complex Project Nghị Sơn, Vietnam	 Nghị Sơn Refinery and Petrochemical Limited Liability Company	Employer Doc. No.	
		Contractor Doc. No. S-000-1360-0201J	
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Technical Specification for Strainers

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HOLD LIST

No.	Para.	Subject	Description

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1 PURPOSE AND SCOPE

This specification covers the minimum requirements for the following materials in NSRP (Nghi Son Refinery and Petrochemical) Complex Project:

- T - Type Strainers
- Y - Type Strainers
- Bucket Type Strainers

This specification covers the materials which are shown in Attachment-1 “Datasheet for Strainers”.

This specification is intended to supplement, not replace, the requirements in ANSI, ASME, ASTM, MSS or other codes and standards. Where the applicable codes and standards specify more stringent requirements, they shall take precedence over this specification.

In case if conflict among the applicable codes, standards, and applicable specifications; Vendor is responsible to inform Purchaser of the conflict, in writing, for clarification and resolution before proceeding with manufacture or procurement of the affected materials. Vendor is not at liberty to assume which requirements govern.

It is Vendor’s responsibility to obtain Purchaser’s approvals required in this specification before order placement.

2 DEFINITIONS

The following definitions shall apply:

- Employer : Nghi Son Refinery and Petrochemical Limited Liability Company (NSRP)
- Contractor : A Joint Venture formed by JGC Corporation, Chiyoda Corporation, GS Engineering & Construction Corporation, SK Engineering & Construction Co., Ltd., Technip France and Technip Geoproduction (M) Sdn. Bhd., as Contractor for the execution of the NSRP Complex Project
- Vendor : Nominated by the Contractor and approved by Employer
- Carbon steel : Carbon steel includes LTCS (Low Temperature Carbon Steel such as ASTM A333 Gr 6 or ASTM A420 WPL6), unless otherwise specified.
- Low alloy steel : Low alloy steel includes 1.25Cr-0.5Mo steel, 2.25Cr-1Mo steel, 5Cr-0.5Mo steel and 9Cr-1Mo steel, unless otherwise specified.

3 REFERENCE DOCUMENTS

3.1 Project Specifications & Standards

3.1.1 Project Specifications

- S-000-1520-0108V Positive Materials Identification (PMI) of Alloy Bulk Materials
- S-000-1520-0109V Positive Materials Identification (PMI) at Vendor’s Works
- S-000-1670-0006V General Requirement for Field Fabrication of Piping.

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S-000-1351-0004V	Submission of Welding and Manufacturing Procedures
S-000-13A0-0001V	Specification for Painting
S-000-13A0-0002V	Specification for Rust Prevention.
S-000-1450-0001V	Project Shipping and Packing Instructions to Vendor
	Datasheet for Strainers

3.2 International Standards

Where no specific revision numbers or issue dates of the international standards are specified, the latest versions of them as of 27, January 2013 shall govern.

3.2.1 American Society of Mechanical Engineers (ASME)

ASME B1.1	Unified Inch Screw Threads
ASME B1.20.1	Pipe Threads, General Purpose (Inch)
ASME B16.5	Pipe Flanges and Flanged Fittings
ASME B16.9	Factory-Made Wrought Buttwelding Fittings
ASME B16.20	Metallic Gaskets for Pipe Flanges
ASME B16.21	Non Metallic Flat Gaskets for Pipe Flanges
ASME B16.25	Buttwelding Ends
ASME B16.34	Valves Flanged, Threaded and Welding end
ASME B16.47	Large Diameter Steel Flanges
ASME B18.2.1	Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series)
ASME B18.2.2	Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series)
ASME B31.3	Process Piping
ASME Section II Part A	Ferrous Material Specifications
ASME Section V	Non-destructive Examination
ASME Section VIII	Rules For Construction Of Pressure Vessels
ASME Section IX	Welding and Brazing Qualifications

3.2.2 American Society for Testing Materials (ASTM)

ASTM – The latest editions published as of 27, January 2013.

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3.2.3 European Standards

EN 10204	Metallic Products - Types of Inspection Documents
EN 10222	Steel forgings for pressure purposes
EN 10213	Steel castings for pressure purposes

3.2.4 Other Applicable International Standards

NACE RP0170	Protection of Austenitic Stainless Steels and other Austenitic Alloys from Polythionic Acid Stress Corrosion Cracking During Shutdown of Refinery Equipment
NACE MR0103	Materials Resistant to Sulfide Stress Cracking in Corrosive Petroleum Refining Environments
NACE TM0284	Evaluation of Pipeline and Pressure Vessel Steels for Resistance to Hydrogen-Induced Cracking
NACE SP0472	Methods and Controls to Prevent In-Service Environmental Cracking of Carbon Steel Weldments in Corrosive Petroleum Refining Environments

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4 DESIGN AND DIMENSIONS

4.1 Internal Components

4.1.1 Internal components (sieves, sieve guides, etc.) of strainers as an assembled condition, other than those to be installed upstream of compressors, shall be designed to withstand 294kpa (3kgf/cm²) of differential pressure considering the case sieves are blocked up by foreign matter. The internal components of strainers upstream of compressors shall be designed to withstand 490 Kpa (5 Kgf/cm²) differential pressure.

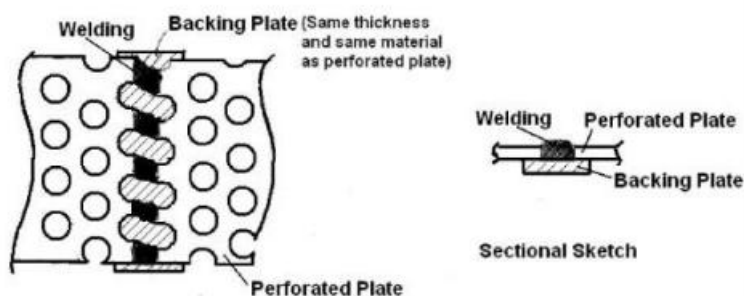
4.1.2 Sieves shall consist of screens and perforated plates. Sieves made of screens only or sieves made of perforated plates only is acceptable, if the sieves satisfy the collapse strength specified in paragraph 4.1.1 and the filtering requirements specified in the data sheet.

4.1.3 “Effective Filtering Area Ratio” is defined as follows.

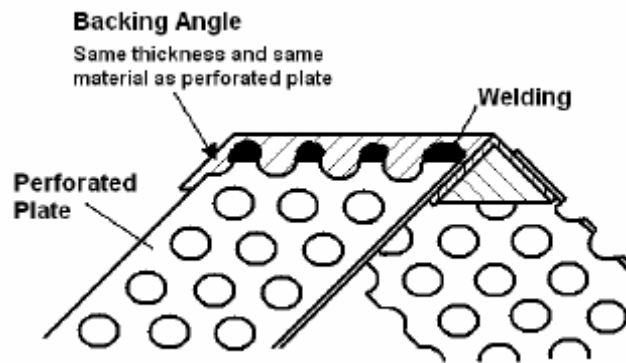
$$\frac{100 \times (\text{Open ratio of screen}) \times (\text{Open ratio of perforated plate}) \times (\text{Screen surface area})}{(\text{Strainer inlet nozzle area})}$$

4.1.4 Perforated plates shall be connected through a solid steel backing plate as shown in the following figure. The backing materials shall be same as perforated plate. Direct welding between ends of perforated plate is not acceptable.

Figure-1

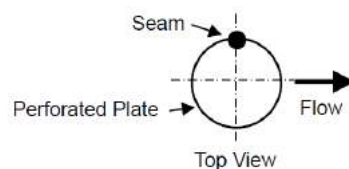


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- 4.1.5 Perforated plate seam shall be 90 degree angles against flow direction as shown in the following figure, except for T- Bathtub type strainers. In addition, screen seam and perforated plate seam shall not overlap each other.

Figure-4



4.2 Specific Requirements for Each Type of Strainers

4.2.1 Y – Type Strainers

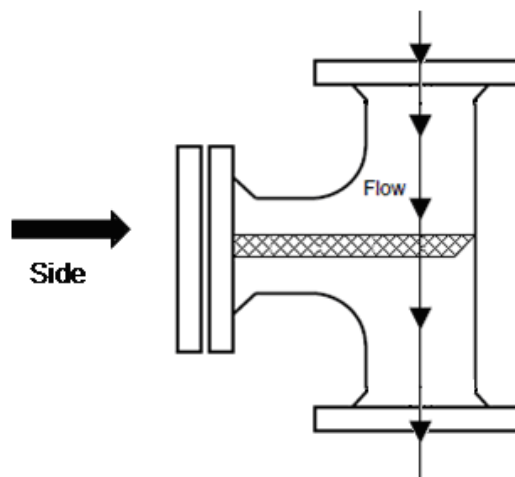
- 1) Y – type strainers (NPS 2 and smaller) shall be designed and provided with the following features:
 - a) One (1) piece forged body or cast body
 - b) Size of branch side equal to that of body end connection
 - c) End of branch side shall have flanged cover or threaded plug, as specified in the data sheet
 - d) Sieve shall be truncated cone type or cylindrical type
 - e) Sieve shall be able to be pulled out from body for maintenance
 - f) Sieve upper rim shall fit to sieve stopper ring, and sieve lower rim shall fit to cover flange or plug. The following gaps shall not exceed 1mm.
 - at any point between sieve rim and stopper ring.
 - at any point between sieve rim and cover flange.

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- at any point between sieve rim and plug.

4.2.2 T – Bathtub Type Strainers

- 1) T – bathtub type strainers shall be designed and provided with the following features:
 - a) T – bathtub type strainers are illustrated as follows:

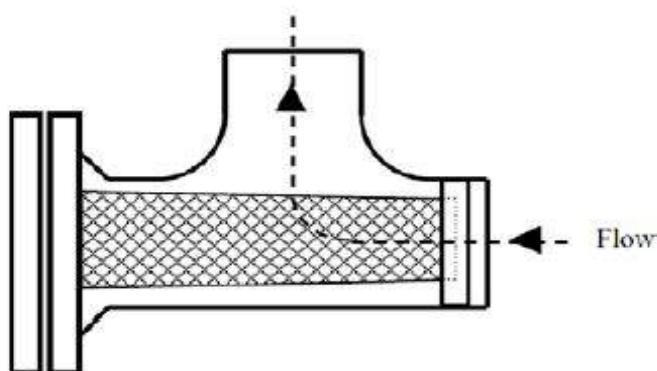


- b) Inlet nozzle, outlet nozzle, and sieve installation nozzle shall be same size.
- c) T – bathtub type strainers shall be made of a wrought straight tee with welding neck flanges. Tees fabricated from pipes shall not be used. A pipe may be installed between the wrought straight tee and the welding neck flange, if sieve need to be extended to obtain the required effective filtering area ratio.
- d) T – bathtub type strainers shall have flanged cover at the sieve installation nozzle.
- e) Sieve shall be bath-tub type with a suitable grip.
- f) Sieve shall be able to be pulled out from body for maintenance.
- g) Sieve rims shall fit to body inside wall and cover flange. The following gaps shall not exceed 1mm.
 - at any point between sieve rim and body inside wall.
 - at any point between sieve rim and cover flange.
- h) U-type guide rail shall be provided for sieve to settle the sieve in position during operation and to make alimnet of sieve during sieve installation.

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4.2.3 T- Angle Type Strainers

- 1) T- Angle type strainers are illustrated as follows:



- 2) Inlet nozzle, outlet nozzle and sieve installation nozzle shall be same size.
- 3) T- Angle type strainers shall be made of a wrought straight tee with a welding neck flange. Tees fabricated from pipes shall not be used. A pipe may be installed between the wrought straight tee and the welding neck flange, if sieve need to be extended to obtain the required effective filtering area ratio.
- 4) T-Angle type strainers shall have flanged cover at the sieve installation nozzle.
- 5) Sieve shall be truncated cone type or cylindrical type, and shall have a suitable grip.
- 6) Sieve shall be able to be pulled out from body for maintenance.
- 7) Sieve rims shall fit to sieve stopper ring and cover flange. The following gaps shall not exceed 1mm.
 - at any point between sieve rim and stopper ring.
 - at any point between sieve rim and cover flange.
- 8) Sieve supports shall be provided to make alignment of sieve during sieve installation.

4.2.4 Bucket Type Strainers

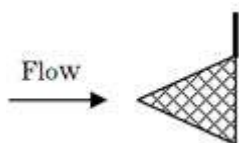
- 1) Bucket type strainers shall have flanged covers on top of the body.
- 2) Bucket type strainers shall have cylindrical bucket sieves with suitable grips.
- 3) Sieves shall be able to be pulled out from the body for maintenance.

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- 4) Bucket sieve upper rim shall fit to ring support. The following gaps shall not exceed 1mm.
 - at any point between bucket sieve upper rim and ring support
- 5) Bucket type strainers shall have supporting legs designed to withstand the weight of strainers when fully filled with water. The support material shall be equivalent to the body material.

4.2.5 Cone Type Strainer

- 1) The point of conical strainers shall face upstream of flow, and mesh screen shall be on upstream surface of perforated plate. See Figure.
- 2) Surface preparation of gasket contact surfaces shall be in accordance with ASME B16.5 and B16.47 series-B.



4.2.6 Hinge and Handle, Davit and Lifting Lug

Hinge and handle shall be provided for the T-type strainer cover flanges. Davit and lifting lug shall be provided for the following bucket-type strainer cover flanges.

<u>ASME Class Rating</u>	<u>Size</u>
CL150	: NPS 10 and larger
CL300	: NPS 8 and larger
CL600	: NPS 6 and larger
CL900	: NPS 6 and larger
CL1500	: NPS 4 and larger

4.3 Dimensions

4.3.1 Pipe Size

The outside diameter and wall thickness shall be in accordance with ASME B36.10M/ B36.19M.

4.3.2 Straight tee

The dimensions shall be in accordance with ASME B16.9. Outlet dimensions "M" of NPS 26 and larger straight tees shall be in accordance with ASME B16.9 Table 7 and 8.

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Tees of which "Specified wall thickness" is greater than "0.1 x (Nominal Outside Diameter)" shall have inside bore diameter not less than "0.75 x (Nominal Outside Diameter)". Refer to ASME B16.9 Paragraph 6.2.2 "Nominal Inside Diameter" is equal to "Nominal Outside Diameter – 2 x Specified Wall Thickness".

4.3.3 **Butt-welding Ends**

The butt-welding ends shall be in accordance with ASME B16.25 Fig.2 (a) and 3 (a)

4.3.4 **Socket-welding Ends**

Socket-welding ends shall be in accordance with ASME B16.11.

4.3.5 **Pipe Threads**

Pipe threads shall be NPT in accordance with ASME B1.20.1.

4.3.6 **Plugs**

Plugs shall be hex head type in accordance with ASME B16.11.

4.3.7 **Flanges**

- 1) Flanges shall be in accordance with the following standards:
 - ASME B16.5 for NPS 24 and smaller of class 150 to class 1500
 - ASME B16.5 for NPS 12 and smaller of class 2500
 - ASME B16.47 series-B for NPS 26 to NPS 60 of class 150 and class 300
 - ASME B16.47 series-B for NPS 26 to NPS 36 of class 600 with raised/flat face
 - ASME B16.47 series-A for NPS 38 to NPS 60 of class 600 with raised/flat face
 - ASME B16.47 series-A for NPS 26 to NPS 36 of class 600 and class 900 with ring joint type

4.3.8 **Wall Thickness Tolerances**

- 1) Minus tolerances of wall thickness for butt-welding ends shall be 0.3mm for the following strainers:
 - Carbon steel strainers NPS 26 and larger.
 - Carbon steel strainers NPS 18 and larger, which do NOT have "Moderate wet H2S service" and "Severe wet H2S service" in Purchaser's Description.
 - Low alloy steel strainers NPS 18 and larger.
 - Austenitic stainless steel strainers NPS 8 and larger.

4.3.9 **Bolts and Nuts**

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Bolts and nuts shall be threaded to ASME B1.1, Coarse Threaded Series (UNC) in sizes 1 inch and smaller, and 8-pitch-thread Series (8UN) in sizes 1-1/8 inch and larger, with Class 2A fit for bolts and Class 2B fit for nuts. Nuts shall be heavy HEX in accordance with ASME B18.2.2.

4.3.10 Gaskets

Gaskets for flat face flanges shall be of full face with punched bolt holes, and shall have the same outside diameter of the mating flanges.

RTJ and Spiral wound gaskets, when specified, shall comply with ASME B16.20.

“Flexible Graphite” compounds of Gaskets shall contain min. 98% pure carbon, leachable chlorides of 50ppm max. and total sulphur of 500ppm max.

5 MATERIAL REQUIREMENTS

5.1 Chemical Restriction

5.1.1 Carbon steel and low temperature carbon steel

- (1) Carbon content shall be 0.23% maximum.

Carbon equivalent value for pipe, fittings and flanges that require full chemical analysis and value shall be 0.43% maximum in accordance with the following formula:

$$CE = C + \left(\frac{Mn}{6} \right) + \left(\frac{Cr + Mo + V}{5} \right) + \left(\frac{Ni + Cu}{15} \right)$$

Where the base material specification does not require full analysis, the carbon equivalent value for pipe and piping components may be reduced to 0.40%, based on the following formula:

$$CE = C + \left(\frac{Mn}{6} \right)$$

- (2) Galvanized carbon steel shall have Si content, 0.15% minimum to 0.25% maximum.

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5.2 Heat Treatment

- 5.2.1 ASTM A105 shall be finished in normalized condition.
- 5.2.2 The following carbon steel materials shall be supplied in heat treated condition. The type of heat treatment shall be in accordance with A516 (normalized) for plates.
- Starting plate of welded pipe (ASTM A671) regardless of wall thickness
(Impact testing requirements to these materials are also specified in Paragraph 7.2.1)
- 5.2.3 Low alloy steel properties that have no welding (seamless pipes, seamless fittings and flanges) shall be supplied in normalized and tempered condition. Other heat treatment is subject to Contractor's approval.
- 5.2.4 Starting plates for low alloy steel welded pipe specified as class 22 shall be normalized and tempered. Other heat treatment is subject to Contractors's approval.
- 5.2.5 Austenitic stainless steel materials (pipes, fittings, flanges, castings and bolts) shall be supplied in solution heat treated condition.

5.3 Hardness Restriction

Strainers shall satisfy the following hardness restrictions.

- 5.3.1 Carbon steel strainers shall have hardness values in accordance with NACE MR0103. In addition, the hardness value of base metal shall be 248 HV10.
- 5.3.2 1.25Cr-0.5Mo steel strainers shall have hardness maximum 225 HB (base metal, HAZ and weld metal).
- 5.3.3 2.25Cr-1Mo steel, 5Cr-0.5Mo steel and 9Cr-1Mo steel strainers shall have hardness maximum 235 HB (base metal, HAZ and weld metal).
- 5.3.4 Ring joint groove on strainer end/cover flanges shall have the following hardness:
- Carbon steels Minimum 150 HB
 - Low alloy steels Minimum 150 HB
 - Austenitic stainless steels Minimum 160 HB
- Hardness measurement at flange facing beside groove is acceptable.
- 5.3.5 Ring joint gaskets shall have the following hardness:
- Soft iron Maximum 90 HB (as per ASME B16.20)
 - 5Cr-0.5Mo steel Maximum 130 HB (as per ASME B16.20)
 - Austenitic stainless steels Maximum 140 HB

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5.4 Others

5.4.1 Steel making process

- (1) Carbon steel materials shall be fully killed.
- (2) Low alloy steel materials shall be fully killed, fine grained, vacuum degassed.
- (3) The base materials of 2.25Cr-1Mo steel, 5Cr-0.5Mo steel and 9Cr-1Mo steel shall be vacuum-carbon deoxidized to minimize silicon content.

5.4.2 Dual grade materials

Materials (pipe, fittings, flanges and castings) that have “Dual Grade” in Attachment-1 “Datasheet for Strainers” shall comply with both material designations. For example, “ASTM A312-TP304/TP304L Dual Grade” shall satisfy all the requirements of both ASTM A312-TP304 and ASTM A312-TP304L.

5.4.3 Galvanizing

- (1) Strainers that have “Galvanized” specified in the Attachment-1 “Datasheet for Strainers” shall be galvanized in accordance with ASTM A153, A123 or A53. Gasket contact surface shall not be galvanized.

5.4.4 Surface finish

For austenitic stainless steels and nickel-base alloy steels, all surfaces shall be cleaned and de-scaled and free from any surface contamination. The base plate shall be furnished with blast cleaned or pickled finish in accordance with ASTM A480, to essentially a No.1 finish.

5.4.5 Auxiliaries

- (1) Hinges, davits, lifting lugs and support legs materials shall be chemically equivalent to the body material.
- (2) Plug material shall be same as the flange material.

5.5 Moderate wet H2S Service

Strainers that have “Moderate wet H2S service” specified in the Attachment-1 “Datasheet for Strainers” shall comply with the following requirements:

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- 5.5.1 All materials shall comply with the requirements of NACE MR0103.
- 5.5.2 Carbon steel strainers having welded components shall be post-weld heat treated at 593°C minimum for 1 hour per 25 mm thickness, 1-hour minimum. The use of lower heat treatment temperatures for longer hold times is not permitted.
- 5.5.3 Carbon steel plate materials for welded pipes shall comply with the following requirements:
- Carbon steel plate materials shall be vacuum degassed.
 - Sulphur content of carbon steel plate materials shall be 0.01% maximum.
 - Carbon steel plate materials shall be normalised (as a minimum).
 - Carbon steel plate materials shall be supplied blast cleaned to ISO 8501-1, Sa2.5.
 - The yield strength of carbon steel plate materials shall be limited to 320 Mpa and the ultimate tensile strength of carbon steel plates shall be limited to 590 Mpa. The maximum tensile strength limit shall not exceed the specified minimum tensile strength value of the material specification by more than 100 Mpa.

5.6 Severe wet H₂S Service

Strainers that have “Severe wet H₂S service” specified in the Attachment-1 “Datasheet for Strainers” shall comply with the following requirements:

- 5.6.1 All materials shall comply with the requirements of NACE MR0103.
- 5.6.2 Carbon steel strainers having welded components shall be post-weld heat treated at 593°C minimum for 1 hour per 25 mm thickness, 1-hour minimum. The use of lower heat treatment temperatures for longer hold times is not permitted.

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5.6.3 Carbon steel plate materials for welded pipes shall comply with the following requirements:

- Carbon steel plate materials shall be vacuum degassed.
- Sulphur content of carbon steel plate materials shall be 0.004% maximum.
- Calcium shape control shall not be used if sulphur content is less than 0.001%. The Ca:S ratio shall be limited if considered necessary by vendor.
- Carbon steel plate materials shall be normalized (as a minimum).
- Carbon steel plate materials shall be supplied blast cleaned to ISO 8501-1, Sa2.5.
- The minimum and maximum thickness of plate shall be tested for susceptibility to Hydrogen Induced Cracking (HIC) in accordance with NACE standard TM0284, using Test solution A, with the following acceptance criteria:

	Average	Individual
CLR	≤ 5%	≤ 7%
CTR	≤ 1.5%	≤ 2%(Note1)
CSR	≤ 0.5%	≤ 0.7%

(Note 1) No transverse cracking greater than 0.1mm.

The test frequency shall be one test for each of the first three heats applied; thereafter, one test for each test unit of not more than ten heats of steel.

- Each plate shall be ultrasonically tested in accordance with ASTM A578, acceptance Standard - Level C, on nominal 75 cm centers.
- The yield strength of carbon steel plate materials shall be limited to 320 MPa and the ultimate tensile strength of carbon steel plates shall be limited to 590 Mpa. The maximum tensile strength limit shall not exceed the specified minimum tensile strength value of the material specification by more than 100 Mpa.

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6 WELDING REQUIREMENT

6.1 General

6.1.1 Repair welding on base metals, except for minor casting repair, is prohibited. The casting repair welding shall be in accordance with an approved repair procedure. The definition of minor casting repair is the casting repair welding that does not fall into any of the following:

- The depth of any cavity prepared for repair welding exceeds 20% of the wall thickness or 1 inch, whichever smaller
- The area on castings in which any cavity prepared for repair welding is greater than 10 square inch
- Repair to correct hydrostatic testing leakage through casting

6.1.2 The use of backing material is prohibited.

6.1.3 When austenitic stainless steel Type 304 or Type 316 materials are subject to welding, the welding consumables shall be low-carbon grades (e.g. AWS A5.4 E316L-16), unless the welding is followed by the solution heat treatment.

6.2 Flux-Cored Arc Welding (FCAW) Requirements

6.2.1 Self-shielding FCAW is prohibited.

6.2.2 FCAW is prohibited for root pass welding, except for:

- Root pass of double-welded joints if the root pass is removed before final side welding
- Root pass on fillet welds
- Root pass of which weld bead is able to be visually inspected and the applicable welding procedure has been qualified by qualification tests.

6.2.3 Bi content of welding consumables used for FCAW on austenitic stainless steels shall be 0.002% maximum.

6.2.4 Welding consumables used for FCAW on carbon steels shall be H4 or H5 grade (Hydrogen content 5 ccH₂/100g or less), where joint thickness exceeds 50.8 mm or the minimum tensile strength of base metal is 80 ksi (550 MPa) or higher. Preheat temperature shall be 50°C higher than the specified temperature of each project.

6.2.5 Welding consumables used for FCAW on low temperature carbon steels shall have the welding consumable supplier's guarantee for impact properties after the required post-weld heat treatment at Vendor's factory.

6.2.6 FCAW shall not be used for low alloy steels of which joint thickness exceeds 31.75 mm.

6.2.7 FCAW is prohibited for other materials than carbon steels, low alloy steels, and austenitic stainless steels.

6.3 Post-weld Heat Treatments (PWHT)

6.3.1 Carbon steel Strainers having welded components and are specified with "Amine service" or "Caustic service" in Attachment-1 "Datasheet for Strainers" shall be post-weld heat treated at 620

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+/- 15°C for 1 hour per 25 mm thickness, 1 hour minimum. The use of lower heat treatment temperatures for longer hold times is not permitted.

- 6.3.2 Low alloy steel Strainers having welded components shall receive post-weld heat treatment in accordance with ASME B31.3 Paragraph 331 and shall be supplied in normalised and tempered condition.

6.4 **Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR)**

- 6.4.1 Welding procedure qualifications used to the following strainers shall have hardness testing by Vickers method. The series of hardness readings shall extend from unaffected base material on one side, across the weld to unaffected base metal on the other side. Three traverses shall be made: one as close as practical to the outer surface, one as close as practical to inner surface, and one across the center. The distance between measurements across the weld shall be adequately configured.

- Strainers that have “Moderate wet H₂S service” in Attachment-1 “Datasheet for Strainers”.
- Strainers that have “Severe wet H₂S service” in Attachment-1 “Datasheet for Strainers”.
- Strainers that have “Amine service” in Attachment-1 “Datasheet for Strainers”.
- Strainers that have “Caustic service” in Attachment-1 “Datasheet for Strainers”.
- Low alloy steel Strainers

7 **TEST & INSPECTION**

7.1 **Production Hardness Testing**

Production hardness testing shall be performed on strainers in accordance with S-000-1670-0006V.

7.2 **Impact Testing**

- 7.2.1 The following carbon steel materials (base metal, HAZ, and weld metal) are used down to - 48°C, and therefore, shall be impact tested in accordance with the following specifications, except the acceptance criteria specified in Paragraph 7.2.2. The test results shall be recorded and reported in Manufacturing Data Reports (MDR).

- Pipe (ASTM A671) in accordance with A671 supplement requirement S2.

- 7.2.2 Low temperature carbon steel materials shall be impact tested at - 48°C with the impact energy, 27 Joules minimum (average 30 Joules).

- 7.2.3 ASTM A350 Grade LF2 Class 1 in excess of 100 mm nominal thickness shall be produced to fine grain practice, heat treated after all forging operations and subject to impact testing at - 48°C.

7.3 **Ferrite Content Measurement**

Strainers having welded components shall be subject to ferrite determination in accordance with S-000-1670-0006V.

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7.4 Non-Destructive Examinations

Notes:

- RT: Radiographic examination.
- MT: Magnetic particle examination.
- PT: Liquid penetrant examination.
- PT instead of MT is acceptable subject to Contractor's approval.
- Ultrasonic examination in lieu of radiographic examination is not acceptable.
- PT and MT shall be performed in final machined condition.

7.4.1 Production casting (body) and forging (body and cover) shall be examined in accordance with ASME B16.34 Paragraph 8 with the frequency shown in the table below.

Strainer Body Material	Rating	Casting or Forging	Size	Required percentage of strainer quantity to be examined in a lot and required examination methods (Note 1)		
				RT	MT	PT
Carbon Steels	Class 150-300	Forging	All	0	5	0
		Casting	NPS 24 and smaller	5	5	0
			NPS 26 and larger	10	10	0
	Class 600 and higher	Forging	All	0	5	0
		Casting	NPS 24 and smaller	10	10	0
			NPS 26 and larger	100	100	0
Low Alloy Steels	Class 150-300	Forging	All	0	5	0
		Casting	NPS 24 and smaller	50	50	0
			NPS 26 and larger	100	100	0
	Class 600 and higher	Forging	All	0	5	0
		Casting	NPS 24 and smaller	100	100	0
			NPS 26 and larger	100	100	0
Austenitic Stainless Steels	Class 150-300	Forging	All	0	0	5
		Casting	NPS 24 and smaller	5	0	5
			NPS 26 and larger	10	0	10
	Class 600 and higher	Forging	All	0	0	5
		Casting	NPS 24 and smaller	10	0	10

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Strainer Body Material	Rating	Casting or Forging	Size	Required percentage of strainer quantity to be examined in a lot and required examination methods (Note 1)		
				RT	MT	PT
			NPS 26 and larger	100	0	100
Incoloy 825	All	Forging	All	0	0	5
		Casting	All	100	0	100
Inconel 625	All	Forging	All	0	0	5
		Casting	All	100	0	100

Note-1 A lot shall consist of purchase order, mould pattern, forging shape, foundry, forging shop, and material specification. Minimum quantity to be examined in a lot shall be one.

A lot is accepted if all of the examined strainers have successfully passed the specified examinations.

If any of the examined strainer have unacceptable defects; then additional examination for the other strainers from the same lot shall be performed. The number of additionally examined strainers shall be same as the original examination. For example, if 3 strainers are originally examined from the lot and any of them failed, then additional 3 strainers from the same lot shall be examined (total 6 strainers to be examined). The lot may be accepted if all of the additionally examined strainers have successfully passed, and the unacceptable defects in the originally examined strainers are repaired.

If any of the additionally examined strainers have unacceptable defects, then, all the strainers in the lot shall be examined and repaired provided it is permitted in accordance with Paragraph 6.1.1, or all the strainers in the lot shall be rejected.

- 7.4.2 Minor casting repair welding shall be examined in accordance with ASME B16.34 Paragraph 8 with the frequency shown in the below table. Casting repair outside the critical areas shall also be examined. Major casting repair welding is prohibited as specified in Paragraph 6.1.1

Strainer Body Material	Required percentage of strainer quantity to be examined in a lot and required examination methods		
	RT	MT	PT
Carbon Steels	0	100	0
Low Alloy Steels	100	100	0
Austenitic Stainless Steels	0	0	100
Incoloy 825	100	0	100
Inconel 625	100	0	100

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- 7.4.3 Strainer butt-welding ends of castings shall be 100% radiographic examined in accordance with ASME B16.34 Paragraph 8.
- 7.4.4 Entire length of pressure retaining welding shall be examined in accordance with S-000-1670-0006V with the frequency shown in the table below.

Strainer Body Material	Examined Welding	Required percentage of strainer quantity to be examined and required examination methods.		
		RT	MT	PT
Carbon steels, Low alloy steels	Butt-welding	100	100	0
	Fillet-welding	0	100	0
Austenitic stainless steels, Incoloy 825 steels, Inconel 625 steels	Butt-welding	100	0	100
	Fillet-welding	0	0	100

7.5 Corrosion Tests

Intergranular corrosion tests shall be performed for Type 321 or 347 stainless steels of which solution heat treatment temperature exceeds 1100°C. The test procedure shall be in accordance with ASTM A262 Particle E, and the test frequency shall be one test per heat number and heat treatment batch. The results shall be recorded and reported in Manufacturers Data Records (MDR).

7.6 PMI

Positive Materials Identification (PMI) shall be performed in accordance with S-000-1520-0109V.

7.7 Pressure Tests

- 7.7.1 All strainers shall be subject to the hydrostatic pressure test in accordance with ASME B31.3 and supplementary requirements herein.
- 7.7.2 Test Duration
- Holding time after the pressure stabilized shall be minimum of 5 minutes, and the time shall also be good enough to examine the leakage from all joints and connections. Strainers should be drained immediately after hydrostatic testing.
- 7.7.3 Test Pressure
- Test pressure shall be in accordance with Attachment-1 "Datasheet for Strainers".

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7.7.4 Test Fluid

Quality of water for hydrostatic tests of austenitic stainless steels shall contain less than 50ppm of chlorides.

7.8 Material test reports (MTR)

All pipe and piping components shall be supplied with MTR, Type 3.1, in accordance with EN 10204 / ISO 10704. Only original MTR from the source of supply shall be acceptable. Inspection documents shall include chemical analysis results, mechanical test results, heat treatment method, heat treatment temperature, heat treatment holding time, and cooling method after heat treatment, as a minimum.

8 MARKING

The marking shall be provided as follows:

8.1 The Contents of Marking

The following information shall be legibly and conspicuously stamped on austenitic stainless steel identification plate permanently attached to the body.

- Tag No. (e.g. 022-STR-0101)
- Manufacturer's Name or Trademark

8.2 Name Plate/Identification Plate

All nameplates or Identification plates shall be of an austenitic stainless steel and permanently attached. The fixing method by means of chain/wire shall be prohibited.

8.3 Flow Direction

Flow direction shall be marked by arrow on the body. The arrow mark shall be casted on the cast body.

8.4 Sieves

All sieves shall be marked with Tag No.

The markings shall remain legible under normal handling and installation practices.

Markings for identifications purposes shall be made in such a manner as not to impair the integrity of the pipe and piping component material.

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9 PAINTING REQUIREMENTS

- 9.1.1 Strainers shall be painted in accordance with the project specification S-000-13A0-0001 "Specification for Painting". Strainers shall be categorized as "In-Line Piping Specialty Items" in this specification.
- 9.1.2 The following strainer parts shall also be painted in accordance with the same painting system by Vendor.
- Outer surface area from the outer-edge of raised face to the outer-end of flange
 - Inside surface of end flange bolt holes (through drilled)
- 9.1.3 Gasket contact surface of end flanges shall not be painted

10 SUPPLIMENTAL REQUIREMENTS FOR LICENSORS

In addition to the requirements through Paragraph 1 to Paragraph 9, Vendor shall comply with the supplemental requirements for licensors specified in ATTACHMENT- A and ATTACHMENT- C Those requirements shall take precedence over the requirements in Paragraph 1 to Paragraph 9.

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ATTACHMENT- A: TECHNICAL REQUIREMENTS BY AXENS

A Strainer that have “Licensor-1” in Attachment-1” Datasheet for Strainer” shall comply with all the requirements in this attachment, Attachment-A, in addition to the requirements through Paragraph 5 to Paragraph 7.

A.1 Pipes for Strainers

A.1.1 ASTM A106 Grade B/ASTM A333 Grade 6 Seamless Pipe

(1) General

- Carbon Equivalent based on long formula $(C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15)$ shall be as follows:
 - 0.42% maximum for thicknesses below 2"
 - 0.45% maximum for thicknesses above or equal to 2"
- Impact test properties

Charpy V-notch impact testing is required. The impact test values correspond to the average of absorbed energy required for three samples taken in transverse orientation and impact tested at given temperature.

For carbon steel, the requirements of EN10216-2+A2 specification shall be applied: minimum energy 27 Joules at 0°C.

For low temperature carbon steel, the impact test requirements done at a temperature not higher than MDMT, follow the corresponding code but is not less than those indicated in EN10216-4 specification: minimum energy 27 Joules at -50°C.

(2) Moderate wet H2S service

Strainers that have “Licensor-1” and “Moderate wet H2S service” specified in Attachment-1” Datasheet for Strainer” shall comply with the following requirements:

- Carbon content shall be 0.20% maximum.
- Ni content shall be 1% maximum.
- Pipe shall be in normalized condition (or quenched and tempered), regardless of thickness.

(3) Severe wet H2S service

Strainers that have “Licensor-1” and “Severe wet H2S service” specified in Attachment-1” Datasheet for Strainer” shall comply with the following requirements:

- Carbon content shall be 0.20% maximum.
- Ni content shall be 1% maximum.

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- Oxygen content shall be less than 0.0025%.
- Pipe shall be in normalized condition (or quenched and tempered), regardless of thickness.

A.1.2 ASTM A672 Grade B60 /ASTM A671 Grade CC60 Welded Pipe

(1) General

- Carbon Equivalent based on long formula shall be as follows:
 - 0.42% maximum for thicknesses below 2"
 - 0.45% maximum for thicknesses above or equal to 2"
- The carbon steel base plates shall comply with the basic requirements of the ASME Section II, Part A specification SA516/SA515 and SA-20 (or EN 10028-2 grade P235GH, P265GH, P295GH, P355GH).
- For low temperature carbon steel, the requirements of SA516 in normalized conditions with additional supplementary requirement S5 for Charpy V-notch impact testing shall be applied (or EN 10028-3 grade P275NL1-NL2, P355NL1-NL2).
- Impact test properties

Charpy V-notch impact testing is required. The impact test values correspond to the average of absorbed energy required for three samples taken in transverse orientation and impact tested at given temperature.

If carbon steel is specified, impact test values shall not be less than those indicated in EN10028-2 specification: minimum 34J at 0°C.

If low temperature carbon steel is specified, in accordance with code (UG84 for ASME VIII Div. 1 and Section 3.11.2 for ASME VIII Div. 2), impact tests must be done at a temperature not higher than MDMT. The impact test values shall be in accordance with code but not less than those indicated in EN10028-3 specification: minimum energy 27 Joules at -50°C.
- Ultrasonic examination (UT) shall be performed in accordance with ASTM A578/A578M (EN 10160) for thicknesses above 1.5 inch.
- The base plates shall be made by electric furnace vacuum degassed steel process or basic oxygen furnace process with heated ladle refining and vacuum degassing.

(2) Moderate wet H2S service

Strainers that have "Licensor-1" and "Moderate wet H2S service" specified in Attachment-1" Datasheet for Strainer" shall comply with the following requirements:

- Carbon content shall be 0.20% maximum.
- Ni content shall be 1% maximum.

(3) Severe wet H2S service

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Strainers that have “Licensor-1” and “Severe wet H2S service” specified in Attachment-1” Datasheet for Strainer” shall comply with the following requirements:

- Carbon content shall be 0.20% maximum.
- Ni content shall be 1% maximum.
- Oxygen content shall be less than 0.0025%.
- Maximum allowable Sulphur content 0.002%

(4) Hydrogen service

Strainers that have “Licensor-1” and “Hydrogen service” specified in Attachment-1” Datasheet for Strainers” shall comply with the following requirements:

- Carbon content shall be 0.16% maximum. (Refer to EN-10028-2 or EN-10028-3. The limit value depends on the EN-10028-3, P275)
- Phosphorous content shall be 0.025% maximum. (The limit value depends on the EN-10028-3, P275)
- Sulphur shall be 0.015% maximum. (The limit value depends on the EN-10028-3, P275).

A.2 Wrought and Forged Fittings for Strainers

A.2.1 ASTM A234 Grade WPB / ASTM A420 Grade WPL6 Seamless fittings

(1) General

- For carbon steel, the requirements for impact test value must follow those defined in EN10253-2 specification are applied: minimum energy 27 Joules at 0°C.
- For low temperature carbon steel, the impact test requirements done at a temperature not higher than MDMT, follow the corresponding code but is not less than 27 Joules at -40°C.

(2) Moderate wet H2S service

Strainers that have “Licensor-1” and “Moderate wet H2S service” specified in Attachment-1” Datasheet for Strainer” shall comply with the following requirements:

- Carbon content shall be 0.20% maximum.
- Carbon Equivalent based on long formula shall be as follows:
 - 0.42% maximum for thicknesses below 2"
 - 0.45% *maximum* for thicknesses above or equal to 2"
- Ni content shall be 1% maximum.
- Fitting shall be in normalized condition (or Quenched and Tempered), regardless of thickness.

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(3) Severe wet H2S service

Strainers that have “Licensor-1” and “Severe wet H2S service” specified in Attachment-1” Datasheet for Strainer” shall comply with the following requirements:

- Carbon content shall be 0.20% maximum.
- Carbon Equivalent based on long formula shall be as follows:
 - 0.42% maximum for thicknesses below 2"
 - 0.45% maximum for thicknesses above or equal to 2"
- Ni content shall be 1% maximum.
- Oxygen content shall be less than 0.0025%.
- Fitting shall be in normalized condition (or Quenched and Tempered), regardless of thickness

A.2.2 ASTM A234 Grade WPB / ASTM A420 Grade WPL6 Welded fittings

(1) General

- For carbon steel, the requirements for impact test value must follow those defined in EN10253-2 specification are applied: minimum energy 27 Joules at 0°C.
- For low temperature carbon steel, the impact test requirements done at a temperature not higher than MDMT, follow the corresponding code but is not less than 27 Joules at -40°C.

(2) Moderate wet H2S service

Strainers that have “Licensor-1” and “Moderate wet H2S service” specified in Attachment-1” Datasheet for Strainer” shall comply with the following requirements:

- Carbon content shall be 0.20% maximum.
- Carbon Equivalent based on long formula shall be as follows:
 - 0.42% maximum for thicknesses below 2"
 - 0.45% maximum for thicknesses above or equal to 2"
- Ni content shall be 1% maximum.

(3) Severe wet H2S service

Strainers that have “Licensor-1” and “Severe wet H2S service” specified in Attachment-1” Datasheet for Strainer” shall comply with the following requirements:

- Carbon content shall be 0.20% maximum.
- Carbon Equivalent based on long formula shall be as follows:
 - 0.42% maximum for thicknesses below 2"

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- 0.45% maximum for thicknesses above or equal to 2"
- Ni content shall be 1% maximum.
- Oxygen content shall be less than 0.0025%.
- Maximum allowable Sulphur content 0.002%

(4) Hydrogen service

Strainers that have "Licensor-1" and "Hydrogen service" specified in Attachment-1 "Datasheet for Strainers" shall comply with the following requirements:

- Carbon content shall be 0.16% maximum (Refer to EN-10028-2 or EN-10028-3. The limit value depends on the EN-10028-3, P275).
- Phosphorous content shall be 0.025% maximum. (The limit value depends on the EN-10028-3, P275).
- Sulphur shall be 0.015% maximum. (The limit value depends on the EN-10028-3, P275).

A.2.3 ASTM A105/ASTM A350 Grade LF2 Forged Strainer

(1) General

- Carbon Equivalent based on long formula shall be as follows:
 - 0.43% maximum for thicknesses below 2"
 - 0.45% maximum for thicknesses above or equal to 2"
- For carbon steel, impact test values shall not be less than those indicated in EN10222-2 specification: minimum energy 27 Joules at 0°C.
- If low temperature carbon steel is specified, impact tests must be done at a temperature not higher than MDMT. The impact test values shall be in accordance with code but not less than those indicated in EN10222-4 specification: minimum energy 27 Joules at -20°C.

(2) Moderate wet H2S service

Strainers that have "Licensor-1" and "Moderate wet H2S service" specified in Attachment-1 "Datasheet for Strainer" shall comply with the following requirements:

- Carbon content shall be 0.20% maximum.
- Carbon Equivalent based on long formula shall be as follows:
 - 0.42% maximum for thicknesses below 2"
 - 0.45% maximum for thicknesses above or equal to 2"
- Ni content shall be 1% maximum.

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- Forged fitting shall be in normalized condition (or Quenched and Tempered), regardless of thickness.

(3) Severe wet H2S service

Strainers that have “Licensor-1” and “Severe wet H2S service” specified in Attachment-1” Datasheet for Strainer” shall comply with the following requirements:

- Carbon content shall be 0.20% maximum.
- Carbon Equivalent based on long formula shall be as follows:
 - 0.42% maximum for thicknesses below 2"
 - 0.45% maximum for thicknesses above or equal to 2"
- Ni content shall be 1% maximum.
- Oxygen content shall be less than 0.0025%.
- Forged fitting shall be in normalized condition (or Quenched and Tempered), regardless of thickness.

A.3 Casting Materials for Strainer

A.3.1 ASTM A216 Grade WCB/ASTM A352 Grade LCC Casting

(1) General

- For carbon steel, the requirements for impact test value must follow those defined in EN10213 specification are applied: minimum energy 27 Joules at 0°C.

(2) Moderate wet H2S service

Strainers that have “Licensor-1” and “Moderate wet H2S service” specified in Attachment-1” Datasheet for Strainer” shall comply with the following requirements:

- Carbon Equivalent based on long formula shall be as follows:
 - 0.42% maximum for body wall thicknesses below 2"
 - 0.45% maximum for body wall thicknesses above or equal to 2"
- Strainers shall be in normalized condition (or Quenched and Tempered), regardless of thickness.

(3) Severe wet H2S service

Strainers that have “Licensor-1” and “Severe wet H2S service” specified in Attachment-1” Datasheet for Strainer” shall comply with the following requirements:

- Carbon Equivalent based on long formula shall be as follows:
 - 0.42% maximum for body wall thicknesses below 2"

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- 0.45% maximum for body wall thicknesses above or equal to 2"
- Strainers shall be in normalized condition (or Quenched and Tempered), regardless of thickness.
- Castings shall be made by vacuum degassed steel process.

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ATTACHMENT- B: TECHNICAL REQUIREMENTS BY JACOBS

B Strainers that have “Licensor-3” specified in Attachment-1” Datasheet for Strainer” shall comply with all the requirements in this attachment, Attachment-C, in addition to the requirements through Paragraph 5 to Paragraph 7.

B.1 Pipe for Strainers

B.1.1 ASTM A106 Grade B/ASTM A333 Grade 6 Seamless Pipe

(1) Severe wet H₂S service

Strainers that have “Licensor-3” and “Severe wet H₂S service” specified in Attachment-1” Datasheet for Strainer” shall comply with the following requirements:

- Sulphur content shall be 0.010% maximum.

B.1.2 ASTM A672 Grade B60 /ASTM A671 Grade CC60 Welded Pipe

(1) Severe wet H₂S service

Strainers that have “Licensor-3” and “Severe wet H₂S service” specified in Attachment-1” Datasheet for Strainer” shall comply with the following requirements:

- Sulphur content shall be 0.002% maximum. Alternatively, if the chemical restriction is not feasible, through - thickness - tensile (t.t.t.) testing is acceptable as an alternative for the chemical restriction. The t.t.t. testing shall be in accordance with ASTM A770

B.2 Wrought Fittings for Strainers

B.2.1 ASTM A234 Grade WPB/ASTM A420 Grade WPL6 Seamless Fitting

(1) Severe wet H₂S service

Strainers that have “Licensor-3” and “Severe wet H₂S service” specified in Attachment-1” Datasheet for Strainer” shall comply with the following requirements:

- Sulphur content shall be 0.010% maximum.

B.2.2 ASTM A234 Grade WPB/ASTM A420 Grade WPL6 Welded Fitting

(1) Severe wet H₂S service

Strainers that have “Licensor-3” and “Severe wet H₂S service” specified in Attachment-1” Datasheet for Strainer” shall comply with the following requirements:

- Sulphur content shall be 0.002% maximum. Alternatively, if the chemical restriction is not feasible, through - thickness - tensile (t.t.t.) testing is acceptable as an alternative for the chemical restriction. The t.t.t. testing shall be in accordance with ASTM A770.

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ATTACHMENT- C: TECHNICAL REQUIREMENTS BY UOP

C Strainer that have “Licensor-4” specified in Attachment-1” Datasheet for Strainer” shall comply with all the requirements in this attachment, Attachment-D, in addition to the requirements through Paragraph 5 to Paragraph 7.

C.1 Pipe for Strainers

C.1.1 ASTM A335 Grade P11 Seamless Pipe

(1) General

- The product analysis content of phosphorus shall be 0.012% maximum.
- The product analysis content of tin shall be 0.015% maximum.

C.1.2 ASTM A672 Grade B60 / ASTM A671 Grade CC60 Welded Pipe

(1) Moderate wet H2S service

Strainers that have “Licensor-4” and “Moderate wet H2S service” specified in Attachment-1 “Datasheet for Strainers” shall comply with the following requirements:

- Post-weld heat-treatment (PWHT) temperature shall be 620°C in accordance with NACE MR0103 (as referring to NACE SP0472).
- The mechanical properties shall be maintained (i.e. those specified in the ASTM specifications) after the post-weld heat treatment (at manufacturers) plus two times post-weld heat treatments at construction site per ASME B31.3 Paragraph 331, except for the minimum temperature of 620°C instead of 593°C. Vendor shall inform Contractor of maximum post-weld heat treatment temperature at construction site for mechanical property guarantee, if any.

(2) Severe wet H2S service

Strainers that have “Licensor-4” and “Severe wet H2S service” specified in Attachment-1 “Datasheet for Strainers” shall comply with the following requirements:

- Post-weld heat-treatment (PWHT) temperature shall be 620°C in accordance with NACE MR0103 (as referring to NACE SP0472).
- The mechanical properties shall be maintained (i.e. those specified in the ASTM specifications) after the post-weld heat treatment (at manufacturers) plus two times post-weld heat treatments at construction site per ASME B31.3 Paragraph 331, except for the minimum temperature of 620°C instead of 593°C. Vendor shall inform Contractor of maximum post-weld heat treatment temperature at construction site for mechanical property guarantee, if any.

C.1.3 ASTM A691 Grade 1-1/4CR Cl. 22 Welded Pipe

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(1) General

- The product analysis content of phosphorus shall be 0.012% maximum (including welding consumables).
- The product analysis content of tin shall be 0.015% maximum (including welding consumables).
- Impact testing shall be conducted in accordance with the requirements of ASME B31.3 Paragraph 323.3, and the testing temperature shall be -29°C . The test specimens shall be supplied in the same heat treated condition as the new pipe.

C.1.4 ASTM A691 Grade 2-1/4CR Class 22 Welded Pipe

(1) General

- Nickel (Ni) content shall be 0.30% maximum.
- Copper (Cu) content shall be 0.20% maximum.
- Material certificates shall include the chemical analysis of Ni, Cu, As, Sn, and Sb.
- Impact testing shall be conducted in accordance with the requirements of ASME B31.3 Paragraph 323.3, and the testing temperature shall be -29°C and the average impact values of the three specimens shall not be less than 54 Joules with no single value below 47 Joules. The test specimens shall be supplied in the same heat treated condition as the new pipe.
- Impact energy versus temperature (transition) curves shall be developed for each heat of plate, pipe and weldments representing each batch or heat of welding consumable, covered electrodes, and wire flux combinations for each welding process used in production welds.
 - A minimum of eight sets of three impact tests (of material subjected to the same heat treatment as the completed item) shall be conducted for each curve. Sample locations shall be as specified in ASME Section VIII, Division 1.
 - The eight sets of impact tests shall be performed at different temperatures, but shall include the impact test temperature, -29°C . The remaining test temperatures shall be selected so that the generated transition curve shall clearly define the transition zone and upper shelf. The maximum test temperature shall correspond to the upper shelf energy level.
- The impact tests shall be performed at different temperatures, but shall include the impact test temperature, -29°C . The remaining test temperatures shall be selected so that the generated transition curve clearly defines the transition zone and the upper and lower shelf. The maximum test temperature shall be on the upper shelf energy level (defined as 100% shear fracture) and the minimum test temperature shall be on the lower shelf energy level (defined as 0% shear fracture). The upper and lower shelves shall each be defined by at least two test points, with at least four additional points defining the transition curve.
- Step cooling tests shall be performed on a sample (subjected to the same heat treatment as the completed item) from each heat of plate, pipe and weldments

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representing each batch or heat of welding consumable, covered electrodes, and wire flux combinations for each welding process used in production welds.

- Step cooling shall be in accordance with the following temperatures, holding times, cooling rates to the next lowest temperature

Temperature [°F (°C)]	Holding Time, [Hour]	Cooling Rate to the Next Temperature [°F (°C) per hour]
1100 (595)	1	10 (6)
1000 (535)	15	10 (6)
975 (525)	24	10 (6)
925 (495)	60	5 (3)
875 (470)	100	50 (28)
600 (315)		air cool

- Impact tests of each step cooling test sample shall be performed and transition curves developed per the requirements above.
- Acceptance criteria for the material shall be in accordance with the following:

$$CvTr40 + 2.5 \Delta CvTr40_{SC} \leq 50^{\circ}F(10^{\circ}C)$$

Where

CvTr40 = Charpy V-notch 55 Joules impact energy transition temperature of completely heat treated specimens before step cooling.

$\Delta CvTr40_{SC}$ = The shift in the Charpy V-notch 55 Joules impact energy transition temperature after step cooling.

C.2 Wrought and Forged Fittings for Strainers

C.2.1 ASTM A234 Grade WP11 Class 1 Seamless Fitting

(1) General

- The product analysis content of phosphorus shall be 0.012% maximum.
- The product analysis content of tin shall be 0.015% maximum.

C.2.2 ASTM A234 Grade WPB/ASTM A420 Grade WPL6 Welded Fitting

(1) Moderate wet H2S service

Strainers that have “Licensor-4” and “Moderate wet H2S service” specified in Attachment-1 “Datasheet for Strainers” shall comply with the following requirements:

- Post-weld heat-treatment (PWHT) temperature shall be 620°C in accordance with NACE MR0103 (as referring to NACE SP0472).

(2) Severe wet H2S service

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Strainers that have “Licensor-4” and “Severe wet H2S service” specified in Attachment-1 “Datasheet for Strainers” shall comply with the following requirements:

- Post-weld heat-treatment (PWHT) temperature shall be 620°C in accordance with NACE MR0103 (as referring to NACE SP0472).

C.2.3 ASTM A234 Grade WP11-W Class 1 Welded Fitting

(1) General

- The product analysis content of phosphorus shall be 0.012% maximum (including welding consumables).
- The product analysis content of tin shall be 0.015% maximum (including welding consumables).
- Impact testing shall be conducted in accordance with the requirements of ASME B31.3 Paragraph 323.3, and the testing temperature shall be –29°C. The test specimens shall be supplied in the same heat treated condition as the new pipe.

C.2.4 ASTM A234 Grade WP22-W Class 1 Welded Fitting

(1) General

- Impact testing shall be conducted in accordance with the requirements of ASME B31.3 Paragraph 323.3, and the testing temperature shall be –29°C and the average impact values of the three specimens shall not be less than 54 Joules with no single value below 47 Joules. The test specimens shall be supplied in the same heat treated condition as the new pipe.

C.2.5 ASTM A182 Grade F11 Class 1 Forged Fitting

(1) General

- The product analysis content of phosphorus shall be 0.012% maximum.
- The product analysis content of tin shall be 0.015% maximum.

C.3 Casting Materials for Strainers

C.3.1 ASTM A216 Grade WCB / ASTM A352 Grade LCC Casting

(2) Hydrogen service

Strainers that have “Licensor-4” and “Hydrogen service” specified in Attachment-1 “Datasheet for Strainers” shall comply with the following requirements:

- ASME Class 900 and greater cast assemblies and integral flanges in hydrogen service shall have a casting quality factor of 100 percent. The examination shall be performed by radiography in accordance with ASME Section VIII, Division 1, Appendix 7. For 2 inch and smaller, if radiography is not possible, a helium mass spectrometer test (probe technique) in accordance with ASME Section V, Subsection

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A, Article 10, Appendix V is acceptable. Casting repairs and identification shall meet the requirements of paragraph 7-4 and 7-5 of Appendix 7 of ASME Section VIII, Division 1.

C.3.2 ASTM A351 Grade CF3 / CF3M / CF8 / CF8C / CF8M / CF10 Casting

(3) Hydrogen service

Strainers that have “Licensor-4” and “Hydrogen service” specified in the Attachment -1 “Datasheet for Strainers” shall comply with the following requirements:

- ASME Class 900 and greater cast assemblies and integral flanges in hydrogen service shall have a casting quality factor of 100 percent. The examination shall be performed by radiography in accordance with ASME Section VIII, Division 1, Appendix 7. For 2 inch and smaller castings, if radiography is not possible, a helium mass spectrometer test (probe technique) in accordance with ASME Section V, Subsection A, Article 10, Appendix V is acceptable. Casting repairs and identification shall meet the requirements of paragraph 7-4 and 7-5 of Appendix 7 of ASME Section VIII, Division 1.

C.3.3 ASTM A217 Grade WC6 Casting

(4) General

- The product analysis content of phosphorus shall be 0.012% maximum.
- The product analysis content of tin shall be 0.015% maximum.

(5) Hydrogen service

Strainers that have “Licensor-4” and “Hydrogen service” specified in Attachment-1 “Datasheet for Strainers” shall comply with the following requirements:

- ASME Class 900 and greater cast assemblies and integral flanges in hydrogen service shall have a casting quality factor of 1.00. The examination shall be performed by radiography in accordance with ASME Section VIII, Division 1, Appendix 7. Casting repairs and identification shall meet the requirements of paragraph 7-4 and 7-5 of Appendix 7 of ASME Section VIII, Division 1.

C.3.4 ASTM A217 Grade WC9 / C5 / C12 Casting

(6) Hydrogen service

Strainers that have “Licensor-4” and “Hydrogen service” specified in the Attachment-1 “Datasheet for Strainers” shall comply with the following requirements:

- ASME Class 900 and greater casting assemblies and integral flanges in hydrogen service shall have a casting quality factor of 1.00. The examination shall be performed by radiography in accordance with ASME Section VIII, Division 1, Appendix 7. Casting repairs and identification shall meet the requirements of paragraph 7-4 and 7-5 of Appendix 7 of ASME Section VIII, Division 1.

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ATTACHMENT – 1 DATA SHEET FOR STRAINERS

INDRA
10-JUL-2015

JGCS
CONSORTIUM

Tag Number		022-STR-0001	022-STR-0002	022-STR-0003	022-STR-0004	022-STR-0008
Qty. (pc(s))		1	1	1	4	22
Size (NPS)		2	18	18	0.75	0.75
End Connection		Butt Weld (SCH XS)	Flange ASME B16.5 RF	Flange ASME B16.5 RF	Socket Weld	Socket Weld
End Flange/ Cover Flange Rating		Class 300	Class 300	Class 300	Class 150	Class 150
Type		Y-Type	Basket Type	Basket Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B	ASTM A672 Grade B60 Class 22	ASTM A672 Grade B60 Class 22	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A105	ASTM A105
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A105	ASTM A105
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	1" / Socket Weld	N/A	N/A
Drain			0.75" / Socket Weld	1" / Socket Weld	N/A	N/A
Design Condition	Press. (MPaG)		2.617	3.080	1.050	1.050
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	205	205	65	65
	C.A. (mm)		3	1.5	1.5	1.5
Operating Condition	Test Press. (MPaG)		4.46	5.25	1.62	1.62
	Press. (MPaG)		0.207	0.22	0.686	0.686
	Temp. (deg.C)		80	80	30	30
	Fluid		OILY WATER	FEED	LP NITROGEN	LP NITROGEN
	Phase		L	L	V	V
	Max. Flow Rate (kg/hr.)		2915	546006	21	21
	M.W. (gas)				28.01	28.01
	Sp. Gr. (liq.) (kg/m3)		999.2	936.8		
	Vis. (cP)		0.355	25	0.018	0.018
	Max. Allow. Press. Drop (MPaG)		0.005	0.003	0.005	0.005
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		Licensor - 1	Licensor - 1	Licensor - 1	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-0011J	D-022-1225-0011J	D-022-1225-0011J	D-022-1225-0110J	D-022-1225-0111J
	Line No.	WO-022-0103	P-022-0109	P-022-0110	LPN-022-1301	LPN-022-1403
	Piping Class	B2AP01	B1AP01	B1AP01	A1AA	A1AA
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation		

Tag Number		022-STR-0021	022-STR-0026	022-STR-0032	022-STR-0035	022-STR-0036
Qty. (pc(s))		4	10	1	1	1
Size (NPS)		1	0.75	0.75	0.75	0.75
End Connection		Socket Weld	Socket Weld	Socket Weld	Socket Weld	Socket Weld
End Flange/ Cover Flange Rating		Class 600	Class 150	Class 150	Class 150	Class 150
Type		Y-Type	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	30	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	5.750	1.050	1.050	1.050	1.050
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	425	65	65	65
	C.A. (mm)	1.5	1.5	1.5	1.5	1.5
	Test Press. (MPaG)	13.45	1.62	1.62	1.62	1.62
Operating Condition	Press. (MPaG)	4.9	0.686	0.686	0.686	0.686
	Temp. (deg.C)	400	30	30	30	30
	Fluid	HP STEAM	LP NITROGEN	LP NITROGEN	LP NITROGEN	LP NITROGEN
	Phase	V	V	V	V	V
	Max. Flow Rate (kg/hr.)	50	21	21	14	50
	M.W. (gas)	18.01	28.01	28.01	28.01	28.01
	Sp. Gr. (liq.) (kg/m3)					
	Vis. (cP)	0.013	0.018	0.018	0.018	0.018
	Max. Allow. Press. Drop (MPaG)	0.005	0.005	0.005	0.005	0.005
	PWHT at Site	N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-0111J	D-022-1225-0112J	D-022-1225-0112J	D-022-1225-0113J	D-022-1225-0113J
	Line No.	HPS-022-1409	LPN-022-1501	LPN-022-1527	LPN-022-1633	LPN-022-1635
	Piping Class	D1AS	A1AA	A1AA	A1AA	A1AA
Remarks						

INDRA
10-JUL-2015

Tag Number		022-STR-0037	022-STR-0038	022-STR-0042	022-STR-0043	022-STR-0044
Qty. (pc(s))		1	8	1	1	6
Size (NPS)		0.75	0.75	1	1	0.75
End Connection		Socket Weld	Socket Weld	Socket Weld	Socket Weld	NPT
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		Y-Type	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B + Galvanized
	Fitting	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105 + Galvanized
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105 + Galvanized
	Casting	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105 + Galvanized
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	30	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.050	1.050	1.050	1.030
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	65	65	65	70
	C.A. (mm)		1.5	1.5	1.5	0
	Test Press. (MPaG)		<u>1.62</u>	<u>1.62</u>	<u>1.62</u>	<u>1.60</u>
Operating Condition	Press. (MPaG)		0.646	0.616	0.686	0.666
	Temp. (deg.C)		30	30	30	40
	Fluid		LP NITROGEN	LP NITROGEN	LP NITROGEN	INSTRUMENT AIR
	Phase		V	V	V	V
	Max. Flow Rate (kg/hr.)		21	12	16	37
	M.W. (gas)		28.01	28.01	28.01	28.85
	Sp. Gr. (liq.) (kg/m3)					
	Vis. (cP)		0.018	0.018	0.018	0.019
	Max. Allow. Press. Drop (MPaG)		0.005	0.005	0.005	0.005
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-0114J	D-022-1225-0114J	D-022-1225-0114J	D-022-1225-0114J	D-022-1225-0115J
	Line No.	LPN-022-3708	LPN-022-1703	LPN-022-1710	LPN-022-1715	IA-022-1813
	Piping Class	A1AA	A1AA	A1AA	A1AA	S0RA
Remarks						

INDRA
10-JUL-2015

Tag Number		022-STR-0046	022-STR-0055	022-STR-0056	022-STR-0057	022-STR-0058
Qty. (pc(s))		5	1	1	1	1
Size (NPS)		0.75	0.75	0.75	0.75	0.75
End Connection		NPT	NPT	NPT	Socket Weld	Socket Weld
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		Y-Type	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105	ASTM A105
	Forging	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105	ASTM A105
	Casting	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105	ASTM A105
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	30	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	1.030	1.030	1.030	1.05	1.05
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	70	70	65	65
	C.A. (mm)	0	0	0	1.5	1.5
	Test Press. (MPaG)	1.60	1.60	1.60	1.62	1.62
Operating Condition	Press. (MPaG)	0.666	0.736	0.736	0.686	0.686
	Temp. (deg.C)	40	40	40	30	30
	Fluid	INSTRUMENT AIR	INSTRUMENT AIR	INSTRUMENT AIR	LP NITROGEN	LP NITROGEN
	Phase	V	V	V	V	V
	Max. Flow Rate (kg/hr.)	10	10	10	14	50
	M.W. (gas)	28.85	28.85	28.85	28.01	28.01
	Sp. Gr. (liq.) (kg/m3)					
	Vis. (cP)	0.019	0.019	0.019	0.018	0.018
	Max. Allow. Press. Drop (MPaG)	0.005	0.005	0.005	0.005	0.005
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-0115J	D-022-1225-0116J	D-022-1225-0117J	D-022-1225-0117J	D-022-1225-0117J
	Line No.	IA-022-1825	IA-022-1916	IA-022-2019	LPN-022-2002	LPN-022-2004
	Piping Class	S0RA	S0RA	S0RA	A1AA	A1AA
Remarks						

INDRA
10-JUL-2015

Tag Number		022-STR-0059	022-STR-0060	022-STR-0061	022-STR-0063	022-STR-0065
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		0.75	0.75	1	1	0.75
End Connection		NPT	NPT	Butt Weld (SCH 80S)	Butt Weld (SCH 80S)	NPT
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 300	Class 300	Class 150
Type		Y-Type	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A312 Grade TP304H	ASTM A312 Grade TP304H	ASTM A106 Grade B + Galvanized
	Fitting	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A403 Grade WP304H Class S	ASTM A403 Grade WP304H Class S	ASTM A105 + Galvanized
	Forging	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A182 Grade F304H	ASTM A182 Grade F304H	ASTM A105 + Galvanized
	Casting	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A182 Grade F304H	ASTM A182 Grade F304H	ASTM A105 + Galvanized
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite-mica filler	SS316 winding / Graphite-mica filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B8M Class 2 / A194 Grade 8MA	ASTM A193 Grade B8M Class 2 / A194 Grade 8MA	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized
	Perforated Plate / Bucket	SS316	SS316	SS304H	SS304H	SS316
	Screen	SS316	SS316	SS304H	SS304H	SS316
	Other Internals	SS316	SS316	SS304H	SS304H	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	30	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.030	1.05	1.05	1.030
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	70	65	65	70
	C.A. (mm)		0	0	0	0
	Test Press. (MPaG)		1.60	1.60	1.60	1.60
Operating Condition	Press. (MPaG)		0.666	0.221	0.221	0.736
	Temp. (deg.C)		40	30	30	40
	Fluid		INSTRUMENT AIR	INSTRUMENT AIR	LP NITROGEN	INSTRUMENT AIR
	Phase		V	V	V	V
	Max. Flow Rate (kg/hr.)		10	13	13	10
	M.W. (gas)		28.85	28.01	28.01	28.85
	Sp. Gr. (liq.) (kg/m3)					
	Vis. (cP)		0.019	0.018	0.018	0.019
	Max. Allow. Press. Drop (MPaG)		0.005	0.005	0.005	0.005
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	Licensor - 1	Licensor - 1	No Licensor
Location	P&ID No.	D-022-1225-0117J	D-022-1225-0117J	D-022-1225-0117J	D-022-1225-0117J	D-022-1225-0117J
	Line No.	IA-022-2012	IA-022-2010	LPN-022-2017	LPN-022-2014	IA-022-2005
	Piping Class	S0RA	S0RA	B0KP01	B0KP01	S0RA
Remarks						

INDRA
10-JUL-2015

Tag Number		022-STR-0066	022-STR-0067	022-STR-0070	022-STR-0071	022-STR-0072
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		0.75	0.75	1.5	0.75	0.75
End Connection		NPT	NPT	Socket Weld	NPT	NPT
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		Y-Type	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized
	Fitting	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105	ASTM A105 + Galvanized	ASTM A105 + Galvanized
	Forging	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105	ASTM A105 + Galvanized	ASTM A105 + Galvanized
	Casting	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105	ASTM A105 + Galvanized	ASTM A105 + Galvanized
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	30	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	1.030	1.030	1.030	1.030	1.030
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	70	70	70	70
	C.A. (mm)	0	0	3	0	0
	Test Press. (MPaG)	1.60	1.60	1.60	1.60	1.60
Operating Condition	Press. (MPaG)	0.736	0.736	0.798	0.736	0.736
	Temp. (deg.C)	40	40	40	40	40
	Fluid	INSTRUMENT AIR	INSTRUMENT AIR	PLANT AIR	INSTRUMENT AIR	INSTRUMENT AIR
	Phase	V	V	V	V	V
	Max. Flow Rate (kg/hr.)	10	10	121	8	3
	M.W. (gas)	28.85	28.85	28.85	28.85	28.85
	Sp. Gr. (liq.) (kg/m3)					
	Vis. (cP)	0.019	0.019	0.019	0.019	0.019
	Max. Allow. Press. Drop (MPaG)	0.005	0.005	0.005	0.005	0.005
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-0117J	D-022-1225-0117J	D-022-1225-0119J	D-022-1225-0120J	D-022-1225-0120J
	Line No.	IA-022-2003	IA-022-2001	PA-022-2114	IA-022-2301	IA-022-2305
	Piping Class	S0RA	S0RA	A2AA	S0RA	S0RA
Remarks						

INDRA
10-JUL-2015

Tag Number		022-STR-0073	022-STR-0074	022-STR-0075	022-STR-0076	022-STR-0077
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		0.75	0.75	0.75	0.75	0.75
End Connection		NPT	NPT	NPT	NPT	NPT
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		Y-Type	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized
	Fitting	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized
	Forging	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized
	Casting	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	30	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	1.030	1.030	1.030	1.030	1.030
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	70	70	70	70
	C.A. (mm)	0	0	0	0	0
Operating Condition	Test Press. (MPaG)	1.60	1.60	1.60	1.60	1.60
	Press. (MPaG)	0.736	0.736	0.736	0.736	0.736
	Temp. (deg.C)	40	40	40	40	40
	Fluid	INSTRUMENT AIR	INSTRUMENT AIR	INSTRUMENT AIR	INSTRUMENT AIR	INSTRUMENT AIR
	Phase	V	V	V	V	V
	Max. Flow Rate (kg/hr.)	3	3	8	8	8
	M.W. (gas)	28.85	28.85	28.85	28.85	28.85
	Sp. Gr. (liq.) (kg/m3)					
	Vis. (cP)	0.019	0.019	0.019	0.019	0.019
	Max. Allow. Press. Drop (MPaG)	0.005	0.005	0.005	0.005	0.005
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-0120J	D-022-1225-0120J	D-022-1225-0120J	D-022-1225-0120J	D-022-1225-0121J
	Line No.	IA-022-2307	IA-022-2309	IA-022-2311	IA-022-2317	IA-022-2401
	Piping Class	S0RA	S0RA	S0RA	S0RA	S0RA
Remarks						

INDRA
10-JUL-2015

Tag Number		022-STR-0078	022-STR-0079	022-STR-0080	022-STR-0081	022-STR-0082
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		0.75	0.75	0.75	0.75	0.75
End Connection		NPT	NPT	NPT	NPT	NPT
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		Y-Type	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized
	Fitting	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized
	Forging	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized
	Casting	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	30	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	1.030	1.030	1.030	1.030	1.030
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	70	70	70	70
	C.A. (mm)	0	0	0	0	0
	Test Press. (MPaG)	1.60	1.60	1.60	1.60	1.60
Operating Condition	Press. (MPaG)	0.736	0.736	0.736	0.736	0.736
	Temp. (deg.C)	40	40	40	40	40
	Fluid	INSTRUMENT AIR	INSTRUMENT AIR	INSTRUMENT AIR	INSTRUMENT AIR	INSTRUMENT AIR
	Phase	V	V	V	V	V
	Max. Flow Rate (kg/hr.)	3	3	3	8	8
	M.W. (gas)	28.85	28.85	28.85	28.85	28.85
	Sp. Gr. (liq.) (kg/m3)					
	Vis. (cP)	0.019	0.019	0.019	0.019	0.019
	Max. Allow. Press. Drop (MPaG)	0.005	0.005	0.005	0.005	0.005
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-0121J	D-022-1225-0121J	D-022-1225-0121J	D-022-1225-0121J	D-022-1225-0121J
	Line No.	IA-022-2405	IA-022-2407	IA-022-2409	IA-022-2411	IA-022-2417
	Piping Class	S0RA	S0RA	S0RA	S0RA	S0RA
Remarks						

INDRA
10-JUL-2015

Tag Number		022-STR-0083	022-STR-0084	022-STR-0085	022-STR-0094	022-STR-0095
Qty. (pc(s))		1	6	4	1	1
Size (NPS)		0.75	0.75	0.75	1.5	1.5
End Connection		NPT	NPT	NPT	Socket Weld	Socket Weld
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		Y-Type	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105	ASTM A105
	Forging	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105	ASTM A105
	Casting	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105	ASTM A105
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	30	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	1.030	1.030	1.030	1.030	1.030
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	70	70	70	70
	C.A. (mm)	0	0	0	3	3
	Test Press. (MPaG)	1.60	1.60	1.60	1.60	1.60
Operating Condition	Press. (MPaG)	0.736	0.666	0.666	0.798	0.798
	Temp. (deg.C)	40	40	40	40	40
	Fluid	INSTRUMENT AIR	INSTRUMENT AIR	INSTRUMENT AIR	PLANT AIR	PLANT AIR
	Phase	V	V	V	V	V
	Max. Flow Rate (kg/hr.)	10	10	10	121	121
	M.W. (gas)	28.85	28.85	28.85	28.85	28.85
	Sp. Gr. (liq.) (kg/m3)					
	Vis. (cP)	0.019	0.019	0.019	0.019	0.019
	Max. Allow. Press. Drop (MPaG)	0.005	0.005	0.005	0.005	0.005
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-0122J	D-022-1225-0122J	D-022-1225-0122J	D-022-1225-0123J	D-022-1225-0123J
	Line No.	IA-022-2601	IA-022-2606	IA-022-2620	PA-022-2814	PA-022-2815
	Piping Class	S0RA	S0RA	S0RA	A2AA	A2AA
Remarks						

INDRA
10-JUL-2015

Tag Number		022-STR-0096	022-STR-0097	022-STR-0098	022-STR-0099	022-STR-0107
Qty. (pc(s))		1	1	1	8	4
Size (NPS)		1.5	1.5	1.5	0.75	0.75
End Connection		Socket Weld	Socket Weld	Socket Weld	NPT	NPT
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		Y-Type	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized
	Fitting	ASTM A105	ASTM A105	ASTM A105	ASTM A105 + Galvanized	ASTM A105 + Galvanized
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105 + Galvanized	ASTM A105 + Galvanized
	Casting	ASTM A105	ASTM A105	ASTM A105	ASTM A105 + Galvanized	ASTM A105 + Galvanized
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	30	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	1.030	1.030	1.030	1.030	1.030
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	70	70	70	70
	C.A. (mm)	3	3	3	0	0
Operating Condition	Test Press. (MPaG)	1.60	1.60	1.60	1.60	1.60
	Press. (MPaG)	0.798	0.798	0.798	0.666	0.666
	Temp. (deg.C)	40	40	40	40	40
	Fluid	PLANT AIR	PLANT AIR	PLANT AIR	INSTRUMENT AIR	INSTRUMENT AIR
	Phase	V	V	V	V	V
	Max. Flow Rate (kg/hr.)	121	121	121	12	12
	M.W. (gas)	28.85	28.85	28.85	28.85	28.85
	Sp. Gr. (liq.) (kg/m3)					
	Vis. (cP)	0.019	0.019	0.019	0.019	0.019
	Max. Allow. Press. Drop (MPaG)	0.005	0.005	0.005	0.005	0.005
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-0124J	D-022-1225-0124J	D-022-1225-0124J	D-022-1225-0125J	D-022-1225-0129J
	Line No.	PA-022-2817	PA-022-2818	PA-022-2816	IA-022-2903	IA-022-3313
	Piping Class	A2AA	A2AA	A2AA	S0RA	S0RA
Remarks						

INDRA
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Tag Number		022-STR-0108	022-STR-0109	022-STR-0117	022-STR-0121	022-STR-0122
Qty. (pc(s))		6	6	10	1	1
Size (NPS)		0.75	0.75	0.75	1	1
End Connection		NPT	NPT	Socket Weld	Socket Weld	Socket Weld
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		Y-Type	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105	ASTM A105	ASTM A105
	Forging	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105	ASTM A105	ASTM A105
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	30	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.030	1.030	1.05	1.05
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	70	65	65	65
	C.A. (mm)		0	1.5	1.5	1.5
	Test Press. (MPaG)		<u>1.60</u>	<u>1.62</u>	<u>1.62</u>	<u>1.62</u>
Operating Condition	Press. (MPaG)		0.666	0.616	0.686	0.686
	Temp. (deg.C)		40	30	30	30
	Fluid		INSTRUMENT AIR	INSTRUMENT AIR	LP NITROGEN	LP NITROGEN
	Phase		V	V	V	V
	Max. Flow Rate (kg/hr.)		10	12	22	38
	M.W. (gas)		28.85	28.01	28.01	28.01
	Sp. Gr. (liq.) (kg/m3)					
	Vis. (cP)		0.019	0.018	0.018	0.018
	Max. Allow. Press. Drop (MPaG)		0.005	0.005	0.005	0.005
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-0129J	D-022-1225-0129J	D-022-1225-0129J	D-022-1225-0129J	D-022-1225-0129J
	Line No.	IA-022-3323	IA-022-3315	LPN-022-3303	LPN-022-3310	LPN-022-3311
	Piping Class	S0RA	S0RA	A1AA	A1AA	A1AA
Remarks						

INDRA
10-JUL-2015

Tag Number		022-STR-0123	022-STR-0124	022-STR-0125	022-STR-0126	022-STR-0127
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		14	0.75	0.75	0.75	0.75
End Connection		Butt Weld (SCH 80)	Socket Weld	Socket Weld	NPT	NPT
End Flange/ Cover Flange Rating		Class 600	Class 300	Class 300	Class 150	Class 150
Type		T- BathtubType	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized
	Fitting	ASTM A234 Grade WPB	ASTM A105	ASTM A105	ASTM A105 + Galvanized	ASTM A105 + Galvanized
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105 + Galvanized	ASTM A105 + Galvanized
	Casting	ASTM A216 Grade WCB	ASTM A105	ASTM A105	ASTM A105 + Galvanized	ASTM A105 + Galvanized
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	Refer Note in remark column	30	30	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	5.75	2.2	2.2	1.030	1.030
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	425	107	70	70
	C.A. (mm)	1.5	1.5	1.5	0	0
	Test Press. (MPaG)	14.62	3.53	3.53	1.60	1.60
Operating Condition	Press. (MPaG)	4.9	0.301	0.301	0.666	0.666
	Temp. (deg.C)	400	38	38	40	40
	Fluid	HP STEAM	FUEL GAS	FUEL GAS	INSTRUMENT AIR	INSTRUMENT AIR
	Phase	V	V	V	V	V
	Max. Flow Rate (kg/hr.)	144288	3	3	31	31
	M.W. (gas)	18.01	58	58	28.85	28.85
	Sp. Gr. (liq.) (kg/m3)					
	Vis. (cP)	0.024	0.009	0.009	0.019	0.019
	Max. Allow. Press. Drop (MPaG)	0.004	0.002	0.002	0.005	0.005
	PWHT at Site	N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-0134J	D-022-1225-0135J	D-022-1225-0136J	D-022-1225-0137J	D-022-1225-0137J
	Line No.	HPS-022-3801	FG-022-3902	FG-022-3904	IA-022-4031	IA-022-4005
	Piping Class	D1AS	B1AP	B1AP	S0RA	S0RA
Remarks		Perforation Type ø3 mm.				

INDRA
10-JUL-2015

Tag Number		022-STR-0128	022-STR-0129	022-STR-0130	022-STR-0131	022-STR-0132
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		0.75	0.75	1.5	1.5	1.5
End Connection		NPT	NPT	NPT	NPT	NPT
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		Y-Type	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized
	Fitting	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized
	Forging	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized
	Casting	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	30	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	1.030	1.030	1.030	1.030	1.030
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	70	70	70	70
	C.A. (mm)	0	0	0	0	0
Operating Condition	Test Press. (MPaG)	1.60	1.60	1.60	1.60	1.60
	Press. (MPaG)	0.666	0.666	0.666	0.666	0.666
	Temp. (deg.C)	40	40	40	40	40
	Fluid	INSTRUMENT AIR	INSTRUMENT AIR	INSTRUMENT AIR	INSTRUMENT AIR	INSTRUMENT AIR
	Phase	V	V	V	V	V
	Max. Flow Rate (kg/hr.)	31	31	148	148	148
	M.W. (gas)	28.85	28.85	28.85	28.85	28.85
	Sp. Gr. (liq.) (kg/m3)					
	Vis. (cP)	0.019	0.019	0.019	0.019	0.019
	Max. Allow. Press. Drop (MPaG)	0.005	0.005	0.005	0.005	0.005
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-0137J	D-022-1225-0137J	D-022-1225-0138J	D-022-1225-0138J	D-022-1225-0138J
	Line No.	IA-022-4007	IA-022-4009	IA-022-4101	IA-022-4103	IA-022-4105
	Piping Class	S0RA	S0RA	S0RA	S0RA	S0RA
Remarks						

INDRA
10-JUL-2015

Tag Number		022-STR-0133	022-STR-0134	022-STR-0135	022-STR-0136	022-STR-0137
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		1.5	1.5	1.5	1.5	1.5
End Connection		NPT	NPT	NPT	NPT	NPT
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		Y-Type	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized
	Fitting	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized
	Forging	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized
	Casting	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	30	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	1.030	1.030	1.030	1.030	1.030
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	70	70	70	70
	C.A. (mm)	0	0	0	0	0
Operating Condition	Test Press. (MPaG)	1.60	1.60	1.60	1.60	1.60
	Press. (MPaG)	0.666	0.666	0.666	0.666	0.666
	Temp. (deg.C)	40	40	40	40	40
	Fluid	INSTRUMENT AIR	INSTRUMENT AIR	INSTRUMENT AIR	INSTRUMENT AIR	INSTRUMENT AIR
	Phase	V	V	V	V	V
	Max. Flow Rate (kg/hr.)	148	148	148	148	148
	M.W. (gas)	28.85	28.85	28.85	28.85	28.85
	Sp. Gr. (liq.) (kg/m3)					
	Vis. (cP)	0.019	0.019	0.019	0.019	0.019
	Max. Allow. Press. Drop (MPaG)	0.005	0.005	0.005	0.005	0.005
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-0138J	D-022-1225-0139J	D-022-1225-0139J	D-022-1225-0139J	D-022-1225-0139J
	Line No.	IA-022-4107	IA-022-4201	IA-022-4203	IA-022-4205	IA-022-4207
	Piping Class	S0RA	S0RA	S0RA	S0RA	S0RA
Remarks						

Tag Number		022-STR-0138	022-STR-0139	022-STR-0140	022-STR-0141	022-STR-0142
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		1.5	1.5	1.5	1.5	8
End Connection		NPT	NPT	NPT	NPT	Butt Weld (SCH 20)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 300
Type		Y-Type	Y-Type	Y-Type	Y-Type	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B
	Fitting	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A234 Grade WPB
	Forging	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105
	Casting	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	30	30	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	1.030	1.030	1.030	1.030	3.080
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	70	70	70	180
	C.A. (mm)	0	0	0	0	1.5
Operating Condition	Test Press. (MPaG)	1.60	1.60	1.60	1.60	4.63
	Press. (MPaG)	0.666	0.666	0.666	0.666	0.495
	Temp. (deg.C)	40	40	40	40	155
	Fluid	INSTRUMENT AIR	INSTRUMENT AIR	INSTRUMENT AIR	INSTRUMENT AIR	MTC RECYCLE
	Phase	V	V	V	V	L
	Max. Flow Rate (kg/hr.)	148	148	148	148	74450
	M.W. (gas)	28.85	28.85	28.85	28.85	
	Sp. Gr. (liq.) (kg/m3)					850
	Vis. (cP)	0.019	0.019	0.019	0.019	0.3
Remarks	Max. Allow. Press. Drop (MPaG)	0.005	0.005	0.005	0.005	0.003
	PWHT at Site	N	N	N	N	N
	Moderate Wet H2S Service	N	N	N	N	N
	Severe Wet H2S Service	N	N	N	N	N
	Amine Service	N	N	N	N	N
	Caustic Service	N	N	N	N	N
	Hydrogen Service	N	N	N	N	N
	Licensors	No Licensors	No Licensors	No Licensors	No Licensors	Licensors - 1
	Location	P&ID No.	D-022-1225-0140J	D-022-1225-0140J	D-022-1225-0140J	D-022-1225-0203J
		Line No.	IA-022-4301	IA-022-4303	IA-022-4305	P-022-4716
		Piping Class	S0RA	S0RA	S0RA	B1AP01

30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		022-STR-0143	022-STR-0144	022-STR-0145	022-STR-0146	022-STR-0147
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		8	12	12	10	10
End Connection		Butt Weld (SCH 20)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH XS)	Butt Weld (SCH XS)
End Flange/ Cover Flange Rating		Class 300	Class 300	Class 300	Class 150	Class 150
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	3.080	2.940	2.940	1.715	1.715
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	180	180	69	69
	C.A. (mm)	1.5	1.5	1.5	6	6
Operating Condition	Test Press. (MPaG)	4.63	4.42	4.42	2.57	2.57
	Press. (MPaG)	0.495	0.491	0.491	0.056	0.056
	Temp. (deg.C)	155	155	155	44	44
	Fluid	MTC RECYCLE	LEAN SPONGE OIL	LEAN SPONGE OIL	SOUR WATER	SOUR WATER
	Phase	L	L	L	L	L
	Max. Flow Rate (kg/hr.)	74450	132026	132026	104706	104706
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)	850	850	850	998.6	998.6
	Vis. (cP)	0.3	0.3	0.3	0.6	0.6
	Max. Allow. Press. Drop (MPaG)	0.003	0.003	0.003	0.003	0.003
PWHT at Site		N	N	N	Y	Y
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	Y	Y
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1
Location	P&ID No.	D-022-1225-0203J	D-022-1225-0203J	D-022-1225-0203J	D-022-1225-0205J	D-022-1225-0205J
	Line No.	P-022-4717	P-022-4718	P-022-4719	P-022-5013	P-022-5014
	Piping Class	B1AP01	B1AP01	B1AP01	A4AR01	A4AR01
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

Tag Number		022-STR-0148	022-STR-0149	022-STR-0150	022-STR-0151	022-STR-0152
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		12	12	10	10	24
End Connection		Butt Weld (SCH 60)	Butt Weld (SCH 60)	Butt Weld (SCH XS)	Butt Weld (SCH XS)	Butt Weld (SCH STD)
End Flange/ Cover Flange Rating		Class 300	Class 300	Class 150	Class 150	Class 300
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A672 Grade B60 Class 22
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	3.3	3.3	1.56	1.56	2.060
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	69	69	69	156
	C.A. (mm)	6	6	6	6	1.5
	Test Press. (MPaG)	4.95	4.95	2.34	2.34	3.09
Operating Condition	Press. (MPaG)	0.059	0.059	0.059	0.059	0.512
	Temp. (deg.C)	44	44	44	44	131
	Fluid	OVERHEAD LIQUID	OVERHEAD LIQUID	OVERHEAD LIQUID	OVERHEAD LIQUID	TOP PUMPAROUND
	Phase	L	L	L	L	L
	Max. Flow Rate (kg/hr.)	180600	180600	119546	119546	762089
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)	770.1	770.1	764.6	764.6	824.9
	Vis. (cP)	0.38	0.38	0.39	0.39	0.31
	Max. Allow. Press. Drop (MPaG)	0.003	0.003	0.003	0.003	0.003
PWHT at Site		Y	Y	Y	Y	N
Moderate Wet H2S Service		Y	Y	Y	Y	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1
Location	P&ID No.	D-022-1225-0206J	D-022-1225-0206J	D-022-1225-0206J	D-022-1225-0206J	D-022-1225-0207J
	Line No.	P-022-5015	P-022-5016	P-022-5017	P-022-5018	P-022-5114
	Piping Class	B4AQ01	B4AQ01	A4AQ01	A4AQ01	B1AP01
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

Tag Number		022-STR-0153	022-STR-0154	022-STR-0155	022-STR-0156	022-STR-0157
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		24	30	30	10	10
End Connection		Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH 30)	Butt Weld (SCH 30)
End Flange/ Cover Flange Rating		Class 300	Class 300	Class 300	Class 300	Class 300
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A672 Grade B60 Class 22	ASTM A672 Grade B60 Class 22	ASTM A672 Grade B60 Class 22	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	2.060	1.770	1.770	1.970	1.970
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	156	227	217	217
	C.A. (mm)	1.5	1.5	1.5	1.5	1.5
	Test Press. (MPaG)	3.09	2.72	2.72	3.00	3.00
Operating Condition	Press. (MPaG)	0.512	0.436	0.436	0.111	0.111
	Temp. (deg.C)	131	202	202	192	192
	Fluid	TOP PUMPAROUND	LCO PUMPAROUND	LCO PUMPAROUND	LCO PRODUCT	LCO PRODUCT
	Phase	L	L	L	L	L
	Max. Flow Rate (kg/hr.)	762089	1474346	1474346	126048	126048
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)	824.9	938.9	938.9	935.2	935.2
	Vis. (cP)	0.31	0.35	0.35	0.35	0.35
	Max. Allow. Press. Drop (MPaG)	0.003	0.003	0.003	0.003	0.003
	PWHT at Site	N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1
Location	P&ID No.	D-022-1225-0207J	D-022-1225-0208J	D-022-1225-0208J	D-022-1225-0209J	D-022-1225-0209J
	Line No.	P-022-5115	P-022-5207	P-022-5208	P-022-5305	P-022-5306
	Piping Class	B1AP01	B1AP01	B1AP01	B1AP01	B1AP01
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

Tag Number		022-STR-0158	022-STR-0159	022-STR-0160	022-STR-0161	022-STR-0162
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		30	30	6	6	6
End Connection		Butt Weld (SCH XS)	Butt Weld (SCH XS)	Butt Weld (SCH XS)	Butt Weld (SCH XS)	Butt Weld (SCH STD)
End Flange/ Cover Flange Rating		Class 300	Class 300	Class 300	Class 300	Class 300
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A691 Grade 1-1/4CR Class 22	ASTM A691 Grade 1-1/4CR Class 22	ASTM A335 Grade P11	ASTM A335 Grade P11	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WP11-W Class 1	ASTM A234 Grade WP11-W Class 1	ASTM A234 Grade WP11 Class 1	ASTM A234 Grade WP11 Class 1	ASTM A234 Grade WPB
	Forging	ASTM A182 Grade F11 Class 2	ASTM A182 Grade F11 Class 2	ASTM A182 Grade F11 Class 2	ASTM A182 Grade F11 Class 2	ASTM A105
	Casting	ASTM A217 Grade WC6	ASTM A217 Grade WC6	ASTM A217 Grade WC6	ASTM A217 Grade WC6	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite-mica filler	SS316 winding / Graphite-mica filler	SS316 winding / Graphite-mica filler	SS316 winding / Graphite-mica filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B16 / A194 Grade 4	ASTM A193 Grade B16 / A194 Grade 4	ASTM A193 Grade B16 / A194 Grade 4	ASTM A193 Grade B16 / A194 Grade 4	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	1.710	1.710	3.84	3.84	1.32
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	323	318	318	293
	C.A. (mm)	3	3	3	3	1.5
Operating Condition	Test Press. (MPaG)	3.10	3.10	6.92	6.92	2.16
	Press. (MPaG)	0.379	0.379	0.227	0.227	0.105
	Temp. (deg.C)	298	298	293	293	180
	Fluid	HCO PUMPAROUND	HCO PUMPAROUND	HCO	HCO	SLURRY OIL
	Phase	L	L	L	L	L
	Max. Flow Rate (kg/hr.)	1272521	1272521	39682	39682	26744
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)	1043	1043	1019	1019	1019
	Vis. (cP)	0.35	0.35	0.37	0.37	0.8
	Max. Allow. Press. Drop (MPaG)	0.003	0.003	0.003	0.003	0.003
PWHT at Site		Y	Y	Y	Y	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1
Location	P&ID No.	D-022-1225-0211J	D-022-1225-0211J	D-022-1225-0212J	D-022-1225-0212J	D-022-1225-0215J
	Line No.	P-022-5609	P-022-5610	P-022-5705	P-022-5706	P-022-6008
	Piping Class	B2DP01	B2DP01	B2DP01	B2DP01	B1AP01
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

Tag Number		022-STR-0163	022-STR-0164	022-STR-0165	022-STR-0166	022-STR-0167
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		6	3	3	20	20
End Connection		Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)
End Flange/ Cover Flange Rating		Class 300	Class 300	Class 300	Class 300	Class 300
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A691 Grade 5CR Class 22	ASTM A691 Grade 5CR Class 22
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WP5 Class 1	ASTM A234 Grade WP5 Class 1
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A182 Grade F5	ASTM A182 Grade F5
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A217 Grade C5	ASTM A217 Grade C5
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite-mica filler	SS316 winding / Graphite-mica filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B16 / A194 Grade 4	ASTM A193 Grade B16 / A194 Grade 4
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	10	10	10	10
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	1.32	1.216	1.216	1.76	1.76
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	293	293	345	345
	C.A. (mm)	1.5	3	3	3	3
	Test Press. (MPaG)	2.16	1.99	1.99	3.18	3.18
Operating Condition	Press. (MPaG)	0.105	0.102	0.102	0.152	0.152
	Temp. (deg.C)	180	180	180	320	320
	Fluid	SLURRY OIL	HCO	HCO	SLURRY OIL	SLURRY OIL
	Phase	L	L	L	L	L
	Max. Flow Rate (kg/hr.)	26744	25734	25734	1179745	1179745
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)	1019	1019	1019	1083	1083
	Vis. (cP)	0.8	0.8	0.8	1	1
	Max. Allow. Press. Drop (MPaG)	0.003	0.003	0.003	0.005	0.005
PWHT at Site		N	N	N	Y	Y
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1
Location	P&ID No.	D-022-1225-0215J	D-022-1225-0217J	D-022-1225-0217J	D-022-1225-0218J	D-022-1225-0218J
	Line No.	P-022-6006	P-022-0611	P-022-0612	P-022-6202	P-022-6204
	Piping Class	B1AP01	B2AC01	B2AC01	B2FC01	B2FC01
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		022-STR-0168	022-STR-0169	022-STR-0170	022-STR-0171	022-STR-0172
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		20	6	6	0.75	0.75
End Connection		Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Socket Weld	Socket Weld
End Flange/ Cover Flange Rating		Class 300	Class 300	Class 300	Class 150	Class 150
Type		T- BathtubType	T- BathtubType	T- BathtubType	Y-Type	Y-Type
Parts Material	Pipe	ASTM A691 Grade 5CR Class 22	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WP5 Class 1	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A105	ASTM A105
	Forging	ASTM A182 Grade F5	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A217 Grade C5	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A105	ASTM A105
	Gasket	SS316 winding / Graphite-mica filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B16 / A194 Grade 4	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	10	10	10	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	1.76	2.617	2.617	1.050	1.050
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	345	294	65	65
	C.A. (mm)	3	3	3	1.5	1.5
Operating Condition	Test Press. (MPaG)	3.18	4.29	4.29	1.62	1.62
	Press. (MPaG)	0.152	0.136	0.136	0.686	0.686
	Temp. (deg.C)	320	253	253	30	30
	Fluid	SLURRY OIL	SLURRY OIL	SLURRY OIL	LP NITROGEN	LP NITROGEN
	Phase	L	L	L	V	V
	Max. Flow Rate (kg/hr.)	1179745	99714	99714	10	10
	M.W. (gas)				28.01	28.01
	Sp. Gr. (liq.) (kg/m3)	1083	1083	1083		
	Vis. (cP)	1	1.4	1.4	0.018	0.018
	Max. Allow. Press. Drop (MPaG)	0.005	0.005	0.005	0.005	0.005
PWHT at Site		Y	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		Licensor - 1	Licensor - 1	Licensor - 1	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-0219J	D-022-1225-0224J	D-022-1225-0224J	D-022-1225-0401J	D-022-1225-0401J
	Line No.	P-022-6301	P-022-6808	P-022-6809	LPN-022-7001	LPN-022-7003
	Piping Class	B2FC01	B2AC01	B2AC01	A1AA	A1AA
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation		

Tag Number		022-STR-0173	022-STR-0174	022-STR-0175	022-STR-0176	022-STR-0177
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		0.75	0.75	0.75	0.75	0.75
End Connection		Socket Weld	NPT	NPT	Socket Weld	Socket Weld
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		Y-Type	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A105	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105	ASTM A105
	Forging	ASTM A105	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105	ASTM A105
	Casting	ASTM A105	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105	ASTM A105
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	30	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	1.050	1.030	1.030	1.05	1.05
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	65	70	65	65
	C.A. (mm)	1.5	0	0	1.5	1.5
	Test Press. (MPaG)	1.62	1.60	1.60	1.62	1.62
Operating Condition	Press. (MPaG)	0.686	0.736	0.736	0.686	0.686
	Temp. (deg.C)	30	40	40	30	30
	Fluid	LP NITROGEN	INSTRUMENT AIR	INSTRUMENT AIR	LP NITROGEN	LP NITROGEN
	Phase	V	V	V	V	V
	Max. Flow Rate (kg/hr.)	10	10	10	14	14
	M.W. (gas)	28.01	28.85	28.85	28.01	28.01
	Sp. Gr. (liq.) (kg/m3)					
	Vis. (cP)	0.018	0.019	0.019	0.018	0.018
	Max. Allow. Press. Drop (MPaG)	0.005	0.005	0.005	0.005	0.005
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-0401J	D-022-1225-0401J	D-022-1225-0401J	D-022-1225-0401J	D-022-1225-0401J
	Line No.	LPN-022-7005	IA-022-7001	IA-022-7003	LPN-022-7011	LPN-022-7012
	Piping Class	A1AA	S0RA	S0RA	A1AA	A1AA
Remarks						

INDRA
10-JUL-2015

Tag Number		022-STR-0178	022-STR-0179	022-STR-0180	022-STR-0181	022-STR-0182
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		0.75	0.75	0.75	1	1
End Connection		Socket Weld	Socket Weld	Socket Weld	Socket Weld	Socket Weld
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		Y-Type	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	30	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	1.05	1.05	1.05	1.05	1.05
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	65	65	65	65
	C.A. (mm)	1.5	1.5	1.5	1.5	1.5
	Test Press. (MPaG)	1.62	1.62	1.62	1.62	1.62
Operating Condition	Press. (MPaG)	0.686	0.686	0.686	0.686	0.686
	Temp. (deg.C)	30	30	30	30	30
	Fluid	LP NITROGEN	LP NITROGEN	LP NITROGEN	LP NITROGEN	LP NITROGEN
	Phase	V	V	V	V	V
	Max. Flow Rate (kg/hr.)	14	13	13	90	89
	M.W. (gas)	28.01	28.01	28.01	28.01	28.01
	Sp. Gr. (liq.) (kg/m3)					
	Vis. (cP)	0.018	0.018	0.018	0.018	0.018
	Max. Allow. Press. Drop (MPaG)	0.005	0.005	0.005	0.005	0.005
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-0401J	D-022-1225-0401J	D-022-1225-0401J	D-022-1225-0401J	D-022-1225-0401J
	Line No.	LPN-022-7013	LPN-022-7014	LPN-022-7015	LPN-022-7017	LPN-022-7018
	Piping Class	A1AA	A1AA	A1AA	A1AA	A1AA
Remarks						

Tag Number		022-STR-0184	022-STR-0185	022-STR-0186	022-STR-0187	022-STR-0188
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		0.75	0.75	0.75	1.5	1.5
End Connection		Socket Weld	NPT	NPT	Socket Weld	Socket Weld
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		Y-Type	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A105	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105	ASTM A105
	Forging	ASTM A105	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105	ASTM A105
	Casting	ASTM A105	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105	ASTM A105
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	30	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	1.05	1.03	1.03	1.030	1.030
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	65	70	70	70
	C.A. (mm)	1.5	0	0	3	3
	Test Press. (MPaG)	1.62	1.60	1.60	1.60	1.60
Operating Condition	Press. (MPaG)	0.686	0.736	0.736	0.798	0.798
	Temp. (deg.C)	30	40	40	40	40
	Fluid	LP NITROGEN	INSTRUMENT AIR	INSTRUMENT AIR	PLANT AIR	PLANT AIR
	Phase	V	V	V	V	V
	Max. Flow Rate (kg/hr.)	11	11	10	121	121
	M.W. (gas)	28.01	28.85	28.85	28.85	28.85
	Sp. Gr. (liq.) (kg/m3)					
	Vis. (cP)	0.018	0.019	0.019	0.019	0.019
	Max. Allow. Press. Drop (MPaG)	0.005	0.005	0.005	0.005	0.005
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-0402J	D-022-1225-0402J	D-022-1225-0405J	D-022-1225-0118J	D-022-1225-0118J
	Line No.	LPN-022-7101	IA-022-7104	PA-022-7102	PA-022-2103	PA-022-2111
	Piping Class	A1AA	S0RA	S0RA	A2AA	A2AA
Remarks						

INDRA
10-JUL-2015

Tag Number		022-STR-0189	022-STR-0190	022-STR-0191	022-STR-0192	022-STR-0195
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		1.5	1.5	0.75	1.5	1
End Connection		Socket Weld	Socket Weld	Socket Weld	Socket Weld	Socket Weld
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		Y-Type	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	30	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	1.030	1.030	1.050	1.050	1.05
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	70	65	65	65
	C.A. (mm)	3	3	1.5	1.5	1.5
	Test Press. (MPaG)	1.60	1.60	1.62	1.62	1.62
Operating Condition	Press. (MPaG)	0.798	0.798	0.686	0.686	0.686
	Temp. (deg.C)	40	40	30	30	30
	Fluid	PLANT AIR	PLANT AIR	LP NITROGEN	LP NITROGEN	LP NITROGEN
	Phase	V	V	V	V	V
	Max. Flow Rate (kg/hr.)	121	121	50	14	40
	M.W. (gas)	28.85	28.85	28.01	28.01	28.01
	Sp. Gr. (liq.) (kg/m3)					
	Vis. (cP)	0.019	0.019	0.018	0.018	0.018
	Max. Allow. Press. Drop (MPaG)	0.005	0.005	0.005	0.005	0.005
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-0118J	D-022-1225-0119J	D-022-1225-0132J	D-022-1225-0132J	D-022-1225-0117J
	Line No.	PA-022-2107	PA-022-2115	LPN-022-3633	LPN-022-3635	LPN-022-2019
	Piping Class	A2AA	A2AA	A1AA	A1AA	A1AA
Remarks						

Tag Number		022-STR-0196	022-STR-0201	022-STR-0202	022-STR-0203	022-STR-0204
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		0.75	0.75	3	4	4
End Connection		NPT	Socket Weld	Butt Weld (SCH STD)	Butt Weld (SCH XS)	Butt Weld (SCH XS)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 300	Class 300	Class 300
Type		Y-Type	Y-Type	T- BathubType	T- BathubType	T- BathubType
Parts Material	Pipe	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A105 + Galvanized	ASTM A105	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A105 + Galvanized	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A105 + Galvanized	ASTM A105	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	Refer Note in remark column	Refer Note in remark column	Refer Note in remark column
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	1.03	1.05	2.8	2.8	2.8
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	70	65	350	350
	C.A. (mm)	0	1.5	1.5	1.5	1.5
	Test Press. (MPaG)	1.60	1.62	4.90	4.90	4.90
Operating Condition	Press. (MPaG)	0.736	0.616	2.06	2.06	2.06
	Temp. (deg.C)	40	30	320	320	320
	Fluid	INSTRUMENT AIR	LP NITROGEN	MP STEAM	MP STEAM	MP STEAM
	Phase	V	V	V	V	V
	Max. Flow Rate (kg/hr.)	10	12	2431	2955	3279
	M.W. (gas)	28.85	28.01	18.01	18.01	18.01
	Sp. Gr. (liq.) (kg/m3)					
	Vis. (cP)	0.019	0.018	0.021	0.021	0.021
	Max. Allow. Press. Drop (MPaG)	0.005	0.005	0.004	0.004	0.004
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-0117J	D-022-1225-0114J	D-022-1225-0205J	D-022-1225-0206J	D-022-1225-0212J
	Line No.	IA-022-2023	LPN-022-1718	MPS-022-4901	MPS-022-5001	MPS-022-5703
	Piping Class	S0RA	A1AA	B1AS	B1AS	B1AS
Remarks				Perforation Type φ3 mm.	Perforation Type φ3 mm.	Perforation Type φ3 mm.

Tag Number		022-STR-0235	022-STR-0205	022-STR-0206	022-STR-0207	022-STR-0208
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		6	6	6	4	4
End Connection		Butt Weld (SCH XS)	Butt Weld (SCH XS)	Butt Weld (SCH XS)	Butt Weld (SCH STD)	Butt Weld (SCH STD)
End Flange/ Cover Flange Rating		Class 300	Class 300	Class 300	Class 150	Class 150
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	Refer Note in remark column	Refer Note in remark column	Refer Note in remark column	8	8
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	2.8	2.8	2.8	1.713	1.713
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	350	350	60	60
	C.A. (mm)	1.5	1.5	1.5	3	3
Operating Condition	Test Press. (MPaG)	4.90	4.90	4.90	2.57	2.57
	Press. (MPaG)	2.06	2.06	2.06	0.81	0.81
	Temp. (deg.C)	320	320	320	30	30
	Fluid	MP STEAM	MP STEAM	MP STEAM	REFINERY FIRE WATER	REFINERY FIRE WATER
	Phase	V	V	V	L	L
	Max. Flow Rate (kg/hr.)	25300	25300	25300	119161	119161
	M.W. (gas)	18.01	18.01	18.01		
	Sp. Gr. (liq.) (kg/m3)				0.996	0.996
	Vis. (cP)	0.021	0.021	0.021	0.8	0.8
	Max. Allow. Press. Drop (MPaG)	0.004	0.004	0.004	0.02	0.02
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-0218J	D-022-1225-0218J	D-022-1225-0219J	D-022-1225-9003J	D-022-1225-9003J
	Line No.	MPS-022-6203	MPS-022-6204	MPS-022-6310	RFW-022-9081	RFW-022-9113
	Piping Class	B1AS	B1AS	B1AS	A0RU	A0RU
Remarks		Perforation Type φ3 mm.	Perforation Type φ3 mm.	Perforation Type φ3 mm.		

Tag Number		022-STR-0209	022-STR-0210	022-STR-0211	022-STR-0212	022-STR-0213
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		3	3	8	8	4
End Connection		Butt Weld (SCH-STD)	Butt Weld (SCH-STD)	Butt Weld (SCH 20)	Butt Weld (SCH 20)	Butt Weld (SCH STD)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WPB + Galvanized	ASTM A234 Grade WPB + Galvanized	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A216 Grade WCB + Galvanized	ASTM A216 Grade WCB + Galvanized	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
Filtering	Other Internals	SS316	SS316	SS316	SS316	SS316
	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	8	8	8	8	8
Vent	Wire Size		By Vendor	By Vendor	By Vendor	By Vendor
	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	N/A	N/A	N/A
	Press. (MPaG)		1.713	1.713	1.713	1.713
Design Condition	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	60	60	60	60
	C.A. (mm)		3	3	3	3
	Test Press. (MPaG)			2.57	2.57	2.57
Operating Condition	Press. (MPaG)		0.81	0.81	0.81	0.81
	Temp. (deg.C)		30	30	30	30
	Fluid		REFINERY FIRE WATER	REFINERY FIRE WATER	REFINERY FIRE WATER	REFINERY FIRE WATER
	Phase		L	L	L	L
	Max. Flow Rate (kg/hr.)		83404	576086	576086	100277
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)		0.996	0.996	0.996	0.996
	Vis. (cP)		0.8	0.8	0.8	0.8
	Max. Allow. Press. Drop (MPaG)		0.02	0.02	0.02	0.02
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-9003J	D-022-1225-9003J	D-022-1225-9003J	D-022-1225-9003J	D-022-1225-9004J
	Line No.	RFW-022-9079	RFW-022-9116	RFW-022-9124	RFW-022-9127	RFW-022-9241
	Piping Class	A0RU	A0RU	A0RU	A0RU	A0RU
Remarks		Canceled	Canceled			

INDRA
10-JUL-2015

Tag Number		022-STR-0214	022-STR-0215	022-STR-0216	022-STR-0217	022-STR-0218
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		4	4	4	6	6
End Connection		Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	8	8	8	8	8
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.713	1.713	1.713	1.713
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	60	60	60	60
	C.A. (mm)		3	3	3	3
Operating Condition	Test Press. (MPaG)		<u>2.57</u>	<u>2.57</u>	<u>2.57</u>	<u>2.57</u>
	Press. (MPaG)		0.81	0.81	0.81	0.81
	Temp. (deg.C)		30	30	30	30
	Fluid		REFINERY FIRE WATER	REFINERY FIRE WATER	REFINERY FIRE WATER	REFINERY FIRE WATER
	Phase		L	L	L	L
	Max. Flow Rate (kg/hr.)		100277	136014	188722	188722
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)		0.996	0.996	0.996	0.996
	Vis. (cP)		0.8	0.8	0.8	0.8
Remarks	Max. Allow. Press. Drop (MPaG)		0.02	0.02	0.02	0.02
	PWHT at Site		N	N	N	N
	Moderate Wet H2S Service		N	N	N	N
	Severe Wet H2S Service		N	N	N	N
	Amine Service		N	N	N	N
	Caustic Service		N	N	N	N
	Hydrogen Service		N	N	N	N
	Licensor		No Licensor	No Licensor	No Licensor	No Licensor
	Location	P&ID No.	D-022-1225-9004J	D-022-1225-9004J	D-022-1225-9010J	D-022-1225-9010J
		Line No.	RFW-022-9252	RFW-022-9246	RFW-022-9249	RFW-022-9261
		Piping Class	A0RU	A0RU	A0RU	A0RU

INDRA
10-JUL-2015

Tag Number		022-STR-0219	022-STR-0220	022-STR-0221	022-STR-0222	022-STR-0223
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		3	3	6	6	4
End Connection		Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B + Galvanized
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB + Galvanized
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105 + Galvanized
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB + Galvanized
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	8	8	8	8	8
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.713	1.713	1.713	1.713
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	60	60	60	60
	C.A. (mm)		3	3	3	3
Operating Condition	Test Press. (MPaG)		2.57	2.57	2.57	
	Press. (MPaG)		0.81	0.81	0.81	0.81
	Temp. (deg.C)		30	30	30	30
	Fluid		REFINERY FIRE WATER	REFINERY FIRE WATER	REFINERY FIRE WATER	REFINERY FIRE WATER
	Phase		L	L	L	L
	Max. Flow Rate (kg/hr.)		67887	201152	201152	93796
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)		0.996	0.996	0.996	0.996
	Vis. (cP)		0.8	0.8	0.8	0.8
Max. Allow. Press. Drop (MPaG)		0.02	0.02	0.02	0.02	0.02
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-9005J	D-022-1225-9005J	D-022-1225-9005J	D-022-1225-9005J	D-022-1225-9005J
	Line No.	RFW-022-9039	RFW-022-9034	RFW-022-9042	RFW-022-9037	RFW-022-9067
	Piping Class	A0RU	A0RU	A0RU	A0RU	A0RU
Remarks						Canceled

INDRA
10-JUL-2015

Tag Number		022-STR-0224	022-STR-0225	022-STR-0226	022-STR-0227	022-STR-0228
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		4	3	3	6	6
End Connection		Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		T- Bath tub Type	T- Bath tub Type	T- Bath tub Type	T- Bath tub Type	T- Bath tub Type
Parts Material	Pipe	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WPB + Galvanized	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A105 + Galvanized	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A216 Grade WCB + Galvanized	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	8	8	8	8	8
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.713	1.713	1.713	1.713
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	60	60	60	60
	C.A. (mm)		3	3	3	3
Operating Condition	Test Press. (MPaG)		2.57	2.57	2.57	2.57
	Press. (MPaG)		0.81	0.81	0.81	0.81
	Temp. (deg.C)		30	30	30	30
	Fluid		REFINERY FIRE WATER	REFINERY FIRE WATER	REFINERY FIRE WATER	REFINERY FIRE WATER
	Phase		L	L	L	L
	Max. Flow Rate (kg/hr.)		93796	22589	288282	288282
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)		0.996	0.996	0.996	0.996
	Vis. (cP)		0.8	0.8	0.8	0.8
	Max. Allow. Press. Drop (MPaG)		0.02	0.02	0.02	0.02
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-9005J	D-022-1225-9005J	D-022-1225-9005J	D-022-1225-9006J	D-022-1225-9006J
	Line No.	RFW-022-9072	RFW-022-9065	RFW-022-9070	RFW-022-9163	RFW-022-9093
	Piping Class	A0RU	A0RU	A0RU	A0RU	A0RU
Remarks		Canceled				

INDRA
10-JUL-2015

Tag Number		022-STR-0229	022-STR-0230	022-STR-0231	022-STR-0232	022-STR-0233
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		8	8	8	8	8
End Connection		Butt Weld (SCH 20)	Butt Weld (SCH 20)	Butt Weld (SCH 20)	Butt Weld (SCH 20)	Butt Weld (SCH 20)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B + Galvanized
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB + Galvanized
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105 + Galvanized
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB + Galvanized
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
Other Internals		SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	8	8	8	8	8
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	N/A		N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	1.713	1.713	1.713	1.713	1.713
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	60	60	60	60
	C.A. (mm)	3	3	3	3	3
Test Press. (MPaG)	2.57	2.57	2.57	2.57	2.57	
Operating Condition	Press. (MPaG)	0.81	0.81	0.81	0.81	0.81
	Temp. (deg.C)	30	30	30	30	30
	Fluid	REFINERY FIRE WATER	REFINERY FIRE WATER	REFINERY FIRE WATER	REFINERY FIRE WATER	REFINERY FIRE WATER
	Phase	L	L	L	L	L
	Max. Flow Rate (kg/hr.)	615528	615528	704809	704809	409357
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)	0.996	0.996	0.996	0.996	0.996
	Vis. (cP)	0.8	0.8	0.8	0.8	0.8
	Max. Allow. Press. Drop (MPaG)	0.02	0.02	0.02	0.02	0.02
PWHt at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-9006J	D-022-1225-9006J	D-022-1225-9007J	D-022-1225-9007J	D-022-1225-9007J
	Line No.	RFW-022-9166	RFW-022-9096	RFW-022-9213	RFW-022-9225	RFW-022-9218
	Piping Class	A0RU	A0RU	A0RU	A0RU	A0RU
Remarks						Canceled

INDRA
10-JUL-2015

Tag Number			022-STR-0234	022-STR-0236	022-STR-0237	022-STR-0238	022-STR-0239
Qty. (pc(s))			4	1	1	1	1
Size (NPS)			8	8	8	8	8
End Connection			Butt Weld (SCH 20)	Butt Weld (SCH 20)	Butt Weld (SCH 20)	Butt Weld (SCH 20)	Butt Weld (SCH 20)
End Flange/ Cover Flange Rating			Class 150	Class 150	Class 150	Class 150	Class 150
Type			T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe		ASTM A106 Grade B + Galvanized	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting		ASTM A234 Grade WPB + Galvanized	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging		ASTM A105 + Galvanized	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting		ASTM A216 Grade WCB + Galvanized	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket		SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut		ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket		SS316	SS316	SS316	SS316	SS316
	Screen		SS316	SS316	SS316	SS316	SS316
	Other Internals		SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)		200	200	200	200	200
	Perforated Plate Hole Diameter (mm)		By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)		8	8	8	8	8
	Wire Size		By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.713	1.713	1.713	1.713	1.713
	Temp.	Min. (deg.C)	10	10	10	10	10
		Max. (deg.C)	60	60	60	60	60
	C.A. (mm)		3	3	3	3	3
	Test Press. (MPaG)		2.57	2.57	2.57	2.57	2.57
Operating Condition	Press. (MPaG)		0.81	0.81	0.81	0.81	0.81
	Temp. (deg.C)		30	30	30	30	30
	Fluid		REFINERY FIRE WATER	REFINERY FIRE WATER	REFINERY FIRE WATER	REFINERY FIRE WATER	REFINERY FIRE WATER
	Phase		L	L	L	L	L
	Max. Flow Rate (kg/hr.)		409357	543099	543099	574891	574891
	M.W. (gas)						
	Sp. Gr. (liq.) (kg/m3)		0.996	0.996	0.996	0.996	0.996
	Vis. (cP)		0.8	0.8	0.8	0.8	0.8
	Max. Allow. Press. Drop (MPaG)		0.02	0.02	0.02	0.02	0.02
PWHT at Site			N	N	N	N	N
Moderate Wet H2S Service			N	N	N	N	N
Severe Wet H2S Service			N	N	N	N	N
Amine Service			N	N	N	N	N
Caustic Service			N	N	N	N	N
Hydrogen Service			N	N	N	N	N
Licensor			No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.		D-022-1225-9007J	D-022-1225-9008J	D-022-1225-9008J	D-022-1225-9007J	D-022-1225-9007J
	Line No.		RFW-022-9230	RFW-022-9215	RFW-022-9227	RFW-022-9244	RFW-022-9255
	Piping Class		A0RU	A0RU	A0RU	A0RU	A0RU
Remarks			Canceled				

INDRA
10-JUL-2015

Tag Number			022-STR-0240	022-STR-0241	022-STR-0242	022-STR-0243	022-STR-0244
Qty. (pc(s))			1	1	1	1	1
Size (NPS)			8	8	1	1	1
End Connection			Butt Weld (SCH 20)	Butt Weld (SCH 20)	Socket Weld	Socket Weld	Socket Weld
End Flange/ Cover Flange Rating			Class 150	Class 150	Class 150	Class 150	Class 150
Type			T- BathtubType	T- BathtubType	Y-Type	Y-Type	Y-Type
Parts Material	Pipe		ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting		ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A105	ASTM A105	ASTM A105
	Forging		ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting		ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A105	ASTM A105	ASTM A105
	Gasket		SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut		ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket		SS316	SS316	SS316	SS316	SS316
	Screen		SS316	SS316	SS316	SS316	SS316
	Other Internals		SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)		200	200	200	200	200
	Perforated Plate Hole Diameter (mm)		By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)		8	8	30	30	30
	Wire Size		By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.713	1.713	1.05	1.05	1.05
	Temp.	Min. (deg.C)	10	10	10	10	10
		Max. (deg.C)	60	60	65	65	65
	C.A. (mm)		3	3	1.5	1.5	1.5
	Test Press. (MPaG)		<u>2.57</u>	<u>2.57</u>	<u>1.62</u>	<u>1.62</u>	<u>1.62</u>
Operating Condition	Press. (MPaG)		0.81	0.81	0.686	0.686	0.686
	Temp. (deg.C)		30	30	30	30	30
	Fluid		REFINERY FIRE WATER	REFINERY FIRE WATER	LP NITROGEN	LP NITROGEN	LP NITROGEN
	Phase		L	L	V	V	V
	Max. Flow Rate (kg/hr.)		326170	326170	40	27	27
	M.W. (gas)				28.01	28.01	28.01
	Sp. Gr. (liq.) (kg/m3)		0.996	0.996			
	Vis. (cP)		0.8	0.8	0.018	0.018	0.018
	Max. Allow. Press. Drop (MPaG)		0.02	0.02	0.005	0.005	0.005
PWHT at Site			N	N	N	N	N
Moderate Wet H2S Service			N	N	N	N	N
Severe Wet H2S Service			N	N	N	N	N
Amine Service			N	N	N	N	N
Caustic Service			N	N	N	N	N
Hydrogen Service			N	N	N	N	N
Licensor			No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.		D-022-1225-9009J	D-022-1225-9009J	D-022-1225-0117J	D-022-1225-0129J	D-022-1225-0129J
	Line No.		RFW-022-9160	RFW-022-9090	LPN-022-2018	LPN-022-3312	LPN-022-3313
	Piping Class		A0RU	A0RU	A1AA	A1AA	A1AA
Remarks							

INDRA
10-JUL-2015

Tag Number		023-STR-0001	023-STR-0002	023-STR-0003	023-STR-0004	023-STR-0005
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		3	3	10	8	8
End Connection		Butt Weld (SCH 160)	Butt Weld (SCH 160)	Butt Weld (SCH 80)	Butt Weld (SCH XS)	Butt Weld (SCH XS)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 600	Class 300	Class 300
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	Refer Note in remark column	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		0.795	0.795	5.75	3.25
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	115	115	425	76
	C.A. (mm)		6	6	1.5	6
	Test Press. (MPaG)		<u>1.19</u>	<u>1.19</u>	<u>14.62</u>	<u>4.88</u>
Operating Condition	Press. (MPaG)		0.046 / 0.058	0.046 / 0.058	4.9	0.368
	Temp. (deg.C)		44	44	400	47
	Fluid		WGC 1st STAGE K.O. DRUM LIQUID WGC 1ST STAGE	WGC 1st STAGE K.O. DRUM LIQUID WGC 1ST STAGE	HP STEAM	INTERSTAGE LIQUID
	Phase		L	L	V	L
	Max. Flow Rate (kg/hr.)		2256 / 2972	2256 / 2972	98800	123365
	M.W. (gas)				18.01	
	Sp. Gr. (liq.) (kg/m3)		775 / 999	775 / 999		815
	Vis. (cP)		0.4 / 0.6	0.4 / 0.6	0.024	0.49
	Max. Allow. Press. Drop (MPaG)		0.003	0.003	0.004	0.003
PWHT at Site		Y	Y	N	Y	Y
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		Y	Y	N	Y	Y
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		Licensor - 1	Licensor - 1	No Licensor	Licensor - 1	Licensor - 1
Location	P&ID No.	D-023-1225-0001J	D-023-1225-0001J	D-023-1225-0002J	D-023-1225-0004J	D-023-1225-0004J
	Line No.	P-023-0104	P-023-0105	HPS-023-0201	P-023-0420	P-023-0421
	Piping Class	A4AR01	A4AR01	D1AS	B4AR01	B4AR01
Remarks		Gasoline/Water. 30 Mesh size for start up operation	Gasoline/Water. 30 Mesh size for start up operation	Perforation Type φ3 mm.	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number			023-STR-0006	023-STR-0007	023-STR-0008	023-STR-0009	023-STR-0010
Qty. (pc(s))			1	1	1	1	1
Size (NPS)			24	24	14	14	14
End Connection			Butt Weld (SCH XS)	Butt Weld (SCH XS)	Butt Weld (SCH 40)	Butt Weld (SCH 40)	Butt Weld (SCH 40)
End Flange/ Cover Flange Rating			Class 300	Class 300	Class 300	Class 300	Class 300
Type			T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe		ASTM A333 Grade 6	ASTM A333 Grade 6	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting		ASTM A420 Grade WPL6	ASTM A420 Grade WPL6	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging		ASTM A350 Grade LF2 Class 1	ASTM A350 Grade LF2 Class 1	ASTM A105	ASTM A105	ASTM A105
	Casting		ASTM A352 Grade LCC	ASTM A352 Grade LCC	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket		SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut		ASTM A320 Grade L7M / A194 Grade 7M	ASTM A320 Grade L7M / A194 Grade 7M	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM
	Perforated Plate / Bucket		SS316	SS316	SS316	SS316	SS316
	Screen		SS316	SS316	SS316	SS316	SS316
	Other Internals		SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)		200	200	200	200	200
	Perforated Plate Hole Diameter (mm)		By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)		20	20	20	20	20
	Wire Size		By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		2.52	2.52	2.84	2.84	2.69
	Temp.	Min. (deg.C)	-5	-5	10	10	10
		Max. (deg.C)	73	73	83	83	78
	C.A. (mm)		3	3	3	3	3
Operating Condition	Test Press. (MPaG)		3.78	3.78	4.26	4.26	4.04
	Press. (MPaG)		1.63	1.63	1.53	1.53	1.92
	Temp. (deg.C)		42	42	42	42	53
	Fluid		STRIPPER FEED	STRIPPER FEED	PRIMARY ABSORBER REFLUX	PRIMARY ABSORBER REFLUX	PRIMARY ABSORBER PUMPAROUND
	Phase		L	L	L	L	L
	Max. Flow Rate (kg/hr.)		670440	670440	250219	250219	237008
	M.W. (gas)						
	Sp. Gr. (liq.) (kg/m3)		644.4	644.4	697	697	710.6
Service	Vis. (cP)		0.17	0.17	0.26	0.26	0.25
	Max. Allow. Press. Drop (MPaG)		0.003	0.003	0.003	0.003	0.003
	PWHT at Site		Y	Y	Y	Y	Y
	Moderate Wet H2S Service		Y	Y	Y	Y	Y
Service	Severe Wet H2S Service		N	N	N	N	N
	Amine Service		N	N	N	N	N
	Caustic Service		N	N	N	N	N
	Hydrogen Service		N	N	N	N	N
Location	Licensors		Licensors - 1	Licensors - 1	Licensors - 1	Licensors - 1	Licensors - 1
	P&ID No.		D-023-1225-0005J	D-023-1225-0005J	D-023-1225-0007J	D-023-1225-0007J	D-023-1225-0008J
	Line No.		P-023-0507	P-023-0508	P-023-0707	P-023-0708	P-023-0804
	Piping Class		B2GQ01	B2GQ01	B2AQ01	B2AQ01	B2AQ01
Remarks			30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number			023-STR-0011	023-STR-0012	023-STR-0013	023-STR-0014	023-STR-0015
Qty. (pc(s))			1	1	1	1	1
Size (NPS)			14	20	20	12	12
End Connection			Butt Weld (SCH 40)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)
End Flange/ Cover Flange Rating			Class 300	Class 300	Class 300	Class 300	Class 300
Type			T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe		ASTM A106 Grade B	ASTM A671 Grade CC60 Class 22	ASTM A671 Grade CC60 Class 22	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting		ASTM A234 Grade WPB	ASTM A420 Grade WPL6	ASTM A420 Grade WPL6	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging		ASTM A105	ASTM A350 Grade LF2 Class 1	ASTM A350 Grade LF2 Class 1	ASTM A105	ASTM A105
	Casting		ASTM A216 Grade WCB	ASTM A352 Grade LCC	ASTM A352 Grade LCC	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket		SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut		ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A320 Grade L7 / A194 Grade 4	ASTM A320 Grade L7 / A194 Grade 4	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket		SS316	SS316	SS316	SS316	SS316
	Screen		SS316	SS316	SS316	SS316	SS316
	Other Internals		SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)		200	200	200	200	200
	Perforated Plate Hole Diameter (mm)		By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)		20	20	20	20	20
	Wire Size		By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		2.69	3.92	3.92	2.42	2.42
	Temp.	Min. (deg.C)	10	-27	-27	10	10
		Max. (deg.C)	78	67	67	130	130
	C.A. (mm)		3	1.5	1.5	1.5	1.5
	Test Press. (MPaG)		<u>4.04</u>	<u>5.88</u>	<u>5.88</u>	<u>3.63</u>	<u>3.63</u>
Operating Condition	Press. (MPaG)		1.92	1.095	1.095	1.07	1.07
	Temp. (deg.C)		53	42	42	55	55
	Fluid		PRIMARY ABSORBER PUMPAROUND	DEBUTANIZER REFLUX	DEBUTANIZER REFLUX	GASOLINE RECYCLE	GASOLINE RECYCLE
	Phase		L	L	L	L	L
	Max. Flow Rate (kg/hr.)		237008	421167	421167	233954	233954
	M.W. (gas)						
	Sp. Gr. (liq.) (kg/m3)		710.6	563	563	729	729
	Vis. (cP)		0.25	0.094	0.094	0.29	0.29
	Max. Allow. Press. Drop (MPaG)		0.003	0.003	0.003	0.003	0.003
PWHT at Site			Y	N	N	N	N
Moderate Wet H2S Service			Y	N	N	N	N
Severe Wet H2S Service			N	N	N	N	N
Amine Service			N	N	N	N	N
Caustic Service			N	N	N	N	N
Hydrogen Service			N	N	N	N	N
Licensor			Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1
Location	P&ID No.		D-023-1225-0008J	D-023-1225-0017J	D-023-1225-0017J	D-023-1225-0018J	D-023-1225-0018J
	Line No.		P-023-0805	P-023-1613	P-023-1614	P-023-1710	P-023-1711
	Piping Class		B2AQ01	B1GP01	B1GP01	B1AP01	B1AP01
Remarks			30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number			023-STR-0016	023-STR-0017	023-STR-0018	023-STR-0019	023-STR-0020
Qty. (pc(s))			1	1	1	1	1
Size (NPS)			4	4	4	4	14
End Connection			Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)
End Flange/ Cover Flange Rating			Class 300	Class 300	Class 300	Class 300	Class 300
Type			T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe		ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting		ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging		ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting		ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket		SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut		ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket		SS316	SS316	SS316	SS316	SS316
	Screen		SS316	SS316	SS316	SS316	SS316
	Other Internals		SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)		200	200	200	200	200
	Perforated Plate Hole Diameter (mm)		By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)		20	20	20	20	20
	Wire Size		By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		4.550	4.550	4.550	4.550	1.67
	Temp.	Min. (deg.C)	10	10	10	10	10
		Max. (deg.C)	67	67	67	67	92
	C.A. (mm)		3	3	3	3	1.5
	Test Press. (MPaG)		6.83	6.83	6.83	6.83	2.51
Operating Condition	Press. (MPaG)		2.875	2.875	2.676	2.676	0.109
	Temp. (deg.C)		42	42	42	42	42
	Fluid		WASH WATER	WASH WATER	WASH WATER	WASH WATER	LIGHT CRACKED GASOLINE
	Phase		L	L	L	L	L
	Max. Flow Rate (kg/hr.)		22820	22820	22820	22820	235155
	M.W. (gas)						
	Sp. Gr. (liq.) (kg/m3)		992.2	992.2	992.2	992.2	659.9
	Vis. (cP)		0.7	0.7	0.7	0.7	0.21
	Max. Allow. Press. Drop (MPaG)		0.003	0.003	0.003	0.003	0.003
PWHT at Site			Y	Y	Y	Y	N
Moderate Wet H2S Service			N	N	N	N	N
Severe Wet H2S Service			Y	Y	Y	Y	N
Amine Service			Y	Y	Y	Y	N
Caustic Service			N	N	N	N	N
Hydrogen Service			N	N	N	N	N
Licensor			Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1
Location	P&ID No.		D-023-1225-0020J	D-023-1225-0020J	D-023-1225-0021J	D-023-1225-0021J	D-023-1225-0102J
	Line No.		AM-023-1906	AM-023-1907	AM-023-2005	AM-023-2006	P-023-2222
	Piping Class		B2A501	B2A501	B2A501	B2A501	B1AP01
Remarks			30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		023-STR-0021	023-STR-0022	023-STR-0023	023-STR-0024	023-STR-0025
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		14	12	12	8	8
End Connection		Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH 30)	Butt Weld (SCH 30)
End Flange/ Cover Flange Rating		Class 300	Class 300	Class 300	Class 150	Class 150
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.67	1.45	1.45	0.59
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	92	207	133	133
	C.A. (mm)		1.5	1.5	1.5	3
	Test Press. (MPaG)		<u>2.51</u>	<u>2.19</u>	<u>0.89</u>	<u>0.89</u>
Operating Condition	Press. (MPaG)		0.109	0.246	0.160	0.160
	Temp. (deg.C)		42	182	92	92
	Fluid		LIGHT CRACKED GASOLINE	GASOLINE SPLITTER BOTTOM	GASOLINE SPLITTER BOTTOM	LEAN AMINE
	Phase		L	L	L	L
	Max. Flow Rate (kg/hr.)		235155	169243	169243	78086
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)		659.9	795.9	795.9	992.2
	Vis. (cP)		0.21	0.18	0.18	0.93
	Max. Allow. Press. Drop (MPaG)		0.003	0.003	0.003	0.003
PWHT at Site		N	N	N	Y	Y
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	Y	Y
Amine Service		N	N	N	Y	Y
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1
Location	P&ID No.	D-023-1225-0102J	D-023-1225-0103J	D-023-1225-0103J	D-023-1225-0201J	D-023-1225-0201J
	Line No.	P-023-2223	P-023-2306	P-023-2307	AM-023-2720	AM-023-2721
	Piping Class	B1AP01	B1AP01	B1AP01	A2A501	A2A501
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number			023-STR-0026	023-STR-0027	023-STR-0028	023-STR-0029	023-STR-0030
Qty. (pc(s))			1	1	1	1	1
Size (NPS)			2	2	6	6	8
End Connection			Butt Weld (SCH10S)	Butt Weld (SCH10S)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)
End Flange/ Cover Flange Rating			Class 150	Class 150	Class 300	Class 300	Class 300
Type			Y-Type	Y-Type	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A312 Grade TP304/TP304L dual grade		ASTM A312 Grade TP304/TP304L dual grade	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A403 Grade WP304/WP304L Class S dual grade		ASTM A403 Grade WP304/WP304L Class S dual grade	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A182 Grade F304/F304L dual grade		ASTM A182 Grade F304/F304L dual grade	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A351 Grade CF8		ASTM A351 Grade CF8	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler		SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7M / A194 Grade 2HM		ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM
	Perforated Plate / Bucket	SS316		SS316	SS316	SS316	SS316
	Screen	SS316		SS316	SS316	SS316	SS316
Other Internals			SS316	SS316	SS316	SS316	
Filtering	Min. Effective Filtering Area Ratio (%)	200		200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor		By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20		20	20	20	20
	Wire Size	By Vendor		By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A	N/A
Drain	0.75" / Butt Weld (Sch 80S)		0.75" / Butt Weld (Sch 80S)	N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.091	1.091	4.319	4.319	3.136
	Temp.	Min. (deg.C)	10	10	10	10	10
		Max. (deg.C)	119	119	70	70	92
	C.A. (mm)		0	0	3	3	3
Operating Condition	Test Press. (MPaG)		1.64	1.64	6.48	6.48	4.70
	Press. (MPaG)		0.164	0.164	1.81	1.81	0.001
	Temp. (deg.C)		47	47	42	42	55
	Fluid		REFLUX SOUR WATER	REFLUX SOUR WATER	LEAN AMINE	LEAN AMINE	LEAN AMINE
	Phase		L	L	L	L	L
	Max. Flow Rate (kg/hr.)		5180	5180	13005	13005	91022
	M.W. (gas)						
	Sp. Gr. (liq.) (kg/m3)		863.4	863.4	1024	1024	1017
	Vis. (cP)		0.48	0.48	3.0	3.0	2.0
Max. Allow. Press. Drop (MPaG)			0.003	0.003	0.003	0.003	0.003
PWHT at Site			N	N	Y	Y	Y
Moderate Wet H2S Service			N	N	N	N	N
Severe Wet H2S Service			Y	Y	Y	Y	Y
Amine Service			Y	Y	Y	Y	Y
Caustic Service			N	N	N	N	N
Hydrogen Service			N	N	N	N	N
Licensor			Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1
Location	P&ID No.	D-023-1225-0203J		D-023-1225-0204J		D-023-1225-0208J	
	Line No.	P-023-2607		P-023-2608		AM-023-2710	
	Piping Class	A0J501		B2A501		B2A501	
Remarks			30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		023-STR-0031	023-STR-0032	023-STR-0033	023-STR-0034	023-STR-0035
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		8	3	12	12	12
End Connection		Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)
End Flange/ Cover Flange Rating		Class 300	Class 150	Class 300	Class 300	Class 300
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A333 Grade 6	ASTM A333 Grade 6	ASTM A333 Grade 6
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A420 Grade WPL6	ASTM A420 Grade WPL6	ASTM A420 Grade WPL6
	Forging	ASTM A105	ASTM A105	ASTM A350 Grade LF2 Class 1	ASTM A350 Grade LF2 Class 1	ASTM A350 Grade LF2 Class 1
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A352 Grade LCC	ASTM A352 Grade LCC	ASTM A352 Grade LCC
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A320 Grade L7 / A194 Grade 4	ASTM A320 Grade L7 / A194 Grade 4	ASTM A320 Grade L7 / A194 Grade 4
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		3.136	0.590	2.94	4.13
	Temp.	Min. (deg.C)	10	10	-27	-48
		Max. (deg.C)	92	92	67	67
	C.A. (mm)		3	3	1.5	1.5
	Test Press. (MPaG)		4.70	0.89	4.41	6.20
Operating Condition	Press. (MPaG)		0.001	0	1.542	1.699
	Temp. (deg.C)		55	25	42	42
	Fluid		LEAN AMINE	AMINE WASH WATER	DEPROPANIZER FEED	"DEPROPANIZER OVERHEAD DISTILLATE"
	Phase		L	L	L	L
	Max. Flow Rate (kg/hr.)		91022	21934	158972	220927
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)		1017	997	562.9	520
	Vis. (cP)		2.0	0.9	0.095	0.08
	Max. Allow. Press. Drop (MPaG)		0.003	0.003	0.003	0.003
PWHT at Site		Y	Y	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		Y	Y	N	N	N
Amine Service		Y	Y	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1
Location	P&ID No.	D-023-1225-0208J	D-023-1225-0208J	D-023-1225-0301J	D-023-1225-0301J	D-023-1225-0303J
	Line No.	AM-023-2927	AM-023-2928	P-023-3014	P-023-3015	P-023-3220
	Piping Class	B2A501	A2A501	B1GP01	B1GP01	B1GP01
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		023-STR-0036	023-STR-0037	023-STR-0038	023-STR-0039	023-STR-0040
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		12	10	10	10	10
End Connection		Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH 30)	Butt Weld (SCH 30)
End Flange/ Cover Flange Rating		Class 300	Class 300	Class 300	Class 300	Class 300
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A333 Grade 6	ASTM A333 Grade 6	ASTM A333 Grade 6	ASTM A333 Grade 6	ASTM A333 Grade 6
	Fitting	ASTM A420 Grade WPL6	ASTM A420 Grade WPL6	ASTM A420 Grade WPL6	ASTM A420 Grade WPL6	ASTM A420 Grade WPL6
	Forging	ASTM A350 Grade LF2 Class 1	ASTM A350 Grade LF2 Class 1	ASTM A350 Grade LF2 Class 1	ASTM A350 Grade LF2 Class 1	ASTM A350 Grade LF2 Class 1
	Casting	ASTM A352 Grade LCC	ASTM A352 Grade LCC	ASTM A352 Grade LCC	ASTM A352 Grade LCC	ASTM A352 Grade LCC
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A320 Grade L7 / A194 Grade 4	ASTM A320 Grade L7M / A194 Grade 7M	ASTM A320 Grade L7M / A194 Grade 7M	ASTM A320 Grade L7 / A194 Grade 4	ASTM A320 Grade L7 / A194 Grade 4
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	4.13	3.83	3.83	4.03	4.03
	Temp.	Min. (deg.C)	-48	-50	-48	-48
		Max. (deg.C)	67	67	66	66
	C.A. (mm)	1.5	3	3	1.5	1.5
	Test Press. (MPaG)	6.20	5.75	5.75	6.05	6.05
Operating Condition	Press. (MPaG)	1.699	2.76	2.76	1.622	1.622
	Temp. (deg.C)	42	42	42	41	41
	Fluid	"DEPROPANIZER OVERHEAD DISTILLATE"	DEETHANIZER REFLUX	DEETHANIZER REFLUX	PROPYLENE CUT	PROPYLENE CUT
	Phase	L	L	L	L	L
	Max. Flow Rate (kg/hr.)	220927	102057	102057	60468	60468
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)	520	509.8	509.8	521	521
	Vis. (cP)	0.08	0.073	0.073	0.081	0.081
	Max. Allow. Press. Drop (MPaG)	0.003	0.003	0.003	0.003	0.003
PWHT at Site		N	Y	Y	N	N
Moderate Wet H2S Service		N	Y	Y	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1
Location	P&ID No.	D-023-1225-0303J	D-023-1225-0306J	D-023-1225-0306J	D-023-1225-0311J	D-023-1225-0311J
	Line No.	P-023-3221	P-023-3414	P-023-3415	P-023-3820	P-023-3825
	Piping Class	B1GP01	B2GQ01	B2GQ01	B1GP01	B1GP01
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		023-STR-0041	023-STR-0042	023-STR-0043	023-STR-0044	023-STR-0045
Qty. (pc(s))		1	1	4	1	1
Size (NPS)		4	4	40	1.5	1.5
End Connection		Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH 30)	Socket Weld	Socket Weld
End Flange/ Cover Flange Rating		Class 300	Class 300	Class 300	Class 150	Class 150
Type		T- BathtubType	T- BathtubType	T- BathtubType	Y-Type	Y-Type
Parts Material	Pipe	ASTM A333 Grade 6	ASTM A333 Grade 6	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A420 Grade WPL6	ASTM A420 Grade WPL6	ASTM A234 Grade WPB	ASTM A105	ASTM A105
	Forging	ASTM A350 Grade LF2 Class 1	ASTM A350 Grade LF2 Class 1	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A352 Grade LCC	ASTM A352 Grade LCC	ASTM A216 Grade WCB	ASTM A105	ASTM A105
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A320 Grade L7 / A194 Grade 4	ASTM A320 Grade L7 / A194 Grade 4	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	30	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	N/A	0.75" / Socket Weld	0.75" / Socket Weld
Design Condition	Press. (MPaG)	3.2	3.2	4.05	1.11	1.11
	Temp.	Min. (deg.C)	-43	-43	10	10
		Max. (deg.C)	65	65	276	276
	C.A. (mm)	1.5	1.5	1.5	1.5	1.5
	Test Press. (MPaG)	4.80	4.80	4.6	2.02	2.02
Operating Condition	Press. (MPaG)	1.239	1.239	0.47	0.276	0.276
	Temp. (deg.C)	38	38	310	42	42
	Fluid	PROPANE CUT	PROPANE CUT	REGENERANT	SOUR WATER	SOUR WATER
	Phase	L	L	L	L	L
	Max. Flow Rate (kg/hr.)	10172	10172	43200	139	139
	M.W. (gas)			78.72		
	Sp. Gr. (liq.) (kg/m3)	509	509		991	991
	Vis. (cP)	0.085	0.085	0.043	0.63	0.63
	Max. Allow. Press. Drop (MPaG)	0.003	0.003	0.003	0.003	0.003
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1
Location	P&ID No.	D-023-1225-0309J	D-023-1225-0309J	D-023-1225-0312J	D-023-1225-0317J	D-023-1225-0317J
	Line No.	P-023-3903	P-023-3904	P-023-4202	SOW-023-4301	SOW-023-4301
	Piping Class	B1GP01	B1GP01	B1AP01	A1AP01	A1AP01
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	Canceled	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		023-STR-0046	023-STR-0047	023-STR-0048	023-STR-0049	023-STR-0050
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		4	4	16	16	10
End Connection		Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH 100)	Butt Weld (SCH 100)	Butt Weld (SCH XS)
End Flange/ Cover Flange Rating		Class 300	Class 300	Class 900	Class 900	Class 600
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A333 Grade 6	ASTM A333 Grade 6	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A420 Grade WPL6	ASTM A420 Grade WPL6	ASTM A234 Grade WPB
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	Soft iron	Soft iron	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	1.95	1.95	10.7	10.7	5.75
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	278	135	135	135
	C.A. (mm)		1.5	3	3	3
	Test Press. (MPaG)		<u>3.14</u>	<u>16.05</u>	<u>16.05</u>	<u>8.63</u>
Operating Condition	Press. (MPaG)	0.276	0.276	0.158	0.158	0.158
	Temp. (deg.C)	42	42	110	110	110
	Fluid	LIGHT ISOMERATE	LIGHT ISOMERATE	HP BFW	HP BFW	MP BFW
	Phase	L	L	L	L	L
	Max. Flow Rate (kg/hr.)	13812	13812	345675	345675	130436
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)	642	642	999	999	999
	Vis. (cP)	0.22	0.22	0.252	0.252	0.252
	Max. Allow. Press. Drop (MPaG)	0.003	0.003	0.003	0.003	0.003
PWHT at Site		N	N	Y	Y	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		Licensor - 1	Licensor - 1	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-023-1225-0317J	D-023-1225-0317J	D-023-1225-0603J	D-023-1225-0603J	D-023-1225-0604J
	Line No.	P-023-4314	P-023-4315	HBFW-023-6102	HBFW-023-6103	MBFW-023-6201
	Piping Class	B1AP01	B1AP01	M2AS	M2AS	D2AS
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		023-STR-0051	023-STR-0052	023-STR-0053	023-STR-0054	023-STR-0055
Qty. (pc(s))		1	1	1	1	4
Size (NPS)		10	8	8	1	4
End Connection		Butt Weld (SCH XS)	Butt Weld (SCH 30)	Butt Weld (SCH 30)	Butt Weld (SCH 160)	Socket Weld
End Flange/ Cover Flange Rating		Class 600	Class 150	Class 150	Class 150	Class 150
Type		T- BathtubType	T- BathtubType	T- BathtubType	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A105	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	5.75	1.1	1.1	0.343	0.66
	Temp.	Min. (deg.C)	10	10	10	40
		Max. (deg.C)	135	125	358	407
	C.A. (mm)		3	3	3	1.5
	Test Press. (MPaG)		8.63	1.65	0.69	
Operating Condition	Press. (MPaG)	0.158	0.024	0.024	0.301	0.301
	Temp. (deg.C)	110	100	100	49	49
	Fluid	MP BFW	LP CONDENSATE	LP CONDENSATE	FUEL GAS	FUEL GAS
	Phase	L	L	L	V	V
	Max. Flow Rate (kg/hr.)	130436	123103	123103	81.5	0.22
	M.W. (gas)				26.5	26
	Sp. Gr. (liq.) (kg/m3)	999	999	999		
	Vis. (cP)	0.252	0.28	0.28		
	Max. Allow. Press. Drop (MPaG)	0.003	0.003	0.003	0.01	0.005
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	Y	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-023-1225-0604J	D-023-1225-0606J	D-023-1225-0606J	D-023-1225-3101J	D-023-1225-3404J
	Line No.	MBFW-023-6202	SCW-023-6508	SCW-023-6509	FLG-022-7225	FG-023-XXXX
	Piping Class	D2AS	A2AS	A2AS	A2AQ	A1AD
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation		Canceled

INDRA
10-JUL-2015

Tag Number		023-STR-0056	023-STR-0057	023-STR-0058	023-STR-0059	023-STR-0060
Qty. (pc(s))		4	1	1	1	1
Size (NPS)		4	1	1	1	1
End Connection		Butt Weld (SCH 160)	Butt Weld (SCH 160)	Butt Weld (SCH 160)	Butt Weld (SCH 160)	Butt Weld (SCH 160)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		Y-Type	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A333 Grade 6	ASTM A106 Grade B	ASTM A333 Grade 6	ASTM A106 Grade B	ASTM A333 Grade 6
	Fitting	ASTM A420 Grade WPL6	ASTM A234 Grade WPB	ASTM A420 Grade WPL6	ASTM A234 Grade WPB	ASTM A420 Grade WPL6
	Forging	ASTM A350 Grade LF2 Class 1	ASTM A105	ASTM A350 Grade LF2 Class 1	ASTM A105	ASTM A350 Grade LF2 Class 1
	Casting	ASTM A350 Grade LF2 Class 1	ASTM A105	ASTM A350 Grade LF2 Class 1	ASTM A105	ASTM A350 Grade LF2 Class 1
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A320 Grade L7M / A194 Grade 7M	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A320 Grade L7M / A194 Grade 7M	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A320 Grade L7M / A194 Grade 7M
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
Other Internals		SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	30	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	0.66	0.343	0.343	0.343	0.343
	Temp.	Min. (deg.C)	10	-50	10	-27
		Max. (deg.C)	158	345	158	345
	C.A. (mm)	3	3	3	3	3
	Test Press. (MPaG)		0.57	0.67	0.57	0.67
Operating Condition	Press. (MPaG)	0.301	0.301	0.301	0.301	0.301
	Temp. (deg.C)	49	49	49	49	49
	Fluid	FUEL GAS	FUEL GAS	FUEL GAS	FUEL GAS	FUEL GAS
	Phase	V	V	V	V	V
	Max. Flow Rate (kg/hr.)	0.22	6.8	35.3	6.8	56
	M.W. (gas)	26	26.5	26.5	26.5	26.5
	Sp. Gr. (liq.) (kg/m3)					
	Vis. (cP)					
Max. Allow. Press. Drop (MPaG)		0.005	0.1	0.1	0.1	0.01
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		Y	Y	Y	Y	Y
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-023-1225-3102J	D-023-1225-3102J	D-023-1225-3105J	D-023-1225-3105J	D-023-1225-3105J
	Line No.	FLG-022-7223	AFLG-022-7212	FLG-023-7207	AFLG-022-7203	FLG-022-7203
	Piping Class	A2GQ	A2AQ	A2GQ	A2AQ	A2GQ
Remarks		Canceled				

INDRA
10-JUL-2015

Tag Number		023-STR-0061	023-STR-0062	023-STR-0063	023-STR-0064	023-STR-0065
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		1	1	24	24	24
End Connection		Butt Weld (SCH 160)	Butt Weld (SCH 160)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 300	Class 300	Class 300
Type		Y-Type	Y-Type	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A333 Grade 6	ASTM A671 Grade CC60 Class 22	ASTM A671 Grade CC60 Class 22	ASTM A671 Grade CC60 Class 22
	Fitting	ASTM A234 Grade WPB	ASTM A420 Grade WPL6	ASTM A420 Grade WPL6	ASTM A420 Grade WPL6	ASTM A420 Grade WPL6
	Forging	ASTM A105	ASTM A350 Grade LF2 Class 1	ASTM A350 Grade LF2 Class 1	ASTM A350 Grade LF2 Class 1	ASTM A350 Grade LF2 Class 1
	Casting	ASTM A105	ASTM A350 Grade LF2 Class 1	ASTM A352 Grade LCC	ASTM A352 Grade LCC	ASTM A352 Grade LCC
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A320 Grade L7M / A194 Grade 7M	ASTM A320 Grade L7 / A194 Grade 4	ASTM A320 Grade L7 / A194 Grade 4	ASTM A320 Grade L7 / A194 Grade 4
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	20	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	0.343	0.343	2.1	2.1	2.1
	Temp.	Min. (deg.C)	10	-50	-48	-48
		Max. (deg.C)	158	345	66	66
	C.A. (mm)		3	1.5	1.5	1.5
	Test Press. (MPaG)		0.57	3.15	3.15	3.15
Operating Condition	Press. (MPaG)	0.301	0.301	1.622	1.622	1.622
	Temp. (deg.C)	49	49	41	41	41
	Fluid	FUEL GAS	FUEL GAS	PROPANE CUT	PROPANE CUT	PROPANE CUT
	Phase	V	V	L	L	L
	Max. Flow Rate (kg/hr.)	9.7	81.5	534611	534611	534611
	M.W. (gas)	26.5	26.5			
	Sp. Gr. (liq.) (kg/m3)			521	521	521
	Vis. (cP)			0.081	0.081	0.081
	Max. Allow. Press. Drop (MPaG)	0.01	0.01	0.003	0.003	0.003
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		Y	Y	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	Licensor - 1	Licensor - 1	Licensor - 1
Location	P&ID No.	D-023-1225-3105J	D-023-1225-3106J	D-023-1225-0310J	D-023-1225-0310J	D-023-1225-0310J
	Line No.	AFLG-022-7202	FLG-023-7208	P-023-3822	P-023-3823	P-023-3824
	Piping Class	A2AQ	A2GQ	B1GP01	B1GP01	B1GP01
Remarks				30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		023-STR-0068	024-STR-0002	024-STR-0003	024-STR-0004	024-STR-0005
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		4	6	6	1.5	1.5
End Connection		Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Socket Weld	Socket Weld
End Flange/ Cover Flange Rating		Class 300	Class 150	Class 150	Class 300	Class 300
Type		T- BathtubType	T- BathtubType	T- BathtubType	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A105	ASTM A105
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A105	ASTM A105
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	Monel	Monel	SS316	SS316
	Screen	SS316	Monel	Monel	SS316	SS316
	Other Internals	SS316	Monel	Monel	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	Refer Note in remark column	20	20	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	N/A	0.75" / Socket Weld	0.75" / Socket Weld
Design Condition	Press. (MPaG)	2.8	0.65	0.65	2.15	2.15
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	350	100	100	100
	C.A. (mm)		1.5	3	3	3
	Test Press. (MPaG)		4.90	0.98	3.43	3.43
Operating Condition	Press. (MPaG)	2.06	0.03	0.03	0.003	0.003
	Temp. (deg.C)	320	42	42	40	40
	Fluid	MP STEAM	SPENT CAUSTIC	SPENT CAUSTIC	CLBFW	CLBFW
	Phase	V	L	L	L	L
	Max. Flow Rate (kg/hr.)	4538	32209	32209	758	758
	M.W. (gas)	18.01				
	Sp. Gr. (liq.) (kg/m3)		1063	1063	993	993
	Vis. (cP)	0.021	0.928	0.928	0.656	0.656
	Max. Allow. Press. Drop (MPaG)		0.003	0.003	0.003	0.003
	PWHT at Site	N	Y	Y	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	Y	Y	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	Licensor - 4	Licensor - 4	No Licensor	No Licensor
Location	P&ID No.	D-023-1225-2103J	D-024-1225-0002J	D-024-1225-0002J	D-024-1225-0003J	D-024-1225-0003J
	Line No.	MPS-023-0203	SCAU-024-0202	SCAU-024-0203	CLBFW-024-0322	CLBFW-024-0313
	Piping Class	B1AS	A2AN04	A2AN04	B2AS	B2AS
Remarks		Perforation Type φ3 mm.	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		024-STR-0006	024-STR-0007	024-STR-0008	024-STR-0009	024-STR-0010
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		1	1	6	4	1
End Connection		Socket Weld	Socket Weld	Butt Weld (SCH XS)	Butt Weld (SCH STD)	Butt Weld (SCH 160)
End Flange/ Cover Flange Rating		Class 300	Class 300	Class 300	Class 300	Class 150
Type		Y-Type	Y-Type	T- BathtubType	T- BathtubType	Y-Type
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A105	ASTM A105	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A105	ASTM A105	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A105
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	Monel	Monel
	Screen	SS316	SS316	SS316	Monel	Monel
	Other Internals	SS316	SS316	SS316	Monel	Monel
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		0.75" / Socket Weld	0.75" / Socket Weld	N/A	0.75" / Butt Weld (Sch 160)
Design Condition	Press. (MPaG)	2.06	2.06	2.5	2.755	1.2
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	100	100	100	100
	C.A. (mm)	3	3	3	3	3
	Test Press. (MPaG)	3.29	3.29	3.75	4.13	1.92
Operating Condition	Press. (MPaG)	0.004	0.004	0.002	-0.015	-0.01
	Temp. (deg.C)	40	40	40	40	40
	Fluid	CLBFW	CLBFW	CLBFW	DILUTE CAUSTIC	DILUTE CAUSTIC
	Phase	L	L	L	L	L
	Max. Flow Rate (kg/hr.)	119	119	30088	34784	693
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)	993	993	993	1148	1148
	Vis. (cP)	0.656	0.656	0.656	1.572	1.572
	Max. Allow. Press. Drop (MPaG)	0.003	0.003	0.003	0.003	0.003
	PWHT at Site	N	N	N	Y	Y
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	Y	Y
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	Licensor - 4	No Licensor
Location	P&ID No.	D-024-1225-0003J	D-024-1225-0003J	D-024-1225-0004J	D-024-1225-0004J	D-024-1225-0004J
	Line No.	CLBFW-024-0314	CLBFW-024-0321	CLBFW-024-0401	FCAU-024-0401	FCAU-024-0408
	Piping Class	B2AS	B2AS	B2AS	B2AN04	A2AN
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		024-STR-0011	024-STR-0012	024-STR-0013	024-STR-0014	024-STR-0015
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		1	6	6	1.5	6
End Connection		Butt Weld (SCH 160)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH XS)	Butt Weld (SCH STD)
End Flange/ Cover Flange Rating		Class 150	Class 300	Class 300	Class 300	Class 300
Type		Y-Type	T- BathtubType	T- BathtubType	Y-Type	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A105	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	Monel	Monel	Monel	Monel	Monel
	Screen	Monel	Monel	Monel	Monel	Monel
	Other Internals	Monel	Monel	Monel	Monel	Monel
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	30	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	0.75" Butt Weld (Sch 160)		N/A	N/A	0.75" Butt Weld (Sch 160)	N/A
Design Condition	Press. (MPaG)		1.2	4.35	4.35	4.25
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	100	100	100	100
	C.A. (mm)		3	3	3	3
Operating Condition	Test Press. (MPaG)		1.92	6.53	6.53	6.38
	Press. (MPaG)		-0.01	1.757	1.757	1.783
	Temp. (deg.C)		40	42	42	42
	Fluid		DILUTE CAUSTIC	CAUSTIC	CAUSTIC	SPENT CAUSTIC
	Phase		L	L	L	L
	Max. Flow Rate (kg/hr.)		693	52937	52937	49501
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)		1148	1063	1063	992
	Vis. (cP)		1.572	0.928	0.928	0.632
	Max. Allow. Press. Drop (MPaG)		0.003	0.003	0.003	0.003
PWHT at Site		Y	Y	Y	Y	Y
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		Y	Y	Y	Y	Y
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	Licensor - 4	Licensor - 4	Licensor - 4	Licensor - 4
Location	P&ID No.	D-024-1225-0004J	D-024-1225-0005J	D-024-1225-0005J	D-024-1225-0005J	D-024-1225-0006J
	Line No.	FCAU-024-0409	P-024-0508	P-024-0507	P-024-0506	P-024-0608
	Piping Class	A2AN	B2AN04	B2AN04	B2AN04	B2AN04
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation		30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number			024-STR-0016	024-STR-0017	024-STR-0018	024-STR-0019	024-STR-0020
Qty. (pc(s))			1	1	1	1	1
Size (NPS)			6	1	0.75	6	6
End Connection			Butt Weld (SCH STD)	Butt Weld (SCH 160)	Socket Weld	Butt Weld (SCH STD)	Butt Weld (SCH STD)
End Flange/ Cover Flange Rating			Class 300	Class 300	Class 150	Class 300	Class 300
Type			T- BathtubType	Y-Type	Y-Type	T- BathtubType	T- BathtubType
Parts Material	Pipe		ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting		ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging		ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting		ASTM A216 Grade WCB	ASTM A105	ASTM A105	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket		SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut		ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket		Monel	Monel	SS316	Monel	Monel
	Screen		Monel	Monel	SS316	Monel	Monel
	Other Internals		Monel	Monel	SS316	Monel	Monel
Filtering	Min. Effective Filtering Area Ratio (%)		200	200	200	200	200
	Perforated Plate Hole Diameter (mm)		By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)		20	30	20	20	20
	Wire Size		By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	0.75" / Butt Weld (Sch 160)	0.75" / Socket Weld	N/A	N/A
Design Condition	Press. (MPaG)		4.25	3.92	1.2	3.2	3.2
	Temp.	Min. (deg.C)	10	10	10	10	10
		Max. (deg.C)	100	100	100	100	100
	C.A. (mm)		3	3	1.5	3	3
	Test Press. (MPaG)		<u>6.38</u>	<u>6.26</u>	<u>1.92</u>	<u>4.80</u>	<u>4.80</u>
Operating Condition	Press. (MPaG)		1.783	1.783	0	0.456	0.456
	Temp. (deg.C)		42	42	36	42	42
	Fluid		WASH WATER	WATER / SPENT CAUSTIC	MEROX WS	CAUSTIC	CAUSTIC
	Phase		L	L	L	L	L
	Max. Flow Rate (kg/hr.)		49501	1488	9	32971	32971
	M.W. (gas)						
	Sp. Gr. (liq.) (kg/m3)		992	992	1116	1072	1072
	Vis. (cP)		0.632	0.632	3.8	1.493	1.493
	Max. Allow. Press. Drop (MPaG)		0.003	0.005	0.003	0.003	0.003
PWHT at Site			Y	Y	N	Y	Y
Moderate Wet H2S Service			N	N	N	N	N
Severe Wet H2S Service			N	N	N	N	N
Amine Service			N	N	N	N	N
Caustic Service			Y	Y	N	Y	Y
Hydrogen Service			N	N	N	N	N
Licensor			Licensor - 4	Licensor - 4	Licensor - 4	Licensor - 4	Licensor - 4
Location	P&ID No.		D-024-1225-0006J	D-024-1225-0006J	D-024-1225-0007J	D-024-1225-0008J	D-024-1225-0008J
	Line No.		P-024-0609	P-024-0602	P-024-0707	P-024-0802	P-024-0803
	Piping Class		B2AN04	B2AN04	A1AY04	B2AN04	B2AN04
Remarks			30 Mesh size for start up operation		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		024-STR-0021	025-STR-0001	025-STR-0002	025-STR-0004	025-STR-0005
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		1	1	1	1	1
End Connection		Socket Weld	Socket Weld	Socket Weld	Socket Weld	Socket Weld
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		Y-Type	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A312 Grade TP316/TP316L dual grade	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A182 Grade F316/F316L dual grade	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Forging	ASTM A182 Grade F316/F316L dual grade	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A182 Grade F316/F316L dual grade	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	20	20	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		0.75" / Socket Weld	0.75" / Socket Weld	0.75" / Socket Weld	0.75" / Socket Weld
Design Condition	Press. (MPaG)		1.05	0.958	0.958	0.749
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	100	100	100	100
	C.A. (mm)		0.8	3	1.5	1.5
	Test Press. (MPaG)		1.58	1.53	1.20	1.20
Operating Condition	Press. (MPaG)		0.6	0.003	0.003	0.006
	Temp. (deg.C)		47	40	42	42
	Fluid		AIR	CLBFW	CLBFW	INHIBITOR
	Phase		V	L	L	L
	Max. Flow Rate (kg/hr.)		57	62	62	3
	M.W. (gas)		28.85			
	Sp. Gr. (liq.) (kg/m3)			993	993	921
	Vis. (cP)		0.019	0.656	0.656	8.285
	Max. Allow. Press. Drop (MPaG)		0.005	0.003	0.003	0.003
	PWHT at Site		N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		Licensor - 4	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-024-1225-0007J	D-025-1225-0002J	D-025-1225-0002J	D-025-1225-0005J	D-025-1225-0005J
	Line No.	P-024-0706	CLBFW-025-0203	CLBFW-024-0204	C-025-0507	C-025-0509
	Piping Class	A0LP04	A2AS	A2AS	A1AY	A1AY
Remarks			30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		025-STR-0006	025-STR-0007	028-STR-0001	028-STR-0002	028-STR-0003
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		1	1	10	10	6
End Connection		Socket Weld	Socket Weld	Butt Weld (SCH 30)	Butt Weld (SCH 30)	Butt Weld (SCH STD)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 300	Class 300	Class 300
Type		Y-Type	Y-Type	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A333 Grade 6	ASTM A333 Grade 6	ASTM A333 Grade 6
	Fitting	ASTM A105	ASTM A105	ASTM A420 Grade WPL6	ASTM A420 Grade WPL6	ASTM A420 Grade WPL6
	Forging	ASTM A105	ASTM A105	ASTM A350 Grade LF2 Class 1	ASTM A350 Grade LF2 Class 1	ASTM A350 Grade LF2 Class 1
	Casting	ASTM A105	ASTM A105	ASTM A352 Grade LCC	ASTM A352 Grade LCC	ASTM A352 Grade LCC
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A320 Grade L7 / A194 Grade 4	ASTM A320 Grade L7 / A194 Grade 4	ASTM A320 Grade L7 / A194 Grade 4
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		0.75" / Socket Weld	N/A	N/A	N/A
Design Condition	Press. (MPaG)	0.82	0.82	4.8	4.8	4.51
	Temp.	Min. (deg.C)	10	-5	-5	-5
		Max. (deg.C)	100	70	70	145
	C.A. (mm)	1.5	1.5	1.5	1.5	1.5
	Test Press. (MPaG)	<u>1.31</u>	<u>1.31</u>	<u>7.20</u>	<u>7.20</u>	<u>6.77</u>
Operating Condition	Press. (MPaG)	0.006	0.006	0.56	0.56	3.17
	Temp. (deg.C)	42	42	42	42	107
	Fluid	INHIBITOR	INHIBITOR	OLEFIN	OLEFIN	OLEFIN
	Phase	L	L	L	L	L
	Max. Flow Rate (kg/hr.)	4	4	93555	93555	46337
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)	921	921	567	567	469
	Vis. (cP)	8.285	8.285	0.136	0.136	0.074
	Max. Allow. Press. Drop (MPaG)	0.003	0.003	0.005	0.005	0.005
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	Licensor - 4	Licensor - 4	Licensor - 4
Location	P&ID No.	D-025-1225-0005J	D-025-1225-0005J	D-028-1225-0012J	D-028-1225-0012J	D-028-1225-0015J
	Line No.	C-025-0505	C-025-0506	P-028-0401	P-028-0402	P-028-0641
	Piping Class	A1AY	A1AY	B1GP04	B1GP04	B1GP04
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		028-STR-0004	028-STR-0005	028-STR-0006	028-STR-0007	028-STR-0008
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		6	6	6	1	10
End Connection		Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Socket Weld	Butt Weld (SCH STD)
End Flange/ Cover Flange Rating		Class 300	Class 300	Class 300	Class 150	Class 600
Type		T- BathtubType	T- BathtubType	T- BathtubType	Y-Type	T- BathtubType
Parts Material	Pipe	ASTM A333 Grade 6	ASTM A333 Grade 6	ASTM A333 Grade 6	ASTM A106 Grade B	ASTM A333 Grade 6
	Fitting	ASTM A420 Grade WPL6	ASTM A420 Grade WPL6	ASTM A420 Grade WPL6	ASTM A105	ASTM A420 Grade WPL6
	Forging	ASTM A350 Grade LF2 Class 1	ASTM A350 Grade LF2 Class 1	ASTM A350 Grade LF2 Class 1	ASTM A105	ASTM A350 Grade LF2 Class 1
	Casting	ASTM A352 Grade LCC	ASTM A352 Grade LCC	ASTM A352 Grade LCC	ASTM A105	ASTM A352 Grade LCC
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A320 Grade L7 / A194 Grade 4	ASTM A320 Grade L7 / A194 Grade 4	ASTM A320 Grade L7 / A194 Grade 4	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A320 Grade L7 / A194 Grade 4
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	N/A	0.75" / Socket Weld	N/A
Design Condition	Press. (MPaG)		4.51	2.15	2.15	0.773
	Temp.	Min. (deg.C)	-5	-5	-5	-5
		Max. (deg.C)	145	120	120	70
	C.A. (mm)		1.5	1.5	1.5	1.5
	Test Press. (MPaG)		<u>6.77</u>	<u>3.23</u>	<u>3.23</u>	<u>9.66</u>
Operating Condition	Press. (MPaG)		3.17	0.44	0.44	0.02
	Temp. (deg.C)		107	47	47	40
	Fluid		OLEFIN	OLEFIN	OLEFIN	CONTINUALLY OIL CONTAMINATED WASTE WATER
	Phase		L	L	L	L
	Max. Flow Rate (kg/hr.)		46337	25272	25272	152
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)		469	540	540	968
	Vis. (cP)		0.074	0.12	0.12	1.863
	Max. Allow. Press. Drop (MPaG)		0.005	0.005	0.005	0.005
	PWHT at Site		N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		Licensor - 4	Licensor - 4	Licensor - 4	Licensor - 4	Licensor - 4
Location	P&ID No.	D-028-1225-0015J	D-028-1225-0067J	D-028-1225-0067J	D-028-1225-0020J	D-028-1225-0031J
	Line No.	P-028-0642	P-028-4601	P-028-4602	WO-028-1115	P-028-1407
	Piping Class	B1GP04	B1GP04	B1GP04	A1AP04	D1GP04
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		028-STR-0009	028-STR-0010	028-STR-0011	028-STR-0012	028-STR-0013
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		10	1	1	1	1
End Connection		Butt Weld (SCH STD)	Socket Weld	Socket Weld	Butt Weld (SCH 80S)	Butt Weld (SCH 80S)
End Flange/ Cover Flange Rating		Class 600	Class 600	Class 600	Class 300	Class 300
Type		T-BathtubType	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A333 Grade 6	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A312 Grade TP304/TP304L dual grade	ASTM A312 Grade TP304/TP304L dual grade
	Fitting	ASTM A420 Grade WPL6	ASTM A105	ASTM A105	ASTM A403 Grade WP304/WP304L Class S dual grade	ASTM A403 Grade WP304/WP304L Class S dual grade
	Forging	ASTM A350 Grade LF2 Class 1	ASTM A105	ASTM A105	ASTM A182 Grade F304/F304L dual grade	ASTM A182 Grade F304/F304L dual grade
	Casting	ASTM A352 Grade LCC	ASTM A105	ASTM A105	ASTM A182 Grade F304/F304L dual grade	ASTM A182 Grade F304/F304L dual grade
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A320 Grade L7 / A194 Grade 4	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	0.75" / Socket Weld	0.75" / Socket Weld	0.75" / Socket Weld
Design Condition	Press. (MPaG)	6.45	4.85	4.85	2.95	2.95
	Temp.	Min. (deg.C)	-5	10	10	10
		Max. (deg.C)	70	70	70	70
	C.A. (mm)	1.5	3	3	0	0
	Test Press. (MPaG)	<u>9.68</u>	<u>7.52</u>	<u>7.52</u>	<u>4.43</u>	<u>4.43</u>
Operating Condition	Press. (MPaG)	0.86	0.003	0.003	0.17	0.17
	Temp. (deg.C)	40	40	40	38	38
	Fluid	OLEFIN	INJECTED WATER	INJECTED WATER	DMDS	DMDS
	Phase	L	L	L	L	L
	Max. Flow Rate (kg/hr.)	93480	9	9	16	16
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)	570	920	920	1034	1034
	Vis. (cP)	0.138	0.653	0.653	0.425	0.425
	Max. Allow. Press. Drop (MPaG)	0.005	0.003	0.003	0.005	0.005
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		Licensor - 4	No Licensor	No Licensor	Licensor - 4	Licensor - 4
Location	P&ID No.	D-028-1225-0031J	D-028-1225-0032J	D-028-1225-0032J	D-028-1225-0040J	D-028-1225-0040J
	Line No.	P-028-1408	CLBFW-028-1521	CLBFW-028-1522	C-028-2346	C-028-2347
	Piping Class	D1GP04	D2AP	D2AP	B0JY04	B0JY04
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		028-STR-0014	028-STR-0015	028-STR-0016	028-STR-0017	028-STR-0018
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		10	10	6	6	12
End Connection		Butt Weld (SCH 30)	Butt Weld (SCH 30)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH 40)
End Flange/ Cover Flange Rating		Class 300	Class 300	Class 300	Class 300	Class 600
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A333 Grade 6	ASTM A333 Grade 6	ASTM A333 Grade 6	ASTM A333 Grade 6	ASTM A106 Grade B
	Fitting	ASTM A420 Grade WPL6	ASTM A420 Grade WPL6	ASTM A420 Grade WPL6	ASTM A420 Grade WPL6	ASTM A234 Grade WPB
	Forging	ASTM A350 Grade LF2 Class 1	ASTM A350 Grade LF2 Class 1	ASTM A350 Grade LF2 Class 1	ASTM A350 Grade LF2 Class 1	ASTM A105
	Casting	ASTM A352 Grade LCC	ASTM A352 Grade LCC	ASTM A352 Grade LCC	ASTM A352 Grade LCC	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A320 Grade L7 / A194 Grade 4	ASTM A320 Grade L7 / A194 Grade 4	ASTM A320 Grade L7 / A194 Grade 4	ASTM A320 Grade L7 / A194 Grade 4	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	3.85	3.85	2.35	2.35	6.1
	Temp.	Min. (deg.C)	-5	-5	-5	10
		Max. (deg.C)	85	75	75	225
	C.A. (mm)		1.5	1.5	1.5	1.5
	Test Press. (MPaG)		<u>5.78</u>	<u>3.53</u>	<u>3.53</u>	<u>9.35</u>
Operating Condition	Press. (MPaG)	2.00	2.00	1.52	1.52	0.55
	Temp. (deg.C)	57	57	49	49	185
	Fluid	SEPARATOR LIQUID	SEPARATOR LIQUID	STRIPPER REFLUX	STRIPPER REFLUX	ALKYLATE
	Phase	L	L	L	L	L
	Max. Flow Rate (kg/hr.)	147136	147136	26453	26453	187516
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)	608	608	528	528	518
	Vis. (cP)	0.155	0.155	0.112	0.112	0.088
	Max. Allow. Press. Drop (MPaG)	0.005	0.005	0.005	0.005	0.005
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		Licensor - 4	Licensor - 4	Licensor - 4	Licensor - 4	Licensor - 4
Location	P&ID No.	D-028-1225-0041J	D-028-1225-0041J	D-028-1225-0048J	D-028-1225-0048J	D-028-1225-0049J
	Line No.	P-028-2355	P-028-2357	P-028-2947	P-028-2948	P-028-3021
	Piping Class	B1GP04	B1GP04	B1GP04	B1GP04	D1AP04
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		028-STR-0019	028-STR-0020	028-STR-0021	028-STR-0022	028-STR-0023
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		12	10	10	3	3
End Connection		Butt Weld (SCH 40)	Butt Weld (SCH 20)	Butt Weld (SCH 20)	Butt Weld (SCH STD)	Butt Weld (SCH STD)
End Flange/ Cover Flange Rating		Class 600	Class 150	Class 150	Class 300	Class 300
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A333 Grade 6	ASTM A333 Grade 6	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WPB	ASTM A420 Grade WPL6	ASTM A420 Grade WPL6	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A105	ASTM A350 Grade LF2 Class 1	ASTM A350 Grade LF2 Class 1	ASTM A105	ASTM A105
	Casting	ASTM A216 Grade WCB	ASTM A352 Grade LCC	ASTM A352 Grade LCC	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A320 Grade L7 / A194 Grade 4	ASTM A320 Grade L7 / A194 Grade 4	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	6.1	1.85	1.85	1.6	1.6
	Temp.	Min. (deg.C)	10	-5	10	10
		Max. (deg.C)	225	70	220	220
	C.A. (mm)		1.5	1.5	1.5	1.5
	Test Press. (MPaG)		<u>9.35</u>	<u>2.78</u>	<u>2.44</u>	<u>2.44</u>
Operating Condition	Press. (MPaG)	0.55	0.434	0.434	0.134	0.134
	Temp. (deg.C)	185	42	42	42	42
	Fluid	ALKYLATE	PRODUCT BUTANE	PRODUCT BUTANE	HEAVY OIL	HEAVY OIL
	Phase	L	L	L	L	L
	Max. Flow Rate (kg/hr.)	187516	148240	148240	10046	10046
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)	518	545	545	728	728
	Vis. (cP)	0.088	0.127	0.127	0.886	0.886
	Max. Allow. Press. Drop (MPaG)	0.005	0.005	0.005	0.005	0.005
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		Licensor - 4	Licensor - 4	Licensor - 4	Licensor - 4	Licensor - 4
Location	P&ID No.	D-028-1225-0049J	D-028-1225-0052J	D-028-1225-0052J	D-028-1225-0054J	D-028-1225-0054J
	Line No.	P-028-3022	P-028-3330	P-028-3331	P-028-3514	P-028-3515
	Piping Class	D1AP04	A1GP04	A1GP04	B1AP04	B1AP04
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		028-STR-0024	028-STR-0025	028-STR-0026	028-STR-0027	028-STR-0028
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		8	8	8	8	6
End Connection		Butt Weld (SCH 20)	Butt Weld (SCH 20)	Butt Weld (SCH 30)	Butt Weld (SCH 30)	Butt Weld (SCH STD)
End Flange/ Cover Flange Rating		Class 300	Class 300	Class 150	Class 150	Class 150
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	20	8
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)	2.15	2.15	1.10	1.10	1.713
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	140	125	125	60
	C.A. (mm)	1.5	1.5	3	3	3
	Test Press. (MPaG)	<u>3.23</u>	<u>3.23</u>	<u>1.65</u>	<u>1.65</u>	<u>2.57</u>
Operating Condition	Press. (MPaG)	0.065	0.065	0.03	0.03	0.81
	Temp. (deg.C)	111	111	100	100	30
	Fluid	ALKYLATE PRODUCT	ALKYLATE PRODUCT	SUSPECTED CONDENSATE	SUSPECTED CONDENSATE	REFINERY FIRE WATER
	Phase	L	L	L	L	L
	Max. Flow Rate (kg/hr.)	60795	60795	77660	77660	251231
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)	579	579	958	958	0.996
	Vis. (cP)	0.13	0.13	0.28	0.28	0.8
	Max. Allow. Press. Drop (MPaG)	0.005	0.005	0.005	0.005	0.02
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		Licensor - 4	Licensor - 4	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-028-1225-0055J	D-028-1225-0055J	D-028-1225-0103J	D-028-1225-0103J	D-028-1225-9002J
	Line No.	P-028-3629	P-028-3630	SCW-028-6320	SCW-028-6321	RFW-028-9019
	Piping Class	B1AP04	B1AP04	A2AS	A2AS	A0RU
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	

INDRA
10-JUL-2015

Tag Number			028-STR-0029	028-STR-0030	028-STR-0031	028-STR-0032	028-STR-0033
Qty. (pc(s))			1	1	1	1	1
Size (NPS)			6	8	8	8	8
End Connection			Butt Weld (SCH STD)	Butt Weld (SCH 20)	Butt Weld (SCH 20)	Butt Weld (SCH 20)	Butt Weld (SCH 20)
End Flange/ Cover Flange Rating			Class 150	Class 150	Class 150	Class 150	Class 150
Type			T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe		ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting		ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging		ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting		ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket		SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut		ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket		SS316	SS316	SS316	SS316	SS316
	Screen		SS316	SS316	SS316	SS316	SS316
	Other Internals		SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)		200	200	200	200	200
	Perforated Plate Hole Diameter (mm)		By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)		8	8	8	8	8
	Wire Size		By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.713	1.713	1.713	1.713	1.713
	Temp.	Min. (deg.C)	10	10	10	10	10
		Max. (deg.C)	60	60	60	60	60
	C.A. (mm)		3	3	3	3	3
Operating Condition	Test Press. (MPaG)		<u>2.57</u>	<u>2.57</u>	<u>2.57</u>	<u>2.57</u>	<u>2.57</u>
	Press. (MPaG)		0.81	0.81	0.81	0.81	0.81
	Temp. (deg.C)		30	30	30	30	30
	Fluid		REFINERY FIRE WATER	REFINERY FIRE WATER	REFINERY FIRE WATER	REFINERY FIRE WATER	REFINERY FIRE WATER
	Phase		L	L	L	L	L
	Max. Flow Rate (kg/hr.)		251231	275613	275613	467921	467921
	M.W. (gas)						
	Sp. Gr. (liq.) (kg/m3)		0.996	0.996	0.996	0.996	0.996
Service Conditions	Vis. (cP)		0.8	0.8	0.8	0.8	0.8
	Max. Allow. Press. Drop (MPaG)		0.02	0.02	0.02	0.02	0.02
	PWHT at Site		N	N	N	N	N
	Moderate Wet H2S Service		N	N	N	N	N
	Severe Wet H2S Service		N	N	N	N	N
	Amine Service		N	N	N	N	N
	Caustic Service		N	N	N	N	N
	Hydrogen Service		N	N	N	N	N
	Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
	Location	P&ID No.	D-028-1225-9002J	D-028-1225-9002J	D-028-1225-9002J	D-028-1225-9003J	D-028-1225-9003J
		Line No.	RFW-028-9047	RFW-028-9042	RFW-028-9039	RFW-028-9031	RFW-028-9036
		Piping Class	A0RU	A0RU	A0RU	A0RU	A0RU
	Remarks						

INDRA
10-JUL-2015

Tag Number		028-STR-0034	028-STR-0035	028-STR-0036	028-STR-0037	081-STR-0001
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		6	6	6	6	8
End Connection		Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH10S)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A358 Grade 304/304L Class 1 dual grade
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A403 Grade WP304/WP304L Class WX dual grade
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A182 Grade F304/F304L dual grade
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A351 Grade CF8
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7M / A194 Grade 2HM
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	8	8	8	8	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.713	1.713	1.713	1.235
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	60	60	60	68
	C.A. (mm)		3	3	3	0
	Test Press. (MPaG)		<u>2.57</u>	<u>2.57</u>	<u>2.57</u>	<u>1.85</u>
Operating Condition	Press. (MPaG)		0.81	0.81	0.81	0.047
	Temp. (deg.C)		30	30	30	42
	Fluid		REFINERY FIRE WATER	REFINERY FIRE WATER	REFINERY FIRE WATER	SOUR WATER
	Phase		L	L	L	L
	Max. Flow Rate (kg/hr.)		290314	290314	203423	98994
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)		0.996	0.996	0.996	986
	Vis. (cP)		0.8	0.8	0.8	0.64
	Max. Allow. Press. Drop (MPaG)		0.02	0.02	0.02	0.005
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	Y
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-028-1225-9003J	D-028-1225-9003J	D-028-1225-9004J	D-028-1225-9004J	D-081-1225-0002J
	Line No.	RFW-028-9029	RFW-028-9034	RFW-028-9005	RFW-028-9021	SOW-081-1021
	Piping Class	A0RU	A0RU	A0RU	A0RU	A0JR
Remarks						30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		081-STR-0002	081-STR-0003	081-STR-0004	081-STR-0005	081-STR-0006
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		8	8	10	10	10
End Connection		Butt Weld (SCH10S)	Butt Weld (SCH10S)	Butt Weld (SCH10S)	Butt Weld (SCH10S)	Butt Weld (SCH STD)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 300
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A358 Grade 304/304L Class 1 dual grade	ASTM A358 Grade 304/304L Class 1 dual grade	ASTM A358 Grade 316/316L Class 1 dual grade	ASTM A358 Grade 316/316L Class 1 dual grade	ASTM A106 Grade B
	Fitting	ASTM A403 Grade WP304/WP304L Class WX dual grade	ASTM A403 Grade WP304/WP304L Class WX dual grade	ASTM A403 Grade WP316/WP316L Class WX dual grade	ASTM A403 Grade WP316/WP316L Class WX dual grade	ASTM A234 Grade WPB
	Forging	ASTM A182 Grade F304/F304L dual grade	ASTM A182 Grade F304/F304L dual grade	ASTM A182 Grade F316/F316L dual grade	ASTM A182 Grade F316/F316L dual grade	ASTM A105
	Casting	ASTM A351 Grade CF8	ASTM A351 Grade CF8	ASTM A351 Grade CF8M	ASTM A351 Grade CF8M	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.235	0.960	0.960	2.075
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	68	122	122	160
	C.A. (mm)		0	0	0	3
	Test Press. (MPaG)		1.85	1.44	1.44	3.12
Operating Condition	Press. (MPaG)		0.047	0.351	0.351	0.196
	Temp. (deg.C)		42	96	96	128
	Fluid		SOUR WATER	STRIPPER PUMPAROUND	STRIPPER PUMPAROUND	STRIPPED WATER
	Phase		L	L	L	L
	Max. Flow Rate (kg/hr.)		98994	212344	212344	120779
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)		986	836	836	937
	Vis. (cP)		0.64	0.25	0.25	0.21
	Max. Allow. Press. Drop (MPaG)		0.005	0.005	0.005	0.005
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		Y	Y	Y	Y	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-081-1225-0002J	D-081-1225-0002J	D-081-1225-0005J	D-081-1225-0005J	D-081-1225-0006J
	Line No.	SOW-081-1021	SOW-081-1022	SOW-081-1025	SOW-081-1026	SOW-081-1031
	Piping Class	A0JR	A0JR	A0LR	A0LR	B2AP
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		081-STR-0007	081-STR-0008	081-STR-0009	081-STR-0010	081-STR-0011
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		10	10	3	3	3
End Connection		Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)
End Flange/ Cover Flange Rating		Class 300	Class 300	Class 150	Class 150	Class 300
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	20	Refer Note in remark column
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		2.075	1.41	1.41	2.8
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	160	68	68	350
	C.A. (mm)		3	3	3	1.5
	Test Press. (MPaG)		<u>3.12</u>	<u>2.12</u>	<u>2.12</u>	<u>4.90</u>
Operating Condition	Press. (MPaG)		0.196	0.034	0.034	2.06
	Temp. (deg.C)		128	42	42	320
	Fluid		STRIPPED WATER	SKIMMED OIL	SKIMMED OIL	MP STEAM
	Phase		L	L	L	V
	Max. Flow Rate (kg/hr.)		120779	6730	6730	1466
	M.W. (gas)					18
	Sp. Gr. (liq.) (kg/m3)		937	673	673	
	Vis. (cP)		0.21	0.34	0.34	0.021
	Max. Allow. Press. Drop (MPaG)		0.005	0.005	0.005	0.004
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	Y	Y	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-081-1225-0006J	D-081-1225-0006J	D-081-1225-0008J	D-081-1225-0008J	D-081-1225-0002J
	Line No.	SOW-081-1031	SOW-081-1030	P-081-1012	P-081-1013	MPS-081-0051
	Piping Class	B2AP	B2AP	A2AQ	A2AQ	B1AS
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	Perforation Type ø3 mm.

INDRA
10-JUL-2015

Tag Number		081-STR-0012	084-STR-1001	084-STR-1002	084-STR-1003	084-STR-0001
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		6	1.5	3	3	30
End Connection		Flange ASME B16.5 RF	Butt Weld (SCH 160)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH 30)
End Flange/ Cover Flange Rating		Class 300	Class 150	Class 150	Class 150	Class 150
Type		Basket Type	Y-Type	T- BathtubType	T- BathtubType	T- AngleType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A671 Grade CC60 Class 22
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB-W
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A216 Grade WCB	ASTM A105	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7M / A194 Grade 2HM
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	30	8	8	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		0.75" / Socket Weld	N/A	N/A	N/A
Drain			1" Flange ASME B16.5 RF	N/A	N/A	N/A
Design Condition	Press. (MPaG)		2.075	0.660	1.713	1.265
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	160	107	60	97
	C.A. (mm)		3	3	3	6
	Test Press. (MPaG)		<u>3.18</u>	<u>1.06</u>	<u>2.57</u>	<u>1.90</u>
Operating Condition	Press. (MPaG)		0.196	0.301	0.81	0.262
	Temp. (deg.C)		128	49	30	68
	Fluid		STRIPPED WATER	FUEL GAS	REFINERY FIRE WATER	REFINERY FIRE WATER
	Phase		L	V	L	L
	Max. Flow Rate (kg/hr.)		109825	31	62031	62031
	M.W. (gas)			26.48		
	Sp. Gr. (liq.) (kg/m3)		937		0.996	1026
	Vis. (cP)		0.21	0.01	0.8	1.24
Remarks	Max. Allow. Press. Drop (MPaG)		0.1	0.005	0.02	0.005
	PWHt at Site		N	N	N	Y
	Moderate Wet H2S Service		N	Y	N	N
	Severe Wet H2S Service		N	N	N	Y
	Amine Service		N	N	N	Y
	Caustic Service		N	N	N	N
	Hydrogen Service		N	N	N	N
	Licensor		No Licensor	No Licensor	No Licensor	No Licensor
	Location	P&ID No.	D-081-1225-0003J	D-084-1225-3005J	D-084-1225-9002J	D-084-1225-0002J
		Line No.	SOW-081-0452	FG-084-0802	RFW-084-9021	AM-084-0059
		Piping Class	B2AP	A2AQ	A0RU	A4A5
						30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		084-STR-0002	084-STR-0003	084-STR-0004	084-STR-0005	084-STR-0006
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		30	24	24	4	4
End Connection		Butt Weld (SCH 30)	Butt Weld (SCH 60)	Butt Weld (SCH 60)	Butt Weld (SCH10S)	Butt Weld (SCH10S)
End Flange/ Cover Flange Rating		Class 150	Class 300	Class 300	Class 150	Class 150
Type		T- AngleType	T- AngleType	T- AngleType	T- AngleType	T- AngleType
Parts Material	Pipe	ASTM A671 Grade CC60 Class 22	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A312 Grade TP316/TP316L dual grade	ASTM A312 Grade TP316/TP316L dual grade
	Fitting	ASTM A234 Grade WPB-W	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A403 Grade WP316/WP316L Class S dual grade	ASTM A403 Grade WP316/WP316L Class S dual grade
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A182 Grade F316/F316L dual grade	ASTM A182 Grade F316/F316L dual grade
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A351 Grade CF8M	ASTM A351 Grade CF8M
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.265	2.375	1.250	1.250
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	97	129	110	110
	C.A. (mm)		6	6	0	0
	Test Press. (MPaG)		1.90	3.56	1.88	1.88
Operating Condition	Press. (MPaG)		0.262	0.168	0.135	0.135
	Temp. (deg.C)		68	94.4	55	55
	Fluid		RICH AMINE	LEAN AMINE	REFLUX WATER	REFLUX WATER
	Phase		L	L	L	L
	Max. Flow Rate (kg/hr.)		869678	1040646	28973	28973
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)		1026	992	985	985
	Vis. (cP)		1.24	0.78	0.49	0.49
	Max. Allow. Press. Drop (MPaG)		0.005	0.003	0.005	0.005
PWHT at Site		Y	Y	Y	N	N
Moderate Wet H2S Service		N	Y	Y	N	N
Severe Wet H2S Service		Y	N	N	Y	Y
Amine Service		Y	Y	Y	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-084-1225-0002J	D-084-1225-0005J	D-084-1225-0005J	D-084-1225-0009J	D-084-1225-0009J
	Line No.	AM-084-0060	AM-084-0111	AM-084-0112	AM-084-0355	AM-084-0356
	Piping Class	A4A5	B4A4	B4A4	A0LR	A0LR
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		084-STR-0007	084-STR-0008	084-STR-0009	084-STR-0010	084-STR-2004
Qty. (pc(s))		1	1	1	1	4
Size (NPS)		6	14	12	12	0.75
End Connection		Butt Weld (SCH STD)	Butt Weld (SCH 40)	Butt Weld (SCH 30)	Butt Weld (SCH 30)	Butt Weld (SCH 160)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		T- AngleType	T- AngleType	T- AngleType	T- AngleType	Y-Type
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A105
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7M / A194 Grade 2HM
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	20	Hold
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		0.374	0.343	1.100	0.500
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	110	60	125	140
	C.A. (mm)		3	6	3	3
	Test Press. (MPaG)		0.56	0.51	1.65	1.65
Operating Condition	Press. (MPaG)		0.037	-0.008 (Refer Note-1 in Remark column)	0.043	0.105
	Temp. (deg.C)		68	36	100	55
	Fluid		SLOP OIL	MAKE-UP AMINE	SUSPECT CONDENSATE WATER	SUSPECT CONDENSATE WATER
	Phase		L	L	L	V
	Max. Flow Rate (kg/hr.)		27218	357175	108457	108457
	M.W. (gas)					Hold
	Sp. Gr. (liq.) (kg/m3)		573	1032	958	958
	Vis. (cP)		0.15	3.1	0.28	0.28
Max. Allow. Press. Drop (MPaG)		0.005	0.003	0.003	0.003	0.005
PWHT at Site		N	Y	N	N	N
Moderate Wet H2S Service		Y	Y	N	N	Y
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	Y	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-084-1225-0012J	D-084-1225-0014J	D-084-1225-0102J	D-084-1225-0102J	D-084-1225-2014J
	Line No.	P-084-0651	AM-084-0602	SCW-084-0904	SCW-084-0905	P-084-0363
	Piping Class	A2AQ	A4A4	A2AS	A2AS	A2AQ
Remarks		30 Mesh size for start up operation	Note-1: Vendor design to compensate for negative operating pressure, Note-2: 30 Mesh size for start-up operation.	30 Mesh size for start up operation	30 Mesh size for start up operation	For Sample Connection 084-SC-0004 Type-L3 Canceled

INDRA
10-JUL-2015

Tag Number		086-STR-0001	086-STR-0002	086-STR-0003	086-STR-0004	086-STR-0005
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		2	2	2	10	3
End Connection		Butt Weld (SCH XS)	Butt Weld (SCH XS)	Butt Weld (SCH 160)	Butt Weld (SCH 30)	Butt Weld (SCH STD)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		Y-Type	Y-Type	Y-Type	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	20	10
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.06	1.039	1.088	0.35
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	120	120	130	130
	C.A. (mm)		3	3	3	3
	Test Press. (MPaG)		1.71	1.68	1.63	0.53
Operating Condition	Press. (MPaG)		0.077	0.077	0.105	0
	Temp. (deg.C)		87	87	101	90
	Fluid		AMINE SOUR WATER	AMINE SOUR WATER / SWS SOUR WATER	SWS SOUR WATER	SUSPECTED CONDENSATE
	Phase		L	L	L	L
	Max. Flow Rate (kg/hr.)		4930	4930	4835	106050
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)		986	967	958	958
	Vis. (cP)		0.493	0.29	0.29	0.28
Remarks	Max. Allow. Press. Drop (MPaG)		0.005	0.005	0.003	0.003
	PWHt at Site		Y	Y	N	N
	Moderate Wet H2S Service		N	N	N	N
	Severe Wet H2S Service		Y	Y	N	N
	Amine Service		N	N	N	N
	Caustic Service		N	N	N	N
	Hydrogen Service		N	N	N	N
	Licensor		Licensor - 3	Licensor - 3	No Licensor	No Licensor
	Location	P&ID No.	D-086-1225-0011J	D-086-1225-0011J	D-086-1225-0015J	D-086-1225-0016J
		Line No.	SOW-086-1046	SOW-086-1048	LPCW-086-1040	BDL-086-1016
		Piping Class	A2AR03	A2AR03	A2AS	A2AS
	30 Mesh size for start up operation		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	

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Tag Number		086-STR-0006	086-STR-0007	086-STR-0008	086-STR-0009	086-STR-0010
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		3	4	4	1	1
End Connection		Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH STD)	Butt Weld (SCH 160)	Butt Weld (SCH 160)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		T- BathtubType	T- BathtubType	T- BathtubType	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A105	ASTM A105
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	10	10	10	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		0.35	1.00	0.343	0.343
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	130	76	252	252
	C.A. (mm)		3	3	3	3
	Test Press. (MPaG)		0.53	1.50	0.61	0.61
Operating Condition	Press. (MPaG)		0	0.535	0.301	0.020
	Temp. (deg.C)		90	34	49	49
	Fluid		LP BLOWDOWN	COOLING WATER	COOLING WATER	FUEL GAS
	Phase		L	L	V	V
	Max. Flow Rate (kg/hr.)		11248	53887	11.9	4.3
	M.W. (gas)				26.5	26.5
	Sp. Gr. (liq.) (kg/m3)		958	994.7		
	Vis. (cP)		0.28	0.73	0.01	0.01
Max. Allow. Press. Drop (MPaG)		0.003	0.003	0.003	0.005	0.005
PWHt at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	Y	Y
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-086-1225-0016J	D-086-1225-0016J	D-086-1225-0016J	D-086-1225-3008J	D-086-1225-3008J
	Line No.	BDL-086-1016	CWS-086-1001	CWS-086-1001	FG-086-1024	FLG-086-1035
	Piping Class	A2AS	A2AW	A2AW	A2AQ	A2AQ
Remarks						

INDRA
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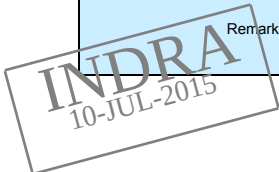
Tag Number		086-STR-0011	087-STR-0001	087-STR-0002	087-STR-0003	088-STR-0001
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		10	3	3	1	3
End Connection		Butt Weld (SCH 30)	Butt Weld (SCH10S)	Butt Weld (SCH10S)	Butt Weld (SCH 160)	Butt Weld (SCH10S)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		T- BathtubType	T- BathtubType	T- BathtubType	Y-Type	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A312 Grade TP316/TP316L dual grade	ASTM A312 Grade TP316/TP316L dual grade	ASTM A106 Grade B	ASTM A312 Grade TP316/TP316L dual grade
	Fitting	ASTM A234 Grade WPB	ASTM A403 Grade WP316/WP316L Class S dual grade	ASTM A403 Grade WP316/WP316L Class S dual grade	ASTM A234 Grade WPB	ASTM A403 Grade WP316/WP316L Class S dual grade
	Forging	ASTM A105	ASTM A182 Grade F316/F316L dual grade	ASTM A182 Grade F316/F316L dual grade	ASTM A105	ASTM A182 Grade F316/F316L dual grade
	Casting	ASTM A216 Grade WCB	ASTM A351 Grade CF8M	ASTM A351 Grade CF8M	ASTM A105	ASTM A351 Grade CF8M
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	40	40	30	40
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.088	0.350	0.66	0.350
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	130	150	107	150
	C.A. (mm)		3	0.8	3	0.8
	Test Press. (MPaG)		1.63	0.53	1.06	0.53
Operating Condition	Press. (MPaG)		0.105	0.079	0.301	0.079
	Temp. (deg.C)		101	80	49	80
	Fluid		SUSPECTED CONDENSATE	STRIPPING AIR	STRIPPING AIR	STRIPPING AIR
	Phase		L	V	V	V
	Max. Flow Rate (kg/hr.)		106050	333	333	333
	M.W. (gas)		28.3	28.3	26.5	28.3
	Sp. Gr. (liq.) (kg/m3)		958			
	Vis. (cP)		0.29	0.02	0.02	0.02
Remarks	Max. Allow. Press. Drop (MPaG)		0.003	0.004	0.005	0.004
	PWHt at Site		N	N	N	N
	Moderate Wet H2S Service		N	N	Y	N
	Severe Wet H2S Service		N	N	N	N
	Amine Service		N	N	N	N
	Caustic Service		N	N	N	N
	Hydrogen Service		N	N	N	N
	Licensor		No Licensor	Licensor - 3	No Licensor	Licensor - 3
	Location	P&ID No.	D-086-1225-0015J	D-087-1225-0018J	D-087-1225-3004J	D-088-1225-0018J
		Line No.	LPCW-086-1041	PA-087-1031	FG-086-1003	PA-088-1031
		Piping Class	A2AS	A0LP03	A2AQ	A0LP03

Remarks

30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number			088-STR-0002	088-STR-0003	089-STR-0001	089-STR-0002	089-STR-0003
Qty. (pc(s))			1	1	1	1	1
Size (NPS)			3	1	3	3	1
End Connection			Butt Weld (SCH10S)	Butt Weld (SCH 160)	Butt Weld (SCH10S)	Butt Weld (SCH10S)	Butt Weld (SCH 160)
End Flange/ Cover Flange Rating			Class 150	Class 150	Class 150	Class 150	Class 150
Type			T- BathtubType	Y-Type	T- BathtubType	T- BathtubType	Y-Type
Parts Material	Pipe	ASTM A312 Grade TP316/TP316L dual grade	ASTM A106 Grade B	ASTM A312 Grade TP316/TP316L dual grade	ASTM A312 Grade TP316/TP316L dual grade	ASTM A106 Grade B	
	Fitting	ASTM A403 Grade WP316/TP316L Class S dual grade	ASTM A234 Grade WPB	ASTM A403 Grade WP316/TP316L Class S dual grade	ASTM A403 Grade WP316/TP316L Class S dual grade	ASTM A234 Grade WPB	
	Forging	ASTM A182 Grade F316/F316L dual grade	ASTM A105	ASTM A182 Grade F316/F316L dual grade	ASTM A182 Grade F316/F316L dual grade	ASTM A105	
	Casting	ASTM A351 Grade CF8M	ASTM A105	ASTM A351 Grade CF8M	ASTM A351 Grade CF8M	ASTM A105	
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7M / A194 Grade 2HM	
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316	
	Screen	SS316	SS316	SS316	SS316	SS316	
Other Internals	SS316	SS316	SS316	SS316	SS316		
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200	
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor	
	Mesh Size (Mesh)	40	30	40	40	30	
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor	
Vent	Size and Connection		N/A	N/A	N/A	N/A	N/A
N/A			N/A	N/A	N/A	N/A	
Design Condition	Press. (MPaG)	0.350	0.66	0.350	0.350	0.66	
	Temp.	Min. (deg.C)	10	10	10	10	
		Max. (deg.C)	150	107	150	150	107
	C.A. (mm)	0.8	1.5	0.8	0.8	3	
	Test Press. (MPaG)	0.53	1.06	0.53	0.53	1.06	
Operating Condition	Press. (MPaG)	0.079	0.301	0.079	0.079	0.301	
	Temp. (deg.C)	80	49	80	80	49	
	Fluid	STRIPPING AIR	FUEL GAS	STRIPPING AIR	STRIPPING AIR	FUEL GAS	
	Phase	V	V	V	V	V	
	Max. Flow Rate (kg/hr.)	333	2.0	333	333	2.0	
	M.W. (gas)	28.3	26.5	28.3	28.3	26.5	
	Sp. Gr. (liq.) (kg/m3)						
	Vis. (cP)	0.02	0.01	0.02	0.02	0.01	
Max. Allow. Press. Drop (MPaG)	0.004	0.005	0.004	0.004	0.005		
PWHT at Site		N	N	N	N	N	
Moderate Wet H2S Service		N	Y	N	N	Y	
Severe Wet H2S Service		N	N	N	N	N	
Amine Service		N	N	N	N	N	
Caustic Service		N	N	N	N	N	
Hydrogen Service		N	N	N	N	N	
Licensor		Licensor - 3	No Licensor	Licensor - 3	Licensor - 3	No Licensor	
Location	P&ID No.	D-088-1225-0018J	D-088-1225-3004J	D-089-1225-0018J	D-089-1225-0018J	D-089-1225-3004J	
	Line No.	PA-088-1032	FG-086-1003	PA-089-1031	PA-089-1032	FG-086-1003	
	Piping Class	A0LP03	A2AQ	A0LP03	A0LP03	A2AQ	
Remarks							



Tag Number		090-STR-0001	090-STR-0002	090-STR-0003	090-STR-0004	090-STR-0005
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		12	12	10	10	8
End Connection		Butt Weld (SCH10S)	Butt Weld (SCH10S)	Butt Weld (SCH 30)	Butt Weld (SCH 30)	Butt Weld (SCH10S)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A358 Grade 316/316L Class 1 dual grade	ASTM A358 Grade 316/316L Class 1 dual grade	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A358 Grade 316/316L Class 1 dual grade
	Fitting	ASTM A403 Grade WP316/WP316L Class WX dual grade	ASTM A403 Grade WP316/WP316L Class WX dual grade	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A403 Grade WP316/WP316L Class WX dual grade
	Forging	ASTM A182 Grade F316/F316L dual grade	ASTM A182 Grade F316/F316L dual grade	ASTM A105	ASTM A105	ASTM A182 Grade F316/F316L dual grade
	Casting	ASTM A351 Grade CF8M	ASTM A351 Grade CF8M	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A351 Grade CF8M
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7M / A194 Grade 2HM
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	10	10	10
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.37	1.00	1.00	1.37
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	110	76	76	110
	C.A. (mm)		0	3	3	0
	Test Press. (MPaG)		<u>2.06</u>	<u>1.50</u>	<u>1.50</u>	<u>2.06</u>
Operating Condition	Press. (MPaG)		0.02	0.535	0.535	0.31
	Temp. (deg.C)		60	34	34	55
	Fluid		QUENCH WATER	COOLING WATER	COOLING WATER	QUENCH WATER
	Phase		L	L	L	L
	Max. Flow Rate (kg/hr.)		549180	397926	397926	396900
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)		972	994.7	994.7	986
	Vis. (cP)		0.39	0.73	0.73	0.5
Remarks	Max. Allow. Press. Drop (MPaG)		0.003	0.003	0.003	0.003
	PWHt at Site		N	N	N	N
	Moderate Wet H2S Service		N	N	N	N
	Severe Wet H2S Service		Y	N	N	Y
	Amine Service		N	N	N	N
	Caustic Service		N	N	N	N
	Hydrogen Service		N	N	N	N
	Licensor		Licensor - 3	No Licensor	No Licensor	Licensor - 3
	Location	P&ID No.	D-090-1225-0013J	D-090-1225-0014J	D-090-1225-0014J	D-090-1225-0014J
		Line No.	SVW-090-1025	CWS-090-1001	CWS-090-1001	SVW-090-1003
		Piping Class	A0LR03	A2AW	A2AW	A0LR03

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Tag Number		091-STR-0008	092-STR-0001	092-STR-0002	092-STR-0003	092-STR-0004
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		10	12	12	8	8
End Connection		Butt Weld (SCH 30)	Butt Weld (SCH 30)	Butt Weld (SCH 30)	Butt Weld (SCH 30)	Butt Weld (SCH 30)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	10	10	10	10
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.41	1.22	1.00	1.00
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	100	110	76	76
	C.A. (mm)		3	3	3	3
	Test Press. (MPaG)		<u>2.12</u>	<u>1.83</u>	<u>1.50</u>	<u>1.50</u>
Operating Condition	Press. (MPaG)		0.83	0.47	0.535	0.535
	Temp. (deg.C)		48	55	34	34
	Fluid		RICH SOLVENT	LEAN AMINE	LEAN AMINE	COOLING WATER
	Phase		L	L	L	L
	Max. Flow Rate (kg/hr.)		236900	347040	347040	305250
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)		1030	1018	994.7	994.7
	Vis. (cP)		2.5	2.0	0.73	0.73
Remarks	Max. Allow. Press. Drop (MPaG)		0.003	0.003	0.003	0.003
	PWHHT at Site		Y	Y	N	N
	Moderate Wet H2S Service		N	N	N	N
	Severe Wet H2S Service		Y	Y	N	N
	Amine Service		Y	Y	N	N
	Caustic Service		N	N	N	N
	Hydrogen Service		N	N	N	N
	Licensor		Licensor - 3	Licensor - 3	No Licensor	No Licensor
	Location	P&ID No.	D-091-1225-0015J	D-092-1225-0011J	D-092-1225-0011J	D-092-1225-0011J
		Line No.	AM-091-1068	AM-092-1013	CWS-092-1003	CWS-092-1003
		Piping Class	A2A503	A2A503	A2AW	A2AW

Remarks

30 Mesh size for start up operation

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Tag Number		092-STR-0005	092-STR-0006	092-STR-0007	092-STR-0008	092-STR-0009
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		14	14	8	8	10
End Connection		Butt Weld (SCH 20)	Butt Weld (SCH 20)	Butt Weld (SCH10S)	Butt Weld (SCH10S)	Butt Weld (SCH10S)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A358 Grade 304/304L Class 1 dual grade	ASTM A358 Grade 304/304L Class 1 dual grade	ASTM A358 Grade 304/304L Class 1 dual grade
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A403 Grade WP304/WP304L Class WX dual grade	ASTM A403 Grade WP304/WP304L Class WX dual grade	ASTM A403 Grade WP304/WP304L Class WX dual grade
	Forging	ASTM A105	ASTM A105	ASTM A182 Grade F304/F304L dual grade	ASTM A182 Grade F304/F304L dual grade	ASTM A182 Grade F304/F304L dual grade
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A351 Grade CF8	ASTM A351 Grade CF8	ASTM A351 Grade CF8
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	10	10	10	10	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.41	1.22	1.22	1.22
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	100	170	170	170
	C.A. (mm)		3	0	0	0
	Test Press. (MPaG)		<u>2.12</u>	<u>1.88</u>	<u>1.88</u>	<u>1.88</u>
Operating Condition	Press. (MPaG)		0.83	0.730	0.730	0.73
	Temp. (deg.C)		45	128	128	128
	Fluid		RICH AMINE	LEAN AMINE	LEAN AMINE	LEAN AMINE
	Phase		L	L	L	L
	Max. Flow Rate (kg/hr.)		317696	347040	347040	347040
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)		1030	964	964	964
	Vis. (cP)		2.5	0.5	0.5	0.5
	Max. Allow. Press. Drop (MPaG)		0.003	0.003	0.003	0.003
PWHT at Site		Y	Y	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		Y	Y	Y	Y	Y
Amine Service		Y	Y	Y	Y	Y
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		Licensor - 3	Licensor - 3	Licensor - 3	Licensor - 3	Licensor - 3
Location	P&ID No.	D-092-1225-0011J	D-092-1225-0011J	D-092-1225-0011J	D-092-1225-0011J	D-092-1225-0012J
	Line No.	AM-092-1002	AM-092-1002	AM-092-1009	AM-092-1009	AM-092-1065
	Piping Class	A2A503	A2A503	A0J503	A0J503	A0J503
Remarks						30 Mesh size for start up operation

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Tag Number		092-STR-0010	092-STR-0011	092-STR-0012	092-STR-0013	092-STR-0014
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		10	4	4	3	1
End Connection		Butt Weld (SCH10S)	Butt Weld (SCH10S)	Butt Weld (SCH10S)	Butt Weld (SCH STD)	Butt Weld (SCH 160)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType	Y-Type
Parts Material	Pipe	ASTM A358 Grade 304/304L Class 1 dual grade	ASTM A312 Grade TP316/TP316L dual grade	ASTM A312 Grade TP316/TP316L dual grade	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A403 Grade WP304/WP304L Class WX dual grade	ASTM A403 Grade WP316/WP316L Class S dual grade	ASTM A403 Grade WP316/WP316L Class S dual grade	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A182 Grade F304/F304L dual grade	ASTM A182 Grade F316/F316L dual grade	ASTM A182 Grade F316/F316L dual grade	ASTM A105	ASTM A105
	Casting	ASTM A351 Grade CF8	ASTM A351 Grade CF8M	ASTM A351 Grade CF8M	ASTM A216 Grade WCB	ASTM A105
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM	ASTM A193 Grade B7M / A194 Grade 2HM
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	20	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.22	1.132	0.343	0.343
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	170	170	60	252
	C.A. (mm)		0	0	3	3
	Test Press. (MPaG)		1.88	1.72	0.51	0.61
Operating Condition	Press. (MPaG)		0.73	0.102	0.057	0.301
	Temp. (deg.C)		128	55	36	49
	Fluid		LEAN AMINE	REFLUX SOUR WATER	REFLUX SOUR WATER	LEAN AMINE
	Phase		L	L	L	V
	Max. Flow Rate (kg/hr.)		347040	33031	33031	15480
	M.W. (gas)					26.5
	Sp. Gr. (liq.) (kg/m3)		964	986	986	1032
	Vis. (cP)		0.5	0.5	0.5	3.3
Remarks	Max. Allow. Press. Drop (MPaG)		0.003	0.003	0.003	0.005
	PWHt at Site		N	N	N	N
	Moderate Wet H2S Service		N	Y	Y	N
	Severe Wet H2S Service		Y	N	N	Y
	Amine Service		Y	N	N	Y
	Caustic Service		N	N	N	N
	Hydrogen Service		N	N	N	N
	Licensor		Licensor - 3	Licensor - 3	Licensor - 3	No Licensor
	Location	P&ID No.	D-092-1225-0012J	D-092-1225-0013J	D-092-1225-0015J	D-092-1225-3005J
		Line No.	AM-092-1066	SOW-092-1044	SOW-092-1045	AM-092-1045
		Piping Class	A0J503	A0LQ03	A0LQ03	A2A503

INDRA
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Tag Number		093-STR-0001	093-STR-0002	130-STR-0001	130-STR-0002	130-STR-0003
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		1.5	1.5	8	4	4
End Connection		Butt Weld (SCH 160)	Butt Weld (SCH 160)	Butt Weld (SCH 30)	Butt Weld (SCH STD)	Butt Weld (SCH STD)
End Flange/ Cover Flange Rating		Class 1500	Class 1500	Class 150	Class 150	Class 150
Type		Y-Type	Y-Type	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A105	ASTM A105	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A105	ASTM A105	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket	Soft iron	Soft iron	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	Monel	Monel	Monel
	Screen	SS316	SS316	Monel	Monel	Monel
	Other Internals	SS316	SS316	Monel	Monel	Monel
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		12.0	0.637	0.783	0.964
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	155	90	70	70
	C.A. (mm)		3	3	3	3
	Test Press. (MPaG)		<u>19.86</u>	<u>0.96</u>	<u>1.17</u>	<u>1.45</u>
Operating Condition	Press. (MPaG)		7.600	-0.011	-0.026	-0.012
	Temp. (deg.C)		120	40	40	40
	Fluid		HP BOILER FEED WATER	HP BOILER FEED WATER	CONCENTRATED CAUSTIC	DILUTE CAUSTIC
	Phase		L	L	L	L
	Max. Flow Rate (kg/hr.)		2300	86127	41099	28650
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)		945	1511	1511	1146
	Vis. (cP)		0.23	24	24	1.7
Max. Allow. Press. Drop (MPaG)		0.003	0.003	0.005	0.003	0.003
PWHT at Site		N	N	Y	Y	Y
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	Y	Y	Y
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-093-1225-0013J	D-093-1225-0015J	D-130-1225-0001J	D-130-1225-0002J	D-130-1225-0004J
	Line No.	HBFW-093-1006	HBFW-093-2006	FCAU-130-0101	FCAU-130-0109	FCAU-130-0308
	Piping Class	M2AS	M2AS	A2AN	A2AN	A2AN
Remarks				30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		130-STR-0004	130-STR-0005	022-STR-0045	022-STR-0245	022-STR-0246
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		4	8	1	1	1
End Connection		Butt Weld (SCH STD)	Butt Weld (SCH 30)	Socket Weld	Socket Weld	Socket Weld
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		T- BathtubType	T- BathtubType	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A105	ASTM A105	ASTM A105
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A105	ASTM A105	ASTM A105
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	Monel	Monel	SS316	SS316	SS316
	Screen	Monel	Monel	SS316	SS316	SS316
	Other Internals	Monel	Monel	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	30	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		0.964	0.637	1.05	1.05
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	70	90	65	65
	C.A. (mm)		3	3	1.5	1.5
	Test Press. (MPaG)		1.45	0.96	1.62	1.62
Operating Condition	Press. (MPaG)		-0.012	-0.011	0.686	0.686
	Temp. (deg.C)		40	40	30	30
	Fluid		DILUTE CAUSTIC	CONCENTRATED CAUSTIC	LP NITROGEN	LP NITROGEN
	Phase		L	L	V	V
	Max. Flow Rate (kg/hr.)		28650	86127	40	27
	M.W. (gas)			28.01	28.01	28.01
	Sp. Gr. (liq.) (kg/m3)		1146	1511		
	Vis. (cP)		1.7	24	0.018	0.018
Max. Allow. Press. Drop (MPaG)		0.003	0.005	0.005	0.005	0.005
PWHT at Site		Y	Y	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		Y	Y	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-130-1225-0004J	D-130-1225-0005J	D-022-1225-0117J	D-022-1225-0117J	D-022-1225-0114J
	Line No.	FCAU-130-0309	FCAU-130-0401	LPN-022-2011	LPN-022-2020	LPN-022-1716
	Piping Class	A2AN	A2AN	A1AA	A1AA	A1AA
Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation			

INDRA
10-JUL-2015

Tag Number		022-STR-0247	022-STR-0248	022-STR-0249	022-STR-0250	022-STR-0251
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		1	3	1	1	2
End Connection		Socket Weld	Butt Weld (SCH STD)	Socket Weld	Socket Weld	Butt Weld (SCH XS)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		Y-Type	T- BathtubType	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A105	ASTM A234 Grade WPB	ASTM A105	ASTM A105	ASTM A234 Grade WPB
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A105	ASTM A216 Grade WCB	ASTM A105	ASTM A105	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	20	20	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	1" / Socket Weld	1" / Socket Weld	0.75" / Socket Weld
Design Condition	Press. (MPaG)	1.05	0.78	0.8	0.8	0.343
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	65	60	60	60
	C.A. (mm)		3	3	3	3
	Test Press. (MPaG)		1.62	1.23	1.23	0.53
Operating Condition	Press. (MPaG)	0.686	0.344	0.062	0.062	0.008
	Temp. (deg.C)	30	36	36	36	30
	Fluid	LP NITROGEN	AMMONIA WATER	AMMONIA WATER	AMMONIA WATER	NEUTRALIZATION WATER
	Phase	V	L	L	L	L
	Max. Flow Rate (kg/hr.)	27	1800	423	423	8973
	M.W. (gas)	28.01				
	Sp. Gr. (liq.) (kg/m3)		900	900	900	997
	Vis. (cP)	0.018	0.9	0.9	0.9	0.8
Service Conditions	Max. Allow. Press. Drop (MPaG)	0.005	0.003	0.003	0.003	0.003
	PWHT at Site	N	N	N	N	N
	Moderate Wet H2S Service	N	N	N	N	N
	Severe Wet H2S Service	N	N	N	N	N
	Amine Service	N	N	N	N	N
	Caustic Service	N	N	N	N	N
	Hydrogen Service	N	N	N	N	N
	Licensors	No Licensors	No Licensors	No Licensors	No Licensors	No Licensors
	Location	P&ID No.	D-022-1225-0114J	D-022-1225-0411J	D-022-1225-0411J	D-022-1225-0412J
		Line No.	LPN-022-1717	C-022-3005	C-022-3018	WW-022-3003
		Piping Class	A1AA	A2AM	A2AM	A2AP
	Remarks		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		022-STR-0252	022-STR-0253	022-STR-0254	022-STR-0255	022-STR-0256
Qty. (pc(s))		1	6	8	18	11
Size (NPS)		0.75	0.75	0.75	0.75	0.75
End Connection		Butt Weld (SCH 80S)	Socket Weld	Socket Weld	Socket Weld	Socket Weld
End Flange/ Cover Flange Rating		Class 1500	Class 150	Class 150	Class 150	Class 300
Type		Y-Type	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A312 Grade TP304/TP304L dual grade	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A403 Grade WP304/WP304L Class S dual grade	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Forging	ASTM A182 Grade F304/F304L dual grade	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A182 Grade F304/F304L dual grade	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Gasket	Ring Joint / SS TP304	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	VV216G-612-A-999	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	30	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	N/A		N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		12	1.05	0.66	3.84
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	65	107	293	293
	C.A. (mm)		0	1.5	1.5	1.5
	Test Press. (MPaG)		18.00			7.11
Operating Condition	Press. (MPaG)		0.294	0.686	0.301	1.550
	Temp. (deg.C)		35	30	38	180
	Fluid		CARBON DIOXIDE	LP NITROGEN	FUEL GAS	HCO FLUSHING OIL
	Phase		V	V	V	L
	Max. Flow Rate (kg/hr.)		8.8	6	6	192
	M.W. (gas)		44	28.01	26	
	Sp. Gr. (liq.) (kg/m3)					960
	Vis. (cP)		0.015	0.018	0.01	0.95
	Max. Allow. Press. Drop (MPaG)		0.005	0.005	0.005	0.005
PWHI at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	Licensor - 1
Location	P&ID No.	D-022-1225-0412J	D-022-1225-2001J	D-022-1225-2001J	D-022-1225-2001J	D-022-1225-2001J
	Line No.	CO2-022-3001	LPN-022-7051	FG-022-7017	FLOH-022-7017	FLOH-022-7080
	Piping Class	M0JS	A1AA	A1AP	A1AP	B1AP01
Remarks			Canceled	Canceled	Canceled	

INDRA
10-JUL-2015

Tag Number		022-STR-0257	022-STR-0258	022-STR-0259	022-STR-0260	022-STR-0261
Qty. (pc(s))		3	19	4	13	3
Size (NPS)		0.75	0.75	0.75	0.75	0.75
End Connection		Socket Weld	Socket Weld	Socket Weld	Socket Weld	Socket Weld
End Flange/ Cover Flange Rating		Class 300	Class 300	Class 300	Class 300	Class 300
Type		Y-Type	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		3.84	3.84	3.84	3.84
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	293	293	293	293
	C.A. (mm)		1.5	1.5	1.5	1.5
	Test Press. (MPaG)		<u>7.11</u>	<u>7.11</u>	<u>7.11</u>	<u>7.11</u>
Operating Condition	Press. (MPaG)		2.100	2.100	2.100	2.100
	Temp. (deg.C)		180	180	180	180
	Fluid		HCO FLUSHING OIL	HCO FLUSHING OIL	HCO FLUSHING OIL	HCO FLUSHING OIL
	Phase		L	L	L	L
	Max. Flow Rate (kg/hr.)		192	192	192	192
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)		960	960	960	960
	Vis. (cP)		0.95	0.95	0.95	0.95
Remarks	Max. Allow. Press. Drop (MPaG)		0.005	0.005	0.005	0.005
	PWHt at Site		N	N	N	N
	Moderate Wet H2S Service		N	N	N	N
	Severe Wet H2S Service		N	N	N	N
	Amine Service		N	N	N	N
	Caustic Service		N	N	N	N
	Hydrogen Service		N	N	N	N
	Licensor		Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1
	Location	P&ID No.	D-022-1225-2001J	D-022-1225-2001J	D-022-1225-2001J	D-022-1225-2001J
		Line No.	FLOH-022-7038	FLOH-022-7045	FLOH-022-7072	FLOH-022-7084
		Piping Class	B1AP01	B1AP01	B1AP01	B1AP01

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Tag Number		022-STR-0262	022-STR-0263	022-STR-0264	022-STR-0327	022-STR-0328
Qty. (pc(s))		1	1	4	1	1
Size (NPS)		0.75	0.75	0.75	4	10
End Connection		Socket Weld	Socket Weld	Socket Weld	Butt Weld (SCH XS)	Butt Weld (SCH 20)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 300	Class 150
Type		Y-Type	Y-Type	Y-Type	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A105	ASTM A105	ASTM A105	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A105	ASTM A105	ASTM A105	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	30	Refer Note in remark column	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		0.66	1.05	2.8	1.247
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	107	65	350	95
	C.A. (mm)		1.5	1.5	1.5	3
	Test Press. (MPaG)		1.06		4.90	1.87
Operating Condition	Press. (MPaG)		0.301	0.686	2.060	0.7844
	Temp. (deg.C)		38	30	320	54
	Fluid		FUEL GAS	FUEL GAS	FUEL GAS	CONDENSATE WATER
	Phase		V	V	V	L
	Max. Flow Rate (kg/hr.)		6	6	3896	142970
	M.W. (gas)		26	26	18	
	Sp. Gr. (liq.) (kg/m3)					986
	Vis. (cP)		0.01	0.01	0.021	0.5124
Remarks	Max. Allow. Press. Drop (MPaG)		0.005	0.005	0.004	0.003
	PWHI at Site		N	N	N	N
	Moderate Wet H2S Service		N	N	N	N
	Severe Wet H2S Service		N	N	N	N
	Amine Service		N	N	N	N
	Caustic Service		N	N	N	N
	Hydrogen Service		N	N	N	N
	Licensor		No Licensor	No Licensor	No Licensor	No Licensor
	Location	P&ID No.	D-022-1225-2001J	D-022-1225-2001J	D-022-1225-2101J	D-022-1225-2103J
		Line No.	FG-022-7117	FG-022-7151	MPS-022-5501	TSCW-022-5504
		Piping Class	A1AP	A1AA	B1AS	A2AP
				Canceled	Perforation Type φ3 mm.	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		022-STR-0329	022-STR-0330	022-STR-0331	022-STR-0332	022-STR-0333
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		10	4	16	18	18
End Connection		Butt Weld (SCH 20)	Butt Weld (SCH XS)	Butt Weld (SCH 40S)	Refer Note in remark column	Refer Note in remark column
End Flange/ Cover Flange Rating		Class 150	Class 300	Class 150	Class 150	Class 150
Type		T- BathtubType	T- BathtubType	T- BathtubType	Cone Type	Cone Type
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A358 Grade 316/316L Class 1 dual grade	N/A	N/A
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A403 Grade WP316/WP316L Class WX dual grade	N/A	N/A
	Forging	ASTM A105	ASTM A105	ASTM A182 Grade F316/F316L dual grade	ASTM A182 Grade F316/F316L dual grade	ASTM A182 Grade F316/F316L dual grade
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A351 Grade CF8M	N/A	N/A
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	N/A	N/A
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	N/A	N/A
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	Refer Note in remark column	Refer Note in remark column
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	Refer Note in remark column	Refer Note in remark column	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	2" / Butt Weld	N/A	N/A
Design Condition	Press. (MPaG)	1.247	2.8	0.935	0.935	0.935
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	95	350	105	105
	C.A. (mm)	3	1.5	1.5	1.5	1.5
	Test Press. (MPaG)	1.87	4.90	1.40		
Operating Condition	Press. (MPaG)	0.7844	2.060	0.119	0.250	0.250
	Temp. (deg.C)	54	320	64.2	64.2	64.2
	Fluid	CONDENSATE WATER	MP STEAM	AGGLO-FILTERING MODULE RECIRCULATION	AGGLO-FILTERING MODULE RECIRCULATION	AGGLO-FILTERING MODULE RECIRCULATION
	Phase	L	V	L	L	L
	Max. Flow Rate (kg/hr.)	142970	3505	1076819	1076819	1076819
	M.W. (gas)		18			
	Sp. Gr. (liq.) (kg/m3)	986		1013	1013	1013
	Vis. (cP)	0.5124	0.021	0.42	0.42	0.42
Remarks	Max. Allow. Press. Drop (MPaG)	0.003	0.004	0.035	0.005	0.005
	PWHT at Site	N	N	N	N	N
	Moderate Wet H2S Service	N	N	N	N	N
	Severe Wet H2S Service	N	N	N	N	N
	Amine Service	N	N	N	N	N
	Caustic Service	N	N	N	N	N
	Hydrogen Service	N	N	N	N	N
	Licensors	No Licensors	No Licensors	No Licensors	No Licensors	No Licensors
	Location	P&ID No.	D-022-1225-2103J	D-022-1225-8002J	D-022-1225-8002J	D-022-1225-8002J
		Line No.	TSCW-022-5507	P-022-8014	P-022-8012	P-022-8052
		Piping Class	A2AP	B1AS	A1LP	A1LP
	Remarks	30 Mesh size for start up operation	Perforation Type φ3 mm.	"Refer to BELCO data sheet(Hole Dia. 3mm). Doc. No.: 65272-99-S-11"	"30 Mesh size for start up operation. Open area is 150%". Removable Strainer. Strainer are removed from spool after startup. Vendor to supply spacer ring. Strainer End Connection to suit between ASME B16.5 RF	"30 Mesh size for start up operation. Open area is 150%". Removable Strainer. Strainer are removed from spool after startup. Vendor to supply spacer ring. Strainer End Connection to suit between ASME B16.5 RF

INDRA
10-JUL-2015

Tag Number		022-STR-0334	022-STR-0335	022-STR-0336	022-STR-0337	022-STR-0338
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		24	24	24	4	4
End Connection		Refer Note in remark column	Refer Note in remark column	Refer Note in remark column	Refer Note in remark column	Refer Note in remark column
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		Cone Type	Cone Type	Cone Type	Cone Type	Cone Type
Parts Material	Pipe	N/A	N/A	N/A	N/A	N/A
	Fitting	N/A	N/A	N/A	N/A	N/A
	Forging	ASTM A182 Grade F316/F316L dual grade	ASTM A182 Grade F316/F316L dual grade	ASTM A182 Grade F316/F316L dual grade	ASTM A182 Grade F316/F316L dual grade	ASTM A182 Grade F316/F316L dual grade
	Casting	N/A	N/A	N/A	N/A	N/A
	Gasket	N/A	N/A	N/A	N/A	N/A
	Bolt & Nut	N/A	N/A	N/A	N/A	N/A
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	Refer Note in remark column	Refer Note in remark column	Refer Note in remark column	Refer Note in remark column	Refer Note in remark column
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		0.622	0.622	0.815	0.815
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	105	105	105	105
	C.A. (mm)		1.5	1.5	1.5	1.5
	Test Press. (MPaG)					
Operating Condition	Press. (MPaG)		0.055	0.055	-0.0193	-0.0193
	Temp. (deg.C)		64.2	64.2	64.2	64.2
	Fluid		QUENCH/SPRAY TOWER RECIRCULATION	QUENCH/SPRAY TOWER RECIRCULATION	PTU EFFLUENT	PTU EFFLUENT
	Phase		L	L	L	L
	Max. Flow Rate (kg/hr.)		1747080	1747080	57289	57289
	M.W. (gas)					
	Sp. Gr. (liq.) (kg/m3)		1055	1055	1057	1057
	Vis. (cP)		0.42	0.42	0.42	0.42
Remarks	Max. Allow. Press. Drop (MPaG)		0.005	0.005	0.005	0.005
	PWHt at Site		N	N	N	N
	Moderate Wet H2S Service		N	N	N	N
	Severe Wet H2S Service		N	N	N	N
	Amine Service		N	N	N	N
	Caustic Service		N	N	N	N
	Hydrogen Service		N	N	N	N
	Licensor		No Licensor	No Licensor	No Licensor	No Licensor
	Location	P&ID No.	D-022-1225-8002J	D-022-1225-8002J	D-022-1225-8005J	D-022-1225-8005J
		Line No.	P-022-8053	P-022-8002	P-022-8003	P-022-8035
		Piping Class	A1LP	A1LP	A1LP	A1LP
	"30 Mesh size for start up operation. Open area is 150%". Removable Strainer. Strainer are removed from spool after startup. Vendor to supply spacer ring. Strainer End Connection to suit between ASME B16.5 RF		"30 Mesh size for start up operation. Open area is 150%". Removable Strainer. Strainer are removed from spool after startup. Vendor to supply spacer ring. Strainer End Connection to suit between ASME B16.5 RF	"30 Mesh size for start up operation. Open area is 150%". Removable Strainer. Strainer are removed from spool after startup. Vendor to supply spacer ring. Strainer End Connection to suit between ASME B16.5 RF	"30 Mesh size for start up operation. Open area is 150%". Removable Strainer. Strainer are removed from spool after startup. Vendor to supply spacer ring. Strainer End Connection to suit between ASME B16.5 RF	"30 Mesh size for start up operation. Open area is 150%". Removable Strainer. Strainer are removed from spool after startup. Vendor to supply spacer ring. Strainer End Connection to suit between ASME B16.5 RF

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Tag Number		022-STR-0339	022-STR-0340	022-STR-0341	022-STR-0342	022-STR-0343
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		6	6	0.75	0.75	0.75
End Connection		Refer Note in remark column	Refer Note in remark column	Socket Weld	Socket Weld	Socket Weld
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 300	Class 150	Class 150
Type		Cone Type	Cone Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	N/A	N/A	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	N/A	N/A	ASTM A105	ASTM A105	ASTM A105
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	N/A	N/A	ASTM A105	ASTM A105	ASTM A105
	Gasket	N/A	N/A	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	N/A	N/A	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	Refer Note in remark column	Refer Note in remark column	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	20	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain	Size and Connection		N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.05	0.343	1.05	1.05
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	75	293	65	65
	C.A. (mm)		3	1.5	1.5	1.5
	Test Press. (MPaG)			0.63	1.62	1.62
Operating Condition	Press. (MPaG)		-0.0133	0.100	0.686	0.686
	Temp. (deg.C)		30	180	30	30
	Fluid		MAKE-UP WATER	HCO FLUSHING OIL	LP NITROGEN	LP NITROGEN
	Phase		L	L	V	V
	Max. Flow Rate (kg/hr.)		131700	192	14	14
	M.W. (gas)				28.01	28.01
	Sp. Gr. (liq.) (kg/m3)		1000	960		
	Vis. (cP)		0.78	0.95	0.018	0.018
Max. Allow. Press. Drop (MPaG)		0.003	0.003	0.005	0.005	0.005
PWHT at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	Licensor - 1	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-8006J	D-022-1225-8006J	D-022-1225-0201J	D-022-1225-0401J	D-022-1225-0401J
	Line No.	SVW-022-8003	SVW-022-8039	FLOH-022-4501	LPN-022-7025	LPN-022-7027
	Piping Class	A2AW	A2AW	B1AP01	A1AA	A1AA
Remarks		"30 Mesh size for start up operation. Open area is 150%". Removable Strainer. Strainer are removed from spool after startup. Vendor to supply spacer ring. Strainer End Connection to suit between ASME B16.5 RF	"30 Mesh size for start up operation. Open area is 150%". Removable Strainer. Strainer are removed from spool after startup. Vendor to supply spacer ring. Strainer End Connection to suit between ASME B16.5 RF			

INDRA
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Tag Number		022-STR-0344	022-STR-0345	022-STR-0346	022-STR-0347	022-STR-0348
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		0.75	0.75	0.75	1	1
End Connection		Socket Weld	Socket Weld	Socket Weld	Socket Weld	Socket Weld
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		Y-Type	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	30	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.05	1.05	1.05	1.05
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	65	65	65	65
	C.A. (mm)		1.5	1.5	1.5	1.5
	Test Press. (MPaG)		1.62	1.62	1.62	1.62
Operating Condition	Press. (MPaG)		0.686	0.686	0.686	0.686
	Temp. (deg.C)		30	30	30	30
	Fluid		LP NITROGEN	LP NITROGEN	LP NITROGEN	LP NITROGEN
	Phase		V	V	V	V
	Max. Flow Rate (kg/hr.)		14	13	90	38
	M.W. (gas)		28.01	28.01	28.01	28.01
	Sp. Gr. (liq.) (kg/m3)					
	Vis. (cP)		0.018	0.018	0.018	0.018
	Max. Allow. Press. Drop (MPaG)		0.005	0.005	0.005	0.005
	PWHt at Site		N	N	N	N
	Moderate Wet H2S Service		N	N	N	N
	Severe Wet H2S Service		N	N	N	N
	Amine Service		N	N	N	N
	Caustic Service		N	N	N	N
	Hydrogen Service		N	N	N	N
	Licensor		No Licensor	No Licensor	No Licensor	No Licensor
	Location	P&ID No.	D-022-1225-0401J	D-022-1225-0401J	D-022-1225-0401J	D-022-1225-0401J
		Line No.	LPN-022-7028	LPN-022-7026	LPN-022-7029	LPN-022-7030
		Piping Class	A1AA	A1AA	A1AA	A1AA
	Remarks					

INDRA
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Tag Number		022-STR-0349	022-STR-0350	022-STR-0351	022-STR-0352	022-STR-0353
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		1	1	1	1	0.75
End Connection		Socket Weld	Socket Weld	Socket Weld	Socket Weld	Socket Weld
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		Y-Type	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Forging	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	30	30	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.05	1.05	1.05	1.05
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	65	65	65	65
	C.A. (mm)		1.5	1.5	1.5	1.5
	Test Press. (MPaG)		1.62	1.62	1.62	1.62
Operating Condition	Press. (MPaG)		0.686	0.686	0.686	0.686
	Temp. (deg.C)		30	30	30	30
	Fluid		LP NITROGEN	LP NITROGEN	LP NITROGEN	LP NITROGEN
	Phase		V	V	V	V
	Max. Flow Rate (kg/hr.)		38	89	26	0.34
	M.W. (gas)		28.01	28.01	28.01	28.01
	Sp. Gr. (liq.) (kg/m3)					
	Vis. (cP)		0.018	0.018	0.018	0.018
	Max. Allow. Press. Drop (MPaG)		0.005	0.005	0.005	0.005
PWHt at Site		N	N	N	N	N
Moderate Wet H2S Service		N	N	N	N	N
Severe Wet H2S Service		N	N	N	N	N
Amine Service		N	N	N	N	N
Caustic Service		N	N	N	N	N
Hydrogen Service		N	N	N	N	N
Licensor		No Licensor	No Licensor	No Licensor	No Licensor	No Licensor
Location	P&ID No.	D-022-1225-0401J	D-022-1225-0401J	D-022-1225-0401J	D-022-1225-0401J	D-022-1225-0403J
	Line No.	LPN-022-7032	LPN-022-7033	LPN-022-7034	LPN-022-7035	LPN-022-7019
	Piping Class	A1AA	A1AA	A1AA	A1AA	A1AA
Remarks						

INDRA
10-JUL-2015

Tag Number		022-STR-0354	022-STR-0355	022-STR-0360	023-STR-0066	023-STR-0067
Qty. (pc(s))		1	2	1	1	1
Size (NPS)		0.75	0.75	4	24	48
End Connection		NPT	NPT	Butt Weld (SCH STD)	Refer Note in remark column	Refer Note in remark column
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		Y-Type	Y-Type	T- BathtubType	Cone Type	Cone Type
Parts Material	Pipe	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B + Galvanized	ASTM A106 Grade B	N/A	N/A
	Fitting	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A234 Grade WPB	N/A	N/A
	Forging	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A105 + Galvanized	ASTM A105 + Galvanized	ASTM A216 Grade WCB	N/A	N/A
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	N/A	N/A
	Bolt & Nut	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 + Galvanized / A194 Grade 2H + Galvanized	ASTM A193 Grade B7 / A194 Grade 2H	N/A	N/A
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	30	40	40
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.03	0.48	0.498	0.443
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	70	350	76	115
	C.A. (mm)		0	1.5	6	6
	Test Press. (MPaG)		1.60	0.84		
Operating Condition	Press. (MPaG)		0.736	0.060	0.320	0.010
	Temp. (deg.C)		40	320	46	44
	Fluid		INSTRUMENT AIR	MP STEAM	WET GAS SECOND STAGE SUCTION	WET GAS FIRST STAGE SUCTION
	Phase		V	V	V	V
	Max. Flow Rate (kg/hr.)		0.37	300	237204	301374
	M.W. (gas)		28.85	18.01	41.24	43.49
	Sp. Gr. (liq.) (kg/m3)					
	Vis. (cP)		0.019	0.021	0.009	0.009
Service	Max. Allow. Press. Drop (MPaG)		0.005	0.005	0.004	0.004
	PWHt at Site		N	N	Y	Y
	Moderate Wet H2S Service		N	N	N	N
	Severe Wet H2S Service		N	N	Y	Y
	Amine Service		N	N	N	N
	Caustic Service		N	N	N	N
	Hydrogen Service		N	N	N	N
	Licensor		No Licensor	No Licensor	Licensor - 1	Licensor - 1
Location	P&ID No.		D-022-1225-0403J	D-022-1225-0111J	D-023-1225-0002J	D-023-1225-0002J
	Line No.		LPN-022-7276	LPN-022-7277 / LPN-022-7278	MPS-022-1415	P-023-0309
	Piping Class		S0RA	S0RA	A1AS	A4AR01
Remarks					Removable Strainer. Strainer are removed from spool after startup. Vendor to supply spacer ring. Strainer End Connection to suit between ASME B16.5 RF Flanges.	Removable Strainer. Strainer are removed from spool after startup. Vendor to supply spacer ring. Strainer End Connection to suit between ASME B16.47-B RF Flanges.

INDRA
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Tag Number		023-STR-0069	023-STR-0070	023-STR-0071	023-STR-0072	023-STR-0073
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		36	8	8	12	12
End Connection		Refer Note in remark column	Butt Weld (SCH 20)	Butt Weld (SCH 20)	Butt Weld (SCH 10S)	Butt Weld (SCH 10S)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		Cone Type	T- BathtubType	T- BathtubType	T- BathtubType	T- BathtubType
Parts Material	Pipe	N/A	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A358 Grade 304/304L Class 1 dual grade	ASTM A358 Grade 304/304L Class 1 dual grade
	Fitting	N/A	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A403 Grade WP304/WP304L Class WX dual grade	ASTM A403 Grade WP304/WP304L Class WX dual grade
	Forging	ASTM A350 Grade LF2 Class 1	ASTM A105	ASTM A105	ASTM A182 Grade F304/F304L dual grade	ASTM A182 Grade F304/F304L dual grade
	Casting	N/A	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A351 Grade CF8	ASTM A351 Grade CF8
	Gasket	N/A	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	N/A	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	40	20	20	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		1.258	1.247	1.502	1.502
	Temp.	Min. (deg.C)	-48	10	10	10
		Max. (deg.C)	65	95	75	75
	C.A. (mm)		1.5	3	0	0
	Test Press. (MPaG)		1.87	1.87	2.25	2.25
Operating Condition	Press. (MPaG)		1.080	-0.043	0.731	0.731
	Temp. (deg.C)		26	66	43	43
	Fluid		HEAT PUMP COMPRESSOR SUCTION	TURBINE SUSPECT CONDENSATE	DM WATER	DM WATER
	Phase		V	L	L	L
	Max. Flow Rate (kg/hr.)		1168000	98000	423157	423157
	M.W. (gas)		42.09			
	Sp. Gr. (liq.) (kg/m3)			980	991	991
	Vis. (cP)		0.009	0.4276	0.62	0.62
Remarks	Max. Allow. Press. Drop (MPaG)		0.004	0.003	0.003	0.003
	PWHT at Site		N	N	N	N
	Moderate Wet H2S Service		N	N	N	N
	Severe Wet H2S Service		N	N	N	N
	Amine Service		N	N	N	N
	Caustic Service		N	N	N	N
	Hydrogen Service		N	N	N	N
	Licensor		Licensor - 1	No Licensor	No Licensor	No Licensor
	Location	P&ID No.	D-023-1225-0308J	D-023-1225-2103J	D-023-1225-3043J	D-023-1225-3043J
		Line No.	P-023-3602	TSCW-023-5606	DMW-023-7002	DMW-023-7003
		Piping Class	A1GP01	A2AP	A0JW	A0JW
	Removable Strainer. Strainer are removed from spool after startup. Vendor to supply spacer ring. Strainer End Connection to suit between ASME B16.47-B RF Flanges.		30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation	30 Mesh size for start up operation

INDRA
10-JUL-2015

Tag Number		023-STR-0074	023-STR-0075	028-STR-0052	086-STR-0012	086-STR-0013
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		1	1	10	4	4
End Connection		Butt Weld (SCH 160)	Butt Weld (SCH 160)	Refer Note in remark column	Butt Weld (SCH STD)	Butt Weld (SCH STD)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 300	Class 300	Class 300
Type		Y-Type	Y-Type	Cone Type	T- BathtubType	T- BathtubType
Parts Material	Pipe	ASTM A333 Grade 6	ASTM A333 Grade 6	N/A	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A420 Grade WPL6	ASTM A420 Grade WPL6	N/A	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A350 Grade LF2 Class 1	ASTM A350 Grade LF2 Class 1	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A350 Grade LF2 Class 1	ASTM A350 Grade LF2 Class 1	N/A	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	N/A	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A320 Grade L7M / A194 Grade 7M	ASTM A320 Grade L7M / A194 Grade 7M	N/A	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	30	40	20	20
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		0.343	2.4	1.615	1.615
	Temp.	Min. (deg.C)	-48	10	10	10
		Max. (deg.C)	250	200	200	200
	C.A. (mm)		3	1.5	3	3
	Test Press. (MPaG)		0.61		2.43	2.43
Operating Condition	Press. (MPaG)		0.301	1.952	0.650	0.650
	Temp. (deg.C)		49	57	150	150
	Fluid		FUEL GAS	HYDROGEN	LIQUID SULPHUR	LIQUID SULPHUR
	Phase		V	V	L	L
	Max. Flow Rate (kg/hr.)		19.8	13221	36647	36647
	M.W. (gas)		26.5	8.0		
	Sp. Gr. (liq.) (kg/m3)				1779	1779
	Vis. (cP)		0.012	0.011	6.94	6.94
Remarks	Max. Allow. Press. Drop (MPaG)		0.005	0.005	0.005	0.005
	PWHT at Site		N	N	N	N
	Moderate Wet H2S Service		Y	N	N	N
	Severe Wet H2S Service		N	N	N	N
	Amine Service		N	N	N	N
	Caustic Service		N	N	N	N
	Hydrogen Service		N	Y	N	N
	Licensor		No Licensor	Licensor - 4	Licensor - 3	Licensor - 3
	Location	P&ID No.	D-023-1225-3103J	D-028-1225-0044J	D-086-1225-0019J	D-086-1225-0019J
		Line No.	FG-023-0420	P-028-2701	P-086-1126	P-086-1127
		Piping Class	A2GQ	B1AH04	B2APCL	B2APCL
				Removable Strainer. Strainer are removed from spool after startup. Vendor to supply spacer ring. Strainer End Connection to suit between ASME B16.5 RF Flanges.	30 Mesh size for start up operation	30 Mesh size for start up operation

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Tag Number		022-STR-0361	022-STR-0362	022-STR-0363	022-STR-0364	022-STR-0365
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		0.75	0.75	0.75	0.75	0.75
End Connection		Butt Weld (SCH 160)	Butt Weld (SCH 160)	Socket Weld	Socket Weld	Socket Weld
End Flange/ Cover Flange Rating		Class 300	Class 300	Class 300	Class 300	Class 150
Type		Y-Type	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A335 Grade P5	ASTM A335 Grade P5	ASTM A335 Grade P11	ASTM A335 Grade P11	ASTM A335 Grade P11
	Fitting	ASTM A234 Grade WP5 Class 1	ASTM A234 Grade WP5 Class 1	ASTM A234 Grade WP11 Class 1	ASTM A234 Grade WP11 Class 1	ASTM A234 Grade WP11 Class 1
	Forging	ASTM A182 Grade F5	ASTM A182 Grade F5	ASTM A182 Grade F11 Class 2	ASTM A182 Grade F11 Class 2	ASTM A182 Grade F11 Class 2
	Casting	ASTM A217 Grade C5	ASTM A217 Grade C5	ASTM A217 Grade WC6	ASTM A217 Grade WC6	ASTM A217 Grade WC6
	Gasket	SS316 winding / Graphite-mica filler	SS316 winding / Graphite-mica filler	SS316 winding / Graphite-mica filler	SS316 winding / Graphite-mica filler	SS316 winding / Graphite-mica filler
	Bolt & Nut	ASTM A193 Grade B16 / A194 Grade 4	ASTM A193 Grade B16 / A194 Grade 4	ASTM A193 Grade B16 / A194 Grade 4	ASTM A193 Grade B16 / A194 Grade 4	ASTM A193 Grade B16 / A194 Grade 4
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	30	20	30	20	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		0.66	0.343	0.66	0.343
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	107	107	293	107
	C.A. (mm)		3	3	3	3
	Test Press. (MPaG)		0.99	0.54	0.99	0.56
Operating Condition	Press. (MPaG)		0.301	0.100	0.301	0.301
	Temp. (deg.C)		38	180	38	38
	Fluid		FUEL GAS	HCO FLUSHING OIL	FUEL GAS	HCO FLUSHING OIL
	Phase		V	L	V	L
	Max. Flow Rate (kg/hr.)		6	192	6	192
	M.W. (gas)		26	26	26	26
	Sp. Gr. (liq.) (kg/m3)			960		960
	Vis. (cP)		0.01	0.95	0.01	0.95
Remarks	Max. Allow. Press. Drop (MPaG)		0.005	0.005	0.005	0.005
	PWHt at Site		N	N	N	N
	Moderate Wet H2S Service		N	N	N	N
	Severe Wet H2S Service		N	N	N	N
	Amine Service		N	N	N	N
	Caustic Service		N	N	N	N
	Hydrogen Service		N	N	N	N
	Licensor		Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1
	Location	P&ID No.	D-022-1225-2001J	D-022-1225-2001J	D-022-1225-2001J	D-022-1225-2001J
		Line No.	FG-022-7017	FLOH-022-7017	FLOH-022-7021	FG-022-7021
		Piping Class	B2FC01	B2DP01	B2DP01	A2DP01

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Tag Number		022-STR-0366	022-STR-0367	022-STR-0368	022-STR-0369	022-STR-0370
Qty. (pc(s))		1	1	1	1	1
Size (NPS)		0.75	0.75	0.75	0.75	0.75
End Connection		Socket Weld	Socket Weld	Socket Weld	Socket Weld	Butt Weld (SCH 160)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150	Class 150	Class 150
Type		Y-Type	Y-Type	Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A335 Grade P11	ASTM A335 Grade P11	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WP11 Class 1	ASTM A234 Grade WP11 Class 1	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A182 Grade F11 Class 2	ASTM A182 Grade F11 Class 2	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A217 Grade WC6	ASTM A217 Grade WC6	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite-mica filler	SS316 winding / Graphite-mica filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B16 / A194 Grade 4	ASTM A193 Grade B16 / A194 Grade 4	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316	SS316	SS316
	Screen	SS316	SS316	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	20	30	20	30
	Wire Size	By Vendor	By Vendor	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A	N/A	N/A
Drain			N/A	N/A	N/A	N/A
Design Condition	Press. (MPaG)		0.343	0.343	0.343	1.05
	Temp.	Min. (deg.C)	10	10	10	10
		Max. (deg.C)	293	293	293	65
	C.A. (mm)		3	3	1.5	3
	Test Press. (MPaG)		0.56	0.99	0.64	1.58
Operating Condition	Press. (MPaG)		0.100	0.100	0.100	0.686
	Temp. (deg.C)		180	180	180	30
	Fluid		HCO FLUSHING OIL	HCO FLUSHING OIL	FUEL GAS	HCO FLUSHING OIL
	Phase		L	L	V	L
	Max. Flow Rate (kg/hr.)		192	192	6	192
	M.W. (gas)			26		28.01
	Sp. Gr. (liq.) (kg/m3)		960		960	
	Vis. (cP)		0.95	0.01	0.95	0.018
Remarks	Max. Allow. Press. Drop (MPaG)		0.005	0.005	0.005	0.005
	PWHt at Site		N	N	N	N
	Moderate Wet H2S Service		N	N	N	N
	Severe Wet H2S Service		N	N	N	N
	Amine Service		N	N	N	N
	Caustic Service		N	N	N	N
	Hydrogen Service		N	N	N	N
	Licensor		Licensor - 1	Licensor - 1	Licensor - 1	Licensor - 1
	Location	P&ID No.	D-022-1225-2001J	D-022-1225-2001J	D-022-1225-2001J	D-022-1225-2001J
		Line No.	FLOH-022-7251	FG-022-7055	FLOH-022-7037	LPN-022-7051
		Piping Class	A2DP01	A1AP01	A1AP01	A2AC01

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Tag Number		022-STR-0371	022-STR-0372	022-STR-0373
Qty. (pc(s))		1	1	1
Size (NPS)		0.75	0.75	0.75
End Connection		Butt Weld (SCH 160)	Butt Weld (SCH 160)	Butt Weld (SCH 160)
End Flange/ Cover Flange Rating		Class 150	Class 150	Class 150
Type		Y-Type	Y-Type	Y-Type
Parts Material	Pipe	ASTM A106 Grade B	ASTM A106 Grade B	ASTM A106 Grade B
	Fitting	ASTM A234 Grade WPB	ASTM A234 Grade WPB	ASTM A234 Grade WPB
	Forging	ASTM A105	ASTM A105	ASTM A105
	Casting	ASTM A216 Grade WCB	ASTM A216 Grade WCB	ASTM A216 Grade WCB
	Gasket	SS316 winding / Graphite filler	SS316 winding / Graphite filler	SS316 winding / Graphite filler
	Bolt & Nut	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H	ASTM A193 Grade B7 / A194 Grade 2H
	Perforated Plate / Bucket	SS316	SS316	SS316
	Screen	SS316	SS316	SS316
	Other Internals	SS316	SS316	SS316
Filtering	Min. Effective Filtering Area Ratio (%)	200	200	200
	Perforated Plate Hole Diameter (mm)	By Vendor	By Vendor	By Vendor
	Mesh Size (Mesh)	20	30	20
	Wire Size	By Vendor	By Vendor	By Vendor
Vent	Size and Connection		N/A	N/A
Drain			N/A	N/A
Design Condition	Press. (MPaG)		0.343	0.343
	Temp.	Min. (deg.C)	10	10
		Max. (deg.C)	293	293
	C.A. (mm)		3	3
	Test Press. (MPaG)		<u>0.64</u>	<u>0.64</u>
Operating Condition	Press. (MPaG)		0.100	0.100
	Temp. (deg.C)		180	180
	Fluid		HCO FLUSHING OIL	LP NITROGEN
	Phase		L	L
	Max. Flow Rate (kg/hr.)		192	192
	M.W. (gas)		28.01	
	Sp. Gr. (liq.) (kg/m3)		960	960
	Vis. (cP)		0.018	0.95
	Max. Allow. Press. Drop (MPaG)		0.005	0.005
PWHIT at Site		N	N	N
Moderate Wet H2S Service		N	N	N
Severe Wet H2S Service		N	N	N
Amine Service		N	N	N
Caustic Service		N	N	N
Hydrogen Service		N	N	N
Licensor		Licensor - 1	Licensor - 1	Licensor - 1
Location	P&ID No.	D-022-1225-2001J	D-022-1225-2001J	D-022-1225-2001J
	Line No.	FLOH-022-7039	LPN-022-7077	FLOH-022-7077
	Piping Class	A2AC01	A2AC01	A2AC01
Remarks				

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