

|                    |    |                                      |                 |        |            |                                        |            |
|--------------------|----|--------------------------------------|-----------------|--------|------------|----------------------------------------|------------|
| GENERAL            | 1  | Tag No                               |                 |        |            | 113-FV-6203                            |            |
|                    | 2  | Service                              |                 |        |            | UPPER FEED TO DEETHANIZER FROM EE-329X |            |
|                    | 3  | Area Classification                  |                 |        |            | IEC Zone-2, Gr.IIA/IIB/IIC, T3         |            |
|                    | 4  | Ambient Temperature                  | Min             | Max    | 1°C        | 39.8°C                                 |            |
|                    | 5  | Allowable Sound Pressure Level       | Db              |        | 85         |                                        |            |
|                    | 6  | Control Action On-Off(OR) Modulating |                 |        |            | Modulating                             |            |
|                    | 7  | Available Air Supply Pressure        | Min             | Max    | 5 kgf/cm2g | 10.5 kgf/cm2g                          |            |
|                    | 8  | Failure Position                     |                 |        |            | Close                                  |            |
| PIPE LINE          | 9  | Line Size and Schedule               | Inlet           | Outlet | 4 in STD   |                                        |            |
|                    | 10 | Inlet Line ID                        |                 |        |            | 102.3 mm                               |            |
|                    | 11 | Outlet Line ID                       |                 |        |            | 102.3 mm                               |            |
| PROCESS CONDITIONS | 12 | Process Fluid                        | Fluid State     |        |            | UPPER FEED TO DEETHANIZER              | Liquid     |
|                    | 13 | Differential Pressure- Shutoff       |                 |        |            | 32.9 kgf/cm2                           |            |
|                    |    |                                      |                 |        |            | Units                                  | @Max. Flow |
|                    | 14 | Flow Rate                            |                 |        |            | Am3/h                                  | 55         |
|                    | 15 | Inlet Pressure                       |                 |        |            | kgf/cm2-g                              | 25.39      |
|                    | 16 | Pressure Drop                        |                 |        |            | kgf/cm2                                | 1.74       |
|                    | 17 | Inlet Temperature                    |                 |        |            | °C                                     | -4.8       |
|                    | 18 | Inlet Viscosity                      |                 |        |            | Cp                                     | 0.069      |
|                    | 19 | Inlet Vapour Pressure                |                 |        |            | kgf/cm2-a                              | 24.96      |
|                    | 20 | Critical Pressure                    |                 |        |            | kgf/cm2-a                              | 49.98      |
| CALCULATED RESULTS | 21 | Flow Coefficient Cv                  | Max             | Nor    | Min        | 33.8                                   |            |
| BODY AND TRIM      | 22 | Body Type                            |                 |        |            | Single Seat Globe                      |            |
|                    | 23 | Body Size                            |                 |        |            | 2 in                                   |            |
|                    | 24 | Rated Cv                             | Characteristics |        |            | data to be furnished by vendor         | Eq. %      |
|                    | 25 | End Connection & Rating              |                 |        |            | 2" 300#                                |            |
|                    | 26 | Facing Finish                        |                 |        |            | RF 125 AARH                            |            |
|                    | 27 | Body, Bonnet Material                |                 |        |            | ASTM A 352 GR.LCB or better            |            |
|                    | 28 | Packing Material                     |                 |        |            | PTFE                                   |            |
|                    | 29 | Trim Type                            |                 |        |            | Single Seat                            |            |
|                    | 30 | Rated Travel                         |                 |        |            | Mfr. Std.                              |            |
|                    | 31 | Type of Bonnet                       |                 |        |            | Extended                               |            |
| ACTUATOR           | 32 | Type                                 |                 |        |            | Pneumatic Spring Diaphragm             |            |
|                    | 33 | Hand Wheel Location                  |                 |        |            |                                        |            |
|                    | 34 | Spring Action                        |                 |        |            | Close                                  |            |
| POSITIONER         | 35 | Signal                               |                 |        |            | 4-20mA HART                            |            |
|                    | 36 | Type                                 |                 |        |            | SMART Positioner                       |            |
|                    | 37 | Gauges                               |                 |        |            | Reqd. 2 nos                            |            |
| SOLENOID VALVE     | 38 | Type                                 |                 |        |            | 3-Way Universal                        |            |
|                    | 39 | When De-Energise Valve               |                 |        |            | Close                                  |            |
|                    | 40 | Tag No                               |                 |        |            | 113-FY-6203                            |            |
| SWITCHES           | 41 | Type                                 | Quantity        |        |            | Proximity                              | 1          |
|                    | 42 | Contact/Rating                       |                 |        |            | 24V DC                                 |            |
|                    | 43 | Switching Position                   |                 |        |            | Closed                                 |            |
|                    | 44 | Tag No                               |                 |        |            | 113-FZLC-6203                          |            |
| AIR SET            | 45 | Set Pressure                         |                 |        |            | Vendor to furnish                      |            |
| TIGHTNESS          | 46 | Leakage Class                        |                 |        |            | ANSI V                                 |            |

- 1 Design temperature: -45 deg. C; Design Pressure: 32.9 Kg/cm2; Density: 448.957 Kg/m3.
- 2 The valve shall have extended bonnet as per BS-6364 (Non cold box application).
- 3 Service is flashing.
- 4 Cryogenic testing requirements as specified in SIV shall be complied.
- 5 Vendor should provide type test certificate with the offer.

## Specifications for Control Valve 113-FV-6851

## Annexure-B2

|                    |    |                                      |                 |        |                   |                                |                  |
|--------------------|----|--------------------------------------|-----------------|--------|-------------------|--------------------------------|------------------|
| GENERAL            | 1  | Tag No                               |                 |        |                   | 113-FV-6851                    |                  |
|                    | 2  | Service                              |                 |        |                   | C2 HYDROCARBON                 |                  |
|                    | 3  | Area Classification                  |                 |        |                   | IEC Zone-2, Gr IIC, T3         |                  |
|                    | 4  | Ambient Temperature                  | Min             | Max    | 1°C               | 39.8°C                         |                  |
|                    | 5  | Allowable Sound Pressure Level       | Db              |        | 85                |                                |                  |
|                    | 6  | Control Action On-Off(OR) Modulating |                 |        |                   | Modulating                     |                  |
|                    | 7  | Available Air Supply Pressure        | Min             | Max    | 5 kgf/cm2g        | 10.5 kgf/cm2g                  |                  |
|                    | 8  | Failure Position                     |                 |        |                   | Close                          |                  |
| PIPE LINE          | 9  | Line Size and Schedule               | Inlet           | Outlet | 10 in STD         |                                |                  |
|                    | 10 | Inlet Line ID                        |                 |        | 254.5 mm          |                                |                  |
|                    | 11 | Outlet Line ID                       |                 |        | 254.5 mm          |                                |                  |
| PROCESS CONDITIONS | 12 | Process Fluid                        | Fluid State     |        |                   | GAS/VAPOUR                     |                  |
|                    | 13 | Differential Pressure- Shutoff       |                 |        | 25.5 kgf/cm2      |                                |                  |
|                    |    |                                      |                 |        | Units             | @Max. Flow                     |                  |
|                    | 14 | Flow Rate                            |                 |        |                   | 47288                          |                  |
|                    | 15 | Inlet Pressure                       |                 |        | kgf/cm2-g         | 21.12                          |                  |
|                    | 16 | Pressure Drop                        |                 |        | kgf/cm2           | 1                              |                  |
|                    | 17 | Inlet Temperature                    |                 |        | °C                | -18.1                          |                  |
|                    | 18 | Inlet Viscosity                      |                 |        | Cp                | 0.01                           |                  |
|                    | 19 | Inlet Vapour Pressure                |                 |        | kgf/cm2-a         |                                |                  |
|                    | 20 | Critical Pressure                    |                 |        | kgf/cm2-a         | 51.05                          |                  |
| CALCULATED RESULTS | 21 | Flow Coefficient Cv                  | Max             | Nor    | Min               | 285                            |                  |
| BODY AND TRIM      | 22 | Body Type                            |                 |        |                   | Single Seat Globe              |                  |
|                    | 23 | Body Size                            |                 |        |                   | 6 in                           |                  |
|                    | 24 | Rated Cv                             | Characteristics |        |                   | data to be furnished by vendor | Equal Percentage |
|                    | 25 | End Connection & Rating              |                 |        |                   | 6" 300#                        |                  |
|                    | 26 | Facing Finish                        |                 |        |                   | RF 125 AARH                    |                  |
|                    | 27 | Body, Bonnet Material                |                 |        |                   | ASTM A 352 GR.LCB or better    |                  |
|                    | 28 | Packing Material                     |                 |        |                   | PTFE                           |                  |
|                    | 29 | Trim Type                            |                 |        |                   | Single Seat                    |                  |
|                    | 30 | Rated Travel                         |                 |        |                   | Mfr. Std.                      |                  |
|                    | 31 | Type of Bonnet                       |                 |        |                   | Extended                       |                  |
| ACTUATOR           | 32 | Type                                 |                 |        |                   | Pneumatic Spring Diaphragm     |                  |
|                    | 33 | Hand Wheel Location                  |                 |        |                   |                                |                  |
|                    | 34 | Spring Action                        |                 |        |                   | Close                          |                  |
| POSITIONER         | 35 | Signal                               |                 |        |                   | 4-20mA HART                    |                  |
|                    | 36 | Type                                 |                 |        |                   | SMART Positioner               |                  |
|                    | 37 | Gauges                               |                 |        |                   | Reqd. 2 nos                    |                  |
| SOLENOID VALVE     | 38 | Type                                 |                 |        |                   | 3-Way Universal                |                  |
|                    | 39 | When De-Energise Valve               |                 |        |                   | Close                          |                  |
|                    | 40 | Tag No                               |                 |        |                   | 113-FY-6851                    |                  |
| SWITCHES           | 41 | Type                                 | Quantity        |        | Proximity         | 1                              |                  |
|                    | 42 | Contact/Rating                       |                 |        | 24V DC            |                                |                  |
|                    | 43 | Switching Position                   |                 |        | Full Close        |                                |                  |
|                    | 44 | Tag No                               |                 |        | 113-FZLC-6851     |                                |                  |
| AIR SET            | 40 | Set Pressure                         |                 |        | Vendor to furnish |                                |                  |
| TIGHTNESS          | 41 | Leakage Class                        |                 |        | ANSI V            |                                |                  |

- 1 Design temperature: -45/80 deg. C; Design Pressure: 25.5 Kg/cm2; Density: 41.028 Kg/m3.
- 2 The valve shall have extended bonnet as per BS-6364 (Non cold box application).
- 3 Cryogenic testing requirements as specified in SIV shall be complied.
- 4 Vendor should provide type test certificate with the offer.

## Specifications for Control Valve 113-FV-7404

## Annexure-B3

|                    |    |                                      |                 |        |            |                                |                  |
|--------------------|----|--------------------------------------|-----------------|--------|------------|--------------------------------|------------------|
| GENERAL            | 1  | Tag No                               |                 |        |            | 113-FV-7404                    |                  |
|                    | 2  | Service                              |                 |        |            | C2 HYDROCARBON                 |                  |
|                    | 3  | Area Classification                  |                 |        |            | IEC Zone-2, Gr IIA/IIB, T3     |                  |
|                    | 4  | Ambient Temperature                  | Min             | Max    | 1°C        | 39.8°C                         |                  |
|                    | 5  | Allowable Sound Pressure Level       | DbA             |        | 85         |                                |                  |
|                    | 6  | Control Action On-Off(OR) Modulating |                 |        |            | Modulating                     |                  |
|                    | 7  | Available Air Supply Pressure        | Min             | Max    | 5 kgf/cm2g | 10.5 kgf/cm2g                  |                  |
|                    | 8  | Failure Position                     |                 |        |            | Close                          |                  |
| PIPE LINE          | 9  | Line Size and Schedule               | Inlet           | Outlet | 8 in STD   |                                |                  |
|                    | 10 | Inlet Line ID                        |                 |        |            | 202.7 mm                       |                  |
|                    | 11 | Outlet Line ID                       |                 |        |            | 202.7 mm                       |                  |
| PROCESS CONDITIONS | 12 | Process Fluid                        | Fluid State     |        |            |                                | LIQUID           |
|                    | 13 | Differential Pressure- Shutoff       |                 |        |            | 21.5 kgf/cm2                   |                  |
|                    |    |                                      |                 |        |            | Units                          | @Max. Flow       |
|                    | 14 | Flow Rate                            |                 |        |            | Am3/h                          | 36               |
|                    | 15 | Inlet Pressure                       |                 |        |            | kgf/cm2-g                      | 17.81            |
|                    | 16 | Pressure Drop                        |                 |        |            | kgf/cm2                        | 1                |
|                    | 17 | Inlet Temperature                    |                 |        |            | °C                             | -18.1            |
|                    | 18 | Inlet Viscosity                      |                 |        |            | Cp                             | 0.01             |
|                    | 19 | Inlet Vapour Pressure                |                 |        |            | kgf/cm2-a                      |                  |
| CALCULATED RESULTS | 20 | Critical Pressure                    |                 |        |            | kgf/cm2-a                      | 51.05            |
|                    | 21 | Flow Coefficient Cv                  | Max             | Nor    | Min        |                                | 285              |
| BODY AND TRIM      | 22 | Body Type                            |                 |        |            | Single Seat Globe              |                  |
|                    | 23 | Body Size                            |                 |        |            | 6 in                           |                  |
|                    | 24 | Rated Cv                             | Characteristics |        |            | data to be furnished by vendor | Equal Percentage |
|                    | 25 | End Connection & Rating              |                 |        |            | 6" 300#                        |                  |
|                    | 26 | Facing Finish                        |                 |        |            | RF 125 AARH                    |                  |
|                    | 27 | Body, Bonnet Material                |                 |        |            | ASTM A 352 GR.LCB or better    |                  |
|                    | 28 | Packing Material                     |                 |        |            | PTFE                           |                  |
|                    | 29 | Trim Type                            |                 |        |            | Single Seat                    |                  |
|                    | 30 | Rated Travel                         |                 |        |            | Mfr. Std.                      |                  |
|                    | 31 | Type of Bonnet                       |                 |        |            | Extended                       |                  |
| ACTUATOR           | 32 | Type                                 |                 |        |            | Pneumatic Spring Diaphragm     |                  |
|                    | 33 | Hand Wheel Location                  |                 |        |            |                                |                  |
|                    | 34 | Spring Action                        |                 |        |            | Close                          |                  |
| POSITIONER         | 35 | Signal                               |                 |        |            | 4-20mA HART                    |                  |
|                    | 36 | Type                                 |                 |        |            | SMART Positioner               |                  |
|                    | 37 | Gauges                               |                 |        |            | Reqd. 2 nos                    |                  |
| OLENOID VALV       | 38 | Type                                 |                 |        |            | 3-Way Universal                |                  |
|                    | 39 | When De-Energise Valve               |                 |        |            | Close                          |                  |
|                    | 40 | Tag No                               |                 |        |            | 113-FY-7404                    |                  |
| AIR SET            | 41 | Set Pressure                         |                 |        |            | Vendor to furnish              |                  |
| TIGHTNESS          | 42 | Leakage Class                        |                 |        |            | ANSI V                         |                  |

- 1 Design temperature: -45 deg. C; Design Pressure: 21.5 Kg/cm2; Density: 424.157 Kg/m3.
- 2 The valve shall have extended bonnet as per BS-6364 (Non cold box application).
- 3 Service is flashing.
- 4 Vendor should provide type test certificate with the offer.

## Specifications for Control Valve 113-FV-7501

## Annexure-B4

|                    |    |                                      |                             |        |                         |                  |
|--------------------|----|--------------------------------------|-----------------------------|--------|-------------------------|------------------|
| GENERAL            | 1  | Tag No                               | 113-FV-7501                 |        |                         |                  |
|                    | 2  | Service                              | C2 HYDROCARBON              |        |                         |                  |
|                    | 3  | Area Classification                  | IEC Zone-2, Gr IIA/IIB, T3  |        |                         |                  |
|                    | 4  | Ambient Temperature                  | Min                         | Max    | 1°C                     | 39.8°C           |
|                    | 5  | Allowable Sound Pressure Level       | Db                          |        | 85                      |                  |
|                    | 6  | Control Action On-Off(OR) Modulating | Modulating                  |        |                         |                  |
|                    | 7  | Available Air Supply Pressure        | Min                         | Max    | 5 kgf/cm2g              | 10.5 kgf/cm2g    |
|                    | 8  | Failure Position                     | Close                       |        |                         |                  |
| PIPE LINE          | 9  | Line Size and Schedule               | Inlet                       | Outlet | 10 in STD               |                  |
|                    | 10 | Inlet Line ID                        | 254.5 mm                    |        |                         |                  |
|                    | 11 | Outlet Line ID                       | 254.5 mm                    |        |                         |                  |
| PROCESS CONDITIONS | 12 | Process Fluid                        | Fluid State                 |        |                         | LIQUID           |
|                    | 13 | Differential Pressure- Shutoff       | 21.4 kgf/cm2                |        |                         |                  |
|                    |    |                                      |                             |        | Units                   | @Max. Flow       |
|                    | 14 | Flow Rate                            | Am3/h                       |        |                         | 79               |
|                    | 15 | Inlet Pressure                       | kgf/cm2-g                   |        |                         | 18.31            |
|                    | 16 | Pressure Drop                        | kgf/cm2                     |        |                         | 0.62             |
|                    | 17 | Inlet Temperature                    | °C                          |        |                         | -15.1            |
|                    | 18 | Inlet Viscosity                      | Cp                          |        |                         | 0.07             |
|                    | 19 | Inlet Vapour Pressure                | kgf/cm2-a                   |        |                         | 18.43            |
|                    | 20 | Critical Pressure                    | kgf/cm2-a                   |        |                         | 49.97            |
| CALCULATED RESULTS | 21 | Flow Coefficient Cv                  | Max                         | Nor    | Min                     | 76.8             |
| BODY AND TRIM      | 22 | Body Type                            | Single Seat Globe           |        |                         |                  |
|                    | 23 | Body Size                            | 6 in                        |        |                         |                  |
|                    | 24 | Rated Cv                             | Characteristics             |        | data to be furnished by | Equal Percentage |
|                    | 25 | End Connection & Rating              | 6" 300#                     |        |                         |                  |
|                    | 26 | Facing Finish                        | RF 125 AARH                 |        |                         |                  |
|                    | 27 | Body, Bonnet Material                | ASTM A 352 GR.LCB or better |        |                         |                  |
|                    | 28 | Packing Material                     | PTFE                        |        |                         |                  |
|                    | 29 | Trim Type                            | Single Seat                 |        |                         |                  |
|                    | 30 | Rated Travel                         | Mfr. Std.                   |        |                         |                  |
|                    | 31 | Type of Bonnet                       | Extended                    |        |                         |                  |
| ACTUATOR           | 32 | Type                                 | Pneumatic Spring Diaphragm  |        |                         |                  |
|                    | 33 | Hand Wheel Location                  |                             |        |                         |                  |
|                    | 34 | Spring Action                        | Close                       |        |                         |                  |
| POSITIONER         | 35 | Signal                               | 4-20mA HART                 |        |                         |                  |
|                    | 36 | Type                                 | SMART Positioner            |        |                         |                  |
|                    | 37 | Gauges                               | Reqd. 2 nos                 |        |                         |                  |
| SOLENOID VALVE     | 38 | Type                                 | 3-Way Universal             |        |                         |                  |
|                    | 39 | When De-Energise Valve               | Close                       |        |                         |                  |
|                    | 40 | Tag No                               | 113-FY-7501                 |        |                         |                  |
| AIR SET            | 41 | Set Pressure                         | Vendor to furnish           |        |                         |                  |
| TIGHTNESS          | 42 | Leakage Class                        | ANSI V                      |        |                         |                  |

- 1 Design temperature: -45 deg. C; Design Pressure: 21.4 Kg/cm2; Density: 427.743 Kg/m3.
- 2 The valve shall have extended bonnet as per BS-6364 (Non cold box application).
- 3 Cryogenic testing requirements as specified in SIV shall be complied.
- 4 Vendor should provide type test certificate with the offer.

## Specifications for Control Valve 113-PV-6402

## Annexure-B5

|                    |    |                                      |                              |           |                                |                  |
|--------------------|----|--------------------------------------|------------------------------|-----------|--------------------------------|------------------|
| GENERAL            | 1  | Tag No                               | 113-PV-6402                  |           |                                |                  |
|                    | 2  | Service                              | METHANE OFF GAS FROM EP-329X |           |                                |                  |
|                    | 3  | Area Classification                  | IEC Zone-2, Gr IIC, T3       |           |                                |                  |
|                    | 4  | Ambient Temperature                  | Min                          | Max       | 1°C                            | 39.8°C           |
|                    | 5  | Allowable Sound Pressure Level       | DbA                          |           | 85                             |                  |
|                    | 6  | Control Action On-Off(OR) Modulating | Modulating                   |           |                                |                  |
|                    | 7  | Available Air Supply Pressure        | Min                          | Max       | 5 kgf/cm2g                     | 10.5 kgf/cm2g    |
|                    | 8  | Failure Position                     | Close                        |           |                                |                  |
| PIPE LINE          | 9  | Line Size and Schedule               | Inlet                        | Outlet    | 10 in 10S                      |                  |
|                    | 10 | Inlet Line ID                        | 264.7 mm                     |           |                                |                  |
|                    | 11 | Outlet Line ID                       | 264.7 mm                     |           |                                |                  |
| PROCESS CONDITIONS | 12 | Process Fluid                        | Fluid State                  |           | METHANE OFF GAS FROM EP-329X   | GAS/VAPOUR       |
|                    | 13 | Differential Pressure- Shutoff       | 8.6 kgf/cm2                  |           |                                |                  |
|                    |    |                                      | Units                        |           | @Max. Flow                     |                  |
|                    | 14 | Flow Rate                            |                              |           | 10797                          |                  |
|                    | 15 | Inlet Pressure                       |                              |           | kgf/cm2-g 5.88                 |                  |
|                    | 16 | Pressure Drop                        |                              |           | kgf/cm2 0.7                    |                  |
|                    | 17 | Inlet Temperature                    |                              |           | °C 35                          |                  |
|                    | 18 | Inlet Viscosity                      |                              |           | Cp 0.012                       |                  |
|                    | 19 | Inlet Vapour Pressure                |                              |           | kgf/cm2-a                      |                  |
|                    | 20 | Critical Pressure                    |                              |           | kgf/cm2-a 33.29                |                  |
| CALCULATED RESULTS | 21 | Flow Coefficient Cv                  | Max                          | Nor       | Min                            | 305              |
| BODY AND TRIM      | 22 | Body Type                            | Single Seat Globe            |           |                                |                  |
|                    | 23 | Body Size                            | 6 in                         |           |                                |                  |
|                    | 24 | Rated Cv                             | Characteristics              |           | data to be furnished by vendor | Equal Percentage |
|                    | 25 | End Connection & Rating              | 6" 150#                      |           |                                |                  |
|                    | 26 | Facing Finish                        | RF 125 AARH                  |           |                                |                  |
|                    | 27 | Body, Bonnet Material                | ASTM A 351 GR.CF8 or better  |           |                                |                  |
|                    | 28 | Packing Material                     | GRAFOIL                      |           |                                |                  |
|                    | 29 | Trim Type                            | Single Seat                  |           |                                |                  |
|                    | 30 | Rated Travel                         | Mfr. Std.                    |           |                                |                  |
|                    | 31 | Type of Bonnet                       | Extended                     |           |                                |                  |
| ACTUATOR           | 32 | Type                                 | Pneumatic Spring Diaphragm   |           |                                |                  |
|                    | 33 | Hand Wheel Location                  |                              |           |                                |                  |
|                    | 34 | Spring Action                        | Close                        |           |                                |                  |
| POSITIONER         | 35 | Signal                               | 4-20mA HART                  |           |                                |                  |
|                    | 36 | Type                                 | SMART Positioner             |           |                                |                  |
|                    | 37 | Gauges                               | Reqd. 2 nos                  |           |                                |                  |
| SOLENOID VALVE     | 38 | Type                                 | 3-Way Universal              |           |                                |                  |
|                    | 39 | When De-Energise Valve               | Close                        |           |                                |                  |
|                    | 40 | Tag No                               | 113-PY-6402                  |           |                                |                  |
| SWITCHES           | 41 | Type                                 | Quantity                     | Proximity | 1                              |                  |
|                    | 42 | Contact/Rating                       | 24V DC                       |           |                                |                  |
|                    | 43 | Switching Position                   | Closed                       |           |                                |                  |
|                    | 44 | Tag No                               | 113-PZLC-6402                |           |                                |                  |
| AIR SET            | 45 | Set Pressure                         | Vendor to furnish            |           |                                |                  |
| TIGHTNESS          | 46 | Leakage Class                        | ANSI V                       |           |                                |                  |

- Design temperature: -180 deg. C; Design Pressure: 8.6 Kg/cm2; Density: 2.757 Kg/m3.
- The valve shall have extended bonnet as per BS-6364 (Non cold box application).
- Cryogenic testing requirements as specified in SIV shall be complied.
- M.W. - 10.44
- Sp. Heat Ratio(Cp/Cv) - 1.343
- Vendor should provide type test certificate with the offer.

## Specifications for Control Valve 113-TV-6901B

## Annexure-B6

|                    |    |                                      |                 |        |            |                                |                  |
|--------------------|----|--------------------------------------|-----------------|--------|------------|--------------------------------|------------------|
| GENERAL            | 1  | Tag No                               |                 |        |            | 113-TV-6901B                   |                  |
|                    | 2  | Service                              |                 |        |            | C2 HC                          |                  |
|                    | 3  | Area Classification                  |                 |        |            | IEC Zone-2, Gr IIC, T3         |                  |
|                    | 4  | Ambient Temperature                  | Min             | Max    | 1°C        | 39.8°C                         |                  |
|                    | 5  | Allowable Sound Pressure Level       | Db              |        | 85         |                                |                  |
|                    | 6  | Control Action On-Off(OR) Modulating |                 |        |            | Modulating                     |                  |
|                    | 7  | Available Air Supply Pressure        | Min             | Max    | 5 kgf/cm2g | 10.5 kgf/cm2g                  |                  |
|                    | 8  | Failure Position                     |                 |        |            | Open                           |                  |
| PIPE LINE          | 9  | Line Size and Schedule               | Inlet           | Outlet | 8 in STD   |                                |                  |
|                    | 10 | Inlet Line ID                        |                 |        |            | 202.7 mm                       |                  |
|                    | 11 | Outlet Line ID                       |                 |        |            | 202.7 mm                       |                  |
| PROCESS CONDITIONS | 12 | Process Fluid                        | Fluid State     |        |            |                                | GAS/VAPOUR       |
|                    | 13 | Differential Pressure- Shutoff       |                 |        |            | 25.5 kgf/cm2                   |                  |
|                    |    |                                      |                 |        |            | Units                          | @Max. Flow       |
|                    | 14 | Flow Rate                            |                 |        |            |                                | 23627            |
|                    | 15 | Inlet Pressure                       |                 |        |            | kgf/cm2-g                      | 19.92            |
|                    | 16 | Pressure Drop                        |                 |        |            | kgf/cm2                        | 0.33             |
|                    | 17 | Inlet Temperature                    |                 |        |            | °C                             | -20.3            |
|                    | 18 | Inlet Viscosity                      |                 |        |            | Cp                             | 0.009            |
|                    | 19 | Inlet Vapour Pressure                |                 |        |            | kgf/cm2-a                      |                  |
|                    | 20 | Critical Pressure                    |                 |        |            | kgf/cm2-a                      | 51.05            |
| CALCULATED RESULTS | 21 | Flow Coefficient Cv                  | Max             | Nor    | Min        |                                | 247              |
| BODY AND TRIM      | 22 | Body Type                            |                 |        |            | Single Seat Globe              |                  |
|                    | 23 | Body Size                            |                 |        |            | 8 in                           |                  |
|                    |    |                                      |                 |        |            | data to be furnished by vendor | Equal Percentage |
|                    | 24 | Rated Cv                             | Characteristics |        |            |                                |                  |
|                    | 25 | End Connection & Rating              |                 |        |            | 8" 300#                        |                  |
|                    | 26 | Facing Finish                        |                 |        |            | RF 125 AARH                    |                  |
|                    | 27 | Body, Bonnet Material                |                 |        |            | ASTM A 352 GR.LCB or better    |                  |
|                    | 28 | Packing Material                     |                 |        |            | PTFE                           |                  |
|                    | 29 | Trim Type                            |                 |        |            | Single Seat                    |                  |
|                    | 30 | Rated Travel                         |                 |        |            | Mfr. Std.                      |                  |
| ACTUATOR           | 31 | Type of Bonnet                       |                 |        |            | Extended                       |                  |
|                    | 32 | Type                                 |                 |        |            | Pneumatic Spring Diaphragm     |                  |
|                    | 33 | Hand Wheel Location                  |                 |        |            |                                |                  |
| POSITIONER         | 34 | Spring Action                        |                 |        |            | Open                           |                  |
|                    | 35 | Signal                               |                 |        |            | 4-20mA HART                    |                  |
|                    | 36 | Type                                 |                 |        |            | SMART Positioner               |                  |
| SOLENOID VALVE     | 37 | Gauges                               |                 |        |            | Reqd. 2 nos                    |                  |
|                    | 38 | Type                                 |                 |        |            | 3-Way Universal                |                  |
|                    | 39 | When De-Energise Valve               |                 |        |            | Open                           |                  |
| SWITCHES           | 40 | Tag No                               |                 |        |            | 113-TY-6901B                   |                  |
|                    | 41 | Type                                 | Quantity        |        |            | Proximity                      | 1                |
|                    | 42 | Contact/Rating                       |                 |        |            | 24V DC                         |                  |
|                    | 43 | Switching Position                   |                 |        |            | Full Open                      |                  |
| AIR SET            | 44 | Tag No                               |                 |        |            | 113-TZLO-6901B                 |                  |
| TIGHTNESS          | 45 | Set Pressure                         |                 |        |            | Vendor to furnish              |                  |
|                    | 46 | Leakage Class                        |                 |        |            | ANSI IV (standard)             |                  |

- 1 Design temperature: -45/65 deg. C; Design Pressure: 25.5 Kg/cm2; Density: 38.562 Kg/m3.
- 2 MW shall be 28.64.
- 3 Cp/Cv shall be 1.791.
- 4 The valve shall have extended bonnet as per BS-6364 (Non cold box application).
- 5 Cryogenic testing requirements as specified in SIV shall be complied.
- 6 Vendor should provide type test certificate with the offer.

## Specifications for Control Valve 113-TV-6902B

## Annexure-B7

|                    |    |                                      |                 |        |                                |                  |
|--------------------|----|--------------------------------------|-----------------|--------|--------------------------------|------------------|
| GENERAL            | 1  | Tag No                               |                 |        | 113-TV-6902B                   |                  |
|                    | 2  | Service                              |                 |        | C2 HC                          |                  |
|                    | 3  | Area Classification                  |                 |        | IEC Zone-2, Gr IIC, T3         |                  |
|                    | 4  | Ambient Temperature                  | Min             | Max    | 1°C                            | 39.8°C           |
|                    | 5  | Allowable Sound Pressure Level       | Db              |        | 85                             |                  |
|                    | 6  | Control Action On-Off(OR) Modulating |                 |        | Modulating                     |                  |
|                    | 7  | Available Air Supply Pressure        | Min             | Max    | 5 kgf/cm2g                     | 10.5 kgf/cm2g    |
|                    | 8  | Failure Position                     |                 |        | Open                           |                  |
| PIPE LINE          | 9  | Line Size and Schedule               | Inlet           | Outlet | 8 in STD                       |                  |
|                    | 10 | Inlet Line ID                        |                 |        | 202.7 mm                       |                  |
|                    | 11 | Outlet Line ID                       |                 |        | 202.7 mm                       |                  |
| PROCESS CONDITIONS | 12 | Process Fluid                        | Fluid State     |        |                                | GAS/VAPOUR       |
|                    | 13 | Differential Pressure- Shutoff       |                 |        | 25.5 kgf/cm2                   |                  |
|                    |    |                                      |                 |        | Units                          | @Max. Flow       |
|                    | 14 | Flow Rate                            |                 |        |                                | 23627            |
|                    | 15 | Inlet Pressure                       |                 |        | kgf/cm2-g                      | 19.92            |
|                    | 16 | Pressure Drop                        |                 |        | kgf/cm2                        | 0.33             |
|                    | 17 | Inlet Temperature                    |                 |        | °C                             | -20.3            |
|                    | 18 | Inlet Viscosity                      |                 |        | Cp                             | 0.009            |
|                    | 19 | Inlet Vapour Pressure                |                 |        | kgf/cm2-a                      |                  |
|                    | 20 | Critical Pressure                    |                 |        | kgf/cm2-a                      | 51.05            |
| CALCULATED RESULTS | 21 | Flow Coefficient Cv                  | Max             | Nor    | Min                            | 247              |
| BODY AND TRIM      | 22 | Body Type                            |                 |        | Single Seat Globe              |                  |
|                    | 23 | Body Size                            |                 |        | 8 in                           |                  |
|                    |    |                                      |                 |        | data to be furnished by vendor | Equal Percentage |
|                    | 24 | Rated Cv                             | Characteristics |        |                                |                  |
|                    | 25 | End Connection & Rating              |                 |        | 8" 300#                        |                  |
|                    | 26 | Facing Finish                        |                 |        | RF 125 AARH                    |                  |
|                    | 27 | Body, Bonnet Material                |                 |        | ASTM A 352 GR.LCB or better    |                  |
|                    | 28 | Packing Material                     |                 |        | PTFE                           |                  |
|                    | 29 | Trim Type                            |                 |        | Single Seat                    |                  |
|                    | 30 | Rated Travel                         |                 |        | Mfr. Std.                      |                  |
|                    | 31 | Type of Bonnet                       |                 |        | Extended                       |                  |
| ACTUATOR           | 32 | Type                                 |                 |        | Pneumatic Spring Diaphragm     |                  |
|                    | 33 | Hand Wheel Location                  |                 |        |                                |                  |
|                    | 34 | Spring Action                        |                 |        | Open                           |                  |
| POSITIONER         | 35 | Signal                               |                 |        | 4-20mA HART                    |                  |
|                    | 36 | Type                                 |                 |        | SMART Positioner               |                  |
|                    | 37 | Gauges                               |                 |        | Reqd. 2 nos                    |                  |
| SOLENOID VALVE     | 38 | Type                                 |                 |        | 3-Way Universal                |                  |
|                    | 39 | When De-Energise Valve               |                 |        | Open                           |                  |
|                    | 40 | Tag No                               |                 |        | 113-TY-6902B                   |                  |
| SWITCHES           | 41 | Type                                 | Quantity        |        | Proximity                      | 1                |
|                    | 42 | Contact/Rating                       |                 |        | 24V DC                         |                  |
|                    | 43 | Switching Position                   |                 |        | Full Open                      |                  |
|                    | 44 | Tag No                               |                 |        | 113-TZLO-6902B                 |                  |
| AIR SET            | 45 | Set Pressure                         |                 |        | Vendor to furnish              |                  |
| TIGHTNESS          | 46 | Leakage Class                        |                 |        | ANSI IV (standard)             |                  |

- 1 Design temperature: -45/65 deg. C; Design Pressure: 25.5 Kg/cm2; Density: 38.562 Kg/m3.
- 2 MW shall be 28.64.
- 3 Cp/Cv shall be 1.791.
- 4 The valve shall have extended bonnet as per BS-6364 (Non cold box application).
- 5 Cryogenic testing requirements as specified in SIV shall be complied.
- 6 Vendor should provide type test certificate with the offer.

## Specifications for Control Valve 113-PV-9202

## Annexure-B8

|                    |          |                                      |                 |        |            |                                   |                            |
|--------------------|----------|--------------------------------------|-----------------|--------|------------|-----------------------------------|----------------------------|
| GENERAL            | 1        | Tag No                               |                 |        |            | 113-PV-9202                       |                            |
|                    | 2        | Service                              |                 |        |            | MEDIUM TR VAPOURS FROM 113-VV-505 |                            |
|                    | 3        | Area Classification                  |                 |        |            | IEC Zone-2, Gr IIC, T3            |                            |
|                    | 4        | Ambient Temperature                  | Min             | Max    | 1°C        | 39.8°C                            |                            |
|                    | 5        | Allowable Sound Pressure Level       | Db              |        | 85         |                                   |                            |
|                    | 6        | Control Action On-Off(OR) Modulating |                 |        |            | Modulating                        |                            |
|                    | 7        | Available Air Supply Pressure        | Min             | Max    | 5 kgf/cm2g | 10.5 kgf/cm2g                     |                            |
|                    | 8        | Failure Position                     |                 |        |            | Close                             |                            |
| PIPE LINE          | 9        | Line Size and Schedule               | Inlet           | Outlet | 10 in STD  |                                   |                            |
|                    | 10       | Inlet Line ID                        |                 |        |            | 254.50 mm                         |                            |
|                    | 11       | Outlet Line ID                       |                 |        |            | 254.50 mm                         |                            |
| PROCESS CONDITIONS | 12       | Process Fluid                        | Fluid State     |        |            | TERTIARY REFRIGERANT VAPOUR       | GAS/VAPOUR                 |
|                    | 13       | Differential Pressure- Shutoff       |                 |        |            | 20 kgf/cm2                        |                            |
|                    |          |                                      |                 |        |            | Units                             | @Max. Flow                 |
|                    | 14       | Flow Rate                            |                 |        |            |                                   | 25096                      |
|                    | 15       | Inlet Pressure                       |                 |        |            | kgf/cm2-g                         | 8.69                       |
|                    | 16       | Pressure Drop                        |                 |        |            | kgf/cm2                           | 0.61                       |
|                    | 17       | Inlet Temperature                    |                 |        |            | °C                                | -11.3                      |
|                    | 18       | Inlet Viscosity                      |                 |        |            | Cp                                | 0.009                      |
|                    | 19       | Inlet Vapour Pressure                |                 |        |            | kgf/cm2-a                         |                            |
|                    | 20       | Critical Pressure                    |                 |        |            | kgf/cm2-a                         | 47.07                      |
| CALCULATED RESULTS | 21       | Flow Coefficient Cv                  | Max             | Nor    | Min        |                                   | 333                        |
| BODY AND TRIM      | 22       | Body Type                            |                 |        |            | Single Seat Globe                 |                            |
|                    | 23       | Body Size                            |                 |        |            | 6 in                              |                            |
|                    | 24       | Rated Cv                             | Characteristics |        |            | data to be furnished by vendor    | Equal Percentage           |
|                    | 25       | End Connection & Rating              |                 |        |            | 6" 300#                           |                            |
|                    | 26       | Facing Finish                        |                 |        |            | RF 125 AARH                       |                            |
|                    | 27       | Body, Bonnet Material                |                 |        |            | ASTM A 352 GR.LCB or better       |                            |
|                    | 28       | Packing Material                     |                 |        |            | PTFE                              |                            |
|                    | 29       | Trim Type                            |                 |        |            | Single Seat                       |                            |
|                    | 30       | Rated Travel                         |                 |        |            | Mfr. Std.                         |                            |
|                    | 31       | Type of Bonnet                       |                 |        |            | Extended                          |                            |
|                    | ACTUATOR | 32                                   | Type            |        |            |                                   | Pneumatic Spring Diaphragm |
| 33                 |          | Hand Wheel Location                  |                 |        |            | Side                              |                            |
| 34                 |          | Spring Action                        |                 |        |            | Close                             |                            |
| POSITIONER         | 35       | Signal                               |                 |        |            | FF                                |                            |
|                    | 36       | Type                                 |                 |        |            | Fieldbus Positioner               |                            |
|                    | 37       | Gauges                               |                 |        |            | Reqd. 2 nos                       |                            |
| AIR SET            | 40       | Set Pressure                         |                 |        |            | Vendor to furnish                 |                            |
| TIGHTNESS          | 41       | Leakage Class                        |                 |        |            | ANSI IV (standard)                |                            |

- 1 Design temperature: -45/65 deg. C; Design Pressure: 20 Kg/cm2; Density: 13.736 Kg/m3.
- 2 M.W. - 28.44; Compressibility(Z) - 0.91; Sp. Heat Ratio(Cp/Cv) - 1.311
- 3 The valve shall have extended bonnet as per BS-6364 (Non cold box application).
- 4 Cryogenic testing requirements as specified in SIV shall be complied.
- 5 Vendor should provide type test certificate with the offer.

## Specifications for Control Valve 115-FV-1405

## Annexure-B9

|                    |    |                                      |                 |        |            |                                |                  |
|--------------------|----|--------------------------------------|-----------------|--------|------------|--------------------------------|------------------|
| GENERAL            | 1  | Tag No                               |                 |        |            | 115-FV-1405                    |                  |
|                    | 2  | Service                              |                 |        |            | MP1 STEAM                      |                  |
|                    | 3  | Area Classification                  |                 |        |            | IEC Zone-2, Gr IIA/IIB, T3     |                  |
|                    | 4  | Ambient Temperature                  | Min             | Max    | 1°C        | 39.8°C                         |                  |
|                    | 5  | Allowable Sound Pressure Level       | DbA             |        | 85         |                                |                  |
|                    | 6  | Control Action On-Off(OR) Modulating |                 |        |            | Modulating                     |                  |
|                    | 7  | Available Air Supply Pressure        | Min             | Max    | 5 kgf/cm2g | 10.5 kgf/cm2g                  |                  |
|                    | 8  | Failure Position                     |                 |        |            | Close                          |                  |
| PIPE LINE          | 9  | Line Size and Schedule               | Inlet           | Outlet | 3 in STD   |                                |                  |
|                    | 10 | Inlet Line ID                        |                 |        |            | 77.9 mm                        |                  |
|                    | 11 | Outlet Line ID                       |                 |        |            | 77.9 mm                        |                  |
| PROCESS CONDITIONS | 12 | Process Fluid                        | Fluid State     |        |            | STEAM                          | STEAM            |
|                    | 13 | Differential Pressure- Shutoff       |                 |        |            | 21 kgf/cm2                     |                  |
|                    |    |                                      |                 |        | Units      | @Max. Flow                     |                  |
|                    | 14 | Flow Rate                            |                 |        |            |                                | 1700             |
|                    | 15 | Inlet Pressure                       |                 |        |            | kgf/cm2-g                      | 15               |
|                    | 16 | Pressure Drop                        |                 |        |            | kgf/cm2                        | 0.7              |
|                    | 17 | Inlet Temperature                    |                 |        |            | °C                             | 290              |
|                    | 18 | Inlet Viscosity                      |                 |        |            | Cp                             | 0.958            |
|                    | 19 | Inlet Vapour Pressure                |                 |        |            | kgf/cm2-a                      |                  |
|                    | 20 | Critical Pressure                    |                 |        |            | kgf/cm2-a                      |                  |
| CALCULATED RESULTS | 21 | Flow Coefficient Cv                  | Max             | Nor    | Min        |                                | 30.7             |
| BODY AND TRIM      | 22 | Body Type                            |                 |        |            | Single Seat Globe              |                  |
|                    | 23 | Body Size                            |                 |        |            | 2 in                           |                  |
|                    |    |                                      |                 |        |            | data to be furnished by vendor | Equal Percentage |
|                    | 24 | Rated Cv                             | Characteristics |        |            |                                |                  |
|                    | 25 | End Connection & Rating              |                 |        |            | 2" 300#                        |                  |
|                    | 26 | Facing Finish                        |                 |        |            | RF 125 AARH                    |                  |
|                    | 27 | Body, Bonnet Material                |                 |        |            | ASTM A 216 GR.WCB or better    |                  |
|                    | 28 | Packing Material                     |                 |        |            | Grafoil                        |                  |
|                    | 29 | Trim Type                            |                 |        |            | Single Seat                    |                  |
|                    | 30 | Rated Travel                         |                 |        |            | Mfr. Std.                      |                  |
|                    | 31 | Type of Bonnet                       |                 |        |            | Radiation Finned               |                  |
| ACTUATOR           | 32 | Type                                 |                 |        |            | Pneumatic Spring Diaphragm     |                  |
|                    | 33 | Hand Wheel Location                  |                 |        |            |                                |                  |
|                    | 34 | Spring Action                        |                 |        |            | Close                          |                  |
| POSITIONER         | 35 | Signal                               |                 |        |            | 4-20mA HART                    |                  |
|                    | 36 | Type                                 |                 |        |            | Smart Positioner               |                  |
|                    | 37 | Gauges                               |                 |        |            | Reqd. 2 nos                    |                  |
| SOLENOID VALVE     | 38 | Type                                 |                 |        |            | 3-Way Universal                |                  |
|                    | 39 | When De-Energise Valve               |                 |        |            | Close                          |                  |
|                    | 40 | Tag No                               |                 |        |            | 115-FY-1405                    |                  |
| SWITCHES           | 41 | Type                                 | Quantity        |        |            | Proximity                      | 1                |
|                    | 42 | Contact/Rating                       |                 |        |            | 24V DC                         |                  |
|                    | 43 | Switching Position                   |                 |        |            | Full Open                      |                  |
|                    | 44 | Tag No                               |                 |        |            | 115-FZLC-1405                  |                  |
| AIR SET            | 45 | Set Pressure                         |                 |        |            | Vendor to furnish              |                  |
| TIGHTNESS          | 46 | Leakage Class                        |                 |        |            | ANSI V                         |                  |

- 1 Design temperature: 330 deg. C; Design Pressure: 21.0/FV Kg/cm2; Density: 6.329 Kg/m3.
- 2 IBR requirements as specified in SIV shall be complied.
- 3 Vendor should provide type test certificate with the offer.

## Specifications for Control Valve 113-FV-6233

## Annexure-B10

|                    |          |                                      |                 |        |            |                                |                            |
|--------------------|----------|--------------------------------------|-----------------|--------|------------|--------------------------------|----------------------------|
| GENERAL            | 1        | Tag No                               |                 |        |            | 113-FV-6233                    |                            |
|                    | 2        | Service                              |                 |        |            | DEMETHANIZER FEED 4 TO EP-321X |                            |
|                    | 3        | Area Classification                  |                 |        |            | IEC Zone-2, Gr IIC, T3         |                            |
|                    | 4        | Ambient Temperature                  | Min             | Max    | 1°C        | 39.8°C                         |                            |
|                    | 5        | Allowable Sound Pressure Level       | DbA             |        | 85         |                                |                            |
|                    | 6        | Control Action On-Off(OR) Modulating |                 |        |            | Modulating                     |                            |
|                    | 7        | Available Air Supply Pressure        | Min             | Max    | 5 kgf/cm2g | 10.5 kgf/cm2g                  |                            |
|                    | 8        | Failure Position                     |                 |        |            | Close                          |                            |
| PIPE LINE          | 9        | Line Size and Schedule               | Inlet           | Outlet | 3 in 10S   |                                |                            |
|                    | 10       | Inlet Line ID                        |                 |        |            | 161.5 mm                       |                            |
|                    | 11       | Outlet Line ID                       |                 |        |            | 161.5 mm                       |                            |
| PROCESS CONDITIONS | 12       | Process Fluid                        | Fluid State     |        |            | DEMETHANIZER FEED 4 TO EP-321X | LIQUID                     |
|                    | 13       | Differential Pressure- Shutoff       |                 |        |            | 39.4 kgf/cm2                   |                            |
|                    |          |                                      |                 |        |            | Units                          | @Max. Flow                 |
|                    | 14       | Flow Rate                            |                 |        |            | Am3/h                          | 86                         |
|                    | 15       | Inlet Pressure                       |                 |        |            | kgf/cm2-g                      | 32.27                      |
|                    | 16       | Pressure Drop                        |                 |        |            | kgf/cm2                        | 24.16                      |
|                    | 17       | Inlet Temperature                    |                 |        |            | °C                             | -76.4                      |
|                    | 18       | Inlet Viscosity                      |                 |        |            | Cp                             | 0.121                      |
|                    | 19       | Inlet Vapour Pressure                |                 |        |            | kgf/cm2-a                      | 33.1                       |
|                    | 20       | Critical Pressure                    |                 |        |            | kgf/cm2-a                      | 48.88                      |
| CALCULATED RESULTS | 21       | Flow Coefficient Cv                  | Max             | Nor    | Min        |                                | 28.2                       |
| BODY AND TRIM      | 22       | Body Type                            |                 |        |            | Single Seat Globe              |                            |
|                    | 23       | Body Size                            |                 |        |            | 3 in                           |                            |
|                    | 24       | Rated Cv                             | Characteristics |        |            | data to be furnished by vendor | Equal Percentage           |
|                    | 25       | End Connection & Rating              |                 |        |            | 3" 300#                        |                            |
|                    | 26       | Facing Finish                        |                 |        |            | RF 125 AARH                    |                            |
|                    | 27       | Body, Bonnet Material                |                 |        |            | ASTM A 351 GR.CF8 or better    |                            |
|                    | 28       | Packing Material                     |                 |        |            | Grafoil                        |                            |
|                    | 29       | Trim Type                            |                 |        |            | Single Seat                    |                            |
|                    | 30       | Rated Travel                         |                 |        |            | Mfr. Std.                      |                            |
|                    | 31       | Type of Bonnet                       |                 |        |            | Extended                       |                            |
|                    | ACTUATOR | 32                                   | Type            |        |            |                                | Pneumatic Spring Diaphragm |
| 33                 |          | Hand Wheel Location                  |                 |        |            |                                |                            |
| 34                 |          | Spring Action                        |                 |        |            | Close                          |                            |
| POSITIONER         | 35       | Signal                               |                 |        |            | 4-20mA HART                    |                            |
|                    | 36       | Type                                 |                 |        |            | Smart Positioner               |                            |
|                    | 37       | Gauges                               |                 |        |            | Reqd. 2 nos                    |                            |
| AIR SET            | 40       | Set Pressure                         |                 |        |            | Vendor to furnish              |                            |
| TIGHTNESS          | 41       | Leakage Class                        |                 |        |            | ANSI IV (Standard)             |                            |

- 1 Design temperature: -180 deg. C; Design Pressure: 39.4 Kg/cm2; Density: 533.774 Kg/m3.
- 2 The valve shall have extended bonnet as per BS-6364 (Non cold box application).
- 3 Cryogenic test requirements as specified in SIV shall be complied.
- 4 Service is flashing.
- 5 Vendor should provide type test certificate with the offer.

## Specifications for Control Valve 113-FV-6234

## Annexure-B11

|                    |    |                                      |                 |        |            |                                |                  |
|--------------------|----|--------------------------------------|-----------------|--------|------------|--------------------------------|------------------|
| GENERAL            | 1  | Tag No                               |                 |        |            | 113-FV-6234                    |                  |
|                    | 2  | Service                              |                 |        |            | DEMETHANIZER FEED 4 TO EP-321X |                  |
|                    | 3  | Area Classification                  |                 |        |            | IEC Zone-2, Gr IIC, T3         |                  |
|                    | 4  | Ambient Temperature                  | Min             | Max    | 1°C        | 39.8°C                         |                  |
|                    | 5  | Allowable Sound Pressure Level       | Db              |        | 85         |                                |                  |
|                    | 6  | Control Action On-Off(OR) Modulating |                 |        |            | Modulating                     |                  |
|                    | 7  | Available Air Supply Pressure        | Min             | Max    | 5 kgf/cm2g | 10.5 kgf/cm2g                  |                  |
|                    | 8  | Failure Position                     |                 |        |            | Close                          |                  |
| PIPE LINE          | 9  | Line Size and Schedule               | Inlet           | Outlet | 4 in 10S   |                                |                  |
|                    | 10 | Inlet Line ID                        |                 |        |            | 108.2 mm                       |                  |
|                    | 11 | Outlet Line ID                       |                 |        |            | 108.2 mm                       |                  |
| PROCESS CONDITIONS | 12 | Process Fluid                        | Fluid State     |        |            | DEMETHANIZER FEED 4 TO EP-321X | LIQUID           |
|                    | 13 | Differential Pressure- Shutoff       |                 |        |            | 39.4 kgf/cm2                   |                  |
|                    |    |                                      |                 |        |            | Units                          | @Max. Flow       |
|                    | 14 | Flow Rate                            |                 |        |            | Am3/h                          | 37               |
|                    | 15 | Inlet Pressure                       |                 |        |            | kgf/cm2-g                      | 32.13            |
|                    | 16 | Pressure Drop                        |                 |        |            | kgf/cm2                        | 23.82            |
|                    | 17 | Inlet Temperature                    |                 |        |            | °C                             | -76.4            |
|                    | 18 | Inlet Viscosity                      |                 |        |            | Cp                             | 0.121            |
|                    | 19 | Inlet Vapour Pressure                |                 |        |            | kgf/cm2-a                      | 33.1             |
|                    | 20 | Critical Pressure                    |                 |        |            | kgf/cm2-a                      | 48.88            |
| CALCULATED RESULTS | 21 | Flow Coefficient Cv                  | Max             | Nor    | Min        |                                | 12.3             |
| BODY AND TRIM      | 22 | Body Type                            |                 |        |            | Single Seat Globe              |                  |
|                    | 23 | Body Size                            |                 |        |            | 2 in                           |                  |
|                    | 24 | Rated Cv                             | Characteristics |        |            | data to be furnished by vendor | Equal Percentage |
|                    | 25 | End Connection & Rating              |                 |        |            | 2" 300#                        |                  |
|                    | 26 | Facing Finish                        |                 |        |            | RF 125 AARH                    |                  |
|                    | 27 | Body, Bonnet Material                |                 |        |            | ASTM A 351 GR.CF8 or better    |                  |
|                    | 28 | Packing Material                     |                 |        |            | Grafoil                        |                  |
|                    | 29 | Trim Type                            |                 |        |            | Single Seat                    |                  |
|                    | 30 | Rated Travel                         |                 |        |            | Mfr. Std.                      |                  |
|                    | 31 | Type of Bonnet                       |                 |        |            | Extended                       |                  |
| ACTUATOR           | 32 | Type                                 |                 |        |            | Pneumatic Spring Diaphragm     |                  |
|                    | 33 | Hand Wheel Location                  |                 |        |            |                                |                  |
|                    | 34 | Spring Action                        |                 |        |            | Close                          |                  |
| POSITIONER         | 35 | Signal                               |                 |        |            | 4-20mA HART                    |                  |
|                    | 36 | Type                                 |                 |        |            | Smart Positioner               |                  |
|                    | 37 | Gauges                               |                 |        |            | Reqd. 2 nos                    |                  |
| AIR SET            | 38 | Set Pressure                         |                 |        |            | Vendor to furnish              |                  |
| TIGHTNESS          | 39 | Leakage Class                        |                 |        |            | ANSI IV (Standard)             |                  |

- 1 Design temperature: -180 deg. C; Design Pressure: 39.4 Kg/cm2; Density: 533.748 Kg/m3.
- 2 The valve shall have extended bonnet as per BS-6364 (Non cold box application).
- 3 Cryogenic test requirements as specified in SIV shall be complied.
- 4 Service is flashing.
- 5 Vendor should provide type test certificate with the offer.

## Specifications for Control Valve 113-TV-6233

## Annexure-B12

|                    |    |                                      |                 |        |            |                                |                  |
|--------------------|----|--------------------------------------|-----------------|--------|------------|--------------------------------|------------------|
| GENERAL            | 1  | Tag No                               |                 |        |            | 113-TV-6233                    |                  |
|                    | 2  | Service                              |                 |        |            | LIGHT TR FROM VV-507           |                  |
|                    | 3  | Area Classification                  |                 |        |            | IEC Zone-2, Gr IIC, T3         |                  |
|                    | 4  | Ambient Temperature                  | Min             | Max    | 1°C        | 39.8°C                         |                  |
|                    | 5  | Allowable Sound Pressure Level       | DbA             |        | 85         |                                |                  |
|                    | 6  | Control Action On-Off(OR) Modulating |                 |        |            | Modulating                     |                  |
|                    | 7  | Available Air Supply Pressure        | Min             | Max    | 5 kgf/cm2g | 10.5 kgf/cm2g                  |                  |
|                    | 8  | Failure Position                     |                 |        |            | Close                          |                  |
| PIPE LINE          | 9  | Line Size and Schedule               | Inlet           | Outlet | 4 in 10S   |                                |                  |
|                    | 10 | Inlet Line ID                        |                 |        |            | 108.2 mm                       |                  |
|                    | 11 | Outlet Line ID                       |                 |        |            | 108.2 mm                       |                  |
| PROCESS CONDITIONS | 12 | Process Fluid                        | Fluid State     |        |            | LIGHT TR FROM VV-507           | LIQUID           |
|                    | 13 | Differential Pressure- Shutoff       |                 |        |            | 30 kgf/cm2                     |                  |
|                    |    |                                      |                 |        |            | Units                          | @Max. Flow       |
|                    | 14 | Flow Rate                            |                 |        |            | Am3/h                          | 27               |
|                    | 15 | Inlet Pressure                       |                 |        |            | kgf/cm2-g                      | 24.51            |
|                    | 16 | Pressure Drop                        |                 |        |            | kgf/cm2                        | 23.33            |
|                    | 17 | Inlet Temperature                    |                 |        |            | °C                             | -72              |
|                    | 18 | Inlet Viscosity                      |                 |        |            | Cp                             | 0.143            |
|                    | 19 | Inlet Vapour Pressure                |                 |        |            | kgf/cm2-a                      | 24.19            |
|                    | 20 | Critical Pressure                    |                 |        |            | kgf/cm2-a                      | 47.12            |
| CALCULATED RESULTS | 21 | Flow Coefficient Cv                  | Max             | Nor    | Min        |                                | 10.3             |
| BODY AND TRIM      | 22 | Body Type                            |                 |        |            | Single Seat Globe              |                  |
|                    | 23 | Body Size                            |                 |        |            | 2 in                           |                  |
|                    | 24 | Rated Cv                             | Characteristics |        |            | data to be furnished by vendor | Equal Percentage |
|                    | 25 | End Connection & Rating              |                 |        |            | 2" 300#                        |                  |
|                    | 26 | Facing Finish                        |                 |        |            | RF 125 AARH                    |                  |
|                    | 27 | Body, Bonnet Material                |                 |        |            | ASTM A 351 GR.CF8 or better    |                  |
|                    | 28 | Packing Material                     |                 |        |            | Grafoil                        |                  |
|                    | 29 | Trim Type                            |                 |        |            | Single Seat                    |                  |
|                    | 30 | Rated Travel                         |                 |        |            | Mfr. Std.                      |                  |
|                    | 31 | Type of Bonnet                       |                 |        |            | Extended                       |                  |
| ACTUATOR           | 32 | Type                                 |                 |        |            | Pneumatic Spring Diaphragm     |                  |
|                    | 33 | Hand Wheel Location                  |                 |        |            |                                |                  |
|                    | 34 | Spring Action                        |                 |        |            | Close                          |                  |
| POSITIONER         | 35 | Signal                               |                 |        |            | FF                             |                  |
|                    | 36 | Type                                 |                 |        |            | Fieldbus Positioner            |                  |
|                    | 37 | Gauges                               |                 |        |            | Reqd. 2 nos                    |                  |
| AIR SET            | 38 | Set Pressure                         |                 |        |            | Vendor to furnish              |                  |
| TIGHTNESS          | 39 | Leakage Class                        |                 |        |            | ANSI IV (Standard)             |                  |

- 1 Design temperature: -75 deg. C; Design Pressure: 30 Kg/cm2; Density: 568.599 Kg/m3.
- 2 The valve shall have extended bonnet as per BS-6364 (Non cold box application).
- 3 Cryogenic test requirements as specified in SIV shall be complied.
- 4 Service is flashing.
- 5 Vendor should provide type test certificate with the offer.

## Specifications for Control Valve 118-PV-2405A

## Annexure-B13

|                    |          |                                      |                 |        |              |                                                                            |                  |
|--------------------|----------|--------------------------------------|-----------------|--------|--------------|----------------------------------------------------------------------------|------------------|
| GENERAL            | 1        | Tag No                               |                 |        |              | 118-PV-2405A                                                               |                  |
|                    | 2        | Service                              |                 |        |              | HP NITROGEN FROM 118-VV-160                                                |                  |
|                    | 3        | Area Classification                  |                 |        |              | IEC Zone-1, Gr IIA/IIB, T3                                                 |                  |
|                    | 4        | Ambient Temperature                  | Min             | Max    |              |                                                                            |                  |
|                    | 5        | Allowable Sound Pressure Level       | Db              |        | 85           |                                                                            |                  |
|                    | 6        | Control Action On-Off(OR) Modulating |                 |        |              | Modulating                                                                 |                  |
|                    | 7        | Available Air Supply Pressure        | Min             | Max    | 5 kgf/cm2g   | 10.5 kgf/cm2g                                                              |                  |
|                    | 8        | Failure Position                     |                 |        |              | Open                                                                       |                  |
| PIPE LINE          | 9        | Line Size and Schedule               | Inlet           | Outlet | 1 1/2 in 160 |                                                                            |                  |
|                    | 10       | Inlet Line ID                        |                 |        |              | 1.383 in                                                                   |                  |
|                    | 11       | Outlet Line ID                       |                 |        |              | 1.383 in                                                                   |                  |
| PROCESS CONDITIONS | 12       | Process Fluid                        | Fluid State     |        |              | NITROGEN                                                                   | GAS/VAPOUR       |
|                    | 13       | Differential Pressure- Shutoff       |                 |        |              | 165 kgf/cm2                                                                |                  |
|                    |          |                                      |                 |        |              | Units                                                                      | @Max. Flow       |
|                    | 14       | Flow Rate                            |                 |        |              |                                                                            | 80               |
|                    | 15       | Inlet Pressure                       |                 |        |              | kgf/cm2-a                                                                  | 81               |
|                    | 16       | Pressure Drop                        |                 |        |              | kgf/cm2                                                                    | 35               |
|                    | 17       | Inlet Temperature                    |                 |        |              | °C                                                                         | 50               |
|                    | 18       | Inlet Viscosity                      |                 |        |              | Cp                                                                         |                  |
|                    | 19       | Inlet Vapour Pressure                |                 |        |              | Pa-a                                                                       |                  |
|                    | 20       | Critical Pressure                    |                 |        |              | bar-g                                                                      |                  |
| CALCULATED RESULTS | 21       | Flow Coefficient Cv                  | Max             | Nor    | Min          |                                                                            | 0.0701           |
| BODY AND TRIM      | 22       | Body Type                            |                 |        |              | Single Seat Globe                                                          |                  |
|                    | 23       | Body Size                            |                 |        |              | 1 in                                                                       |                  |
|                    | 24       | Rated Cv                             | Characteristics |        |              | data to be furnished by vendor                                             | Linear           |
|                    | 25       | End Connection & Rating              |                 |        |              | 1" BW, 1500#                                                               |                  |
|                    | 26       | Facing Finish                        |                 |        |              | Butt Weld                                                                  |                  |
|                    | 27       | Body, Bonnet Material                |                 |        |              | Body material : ASTM A217 Gr.WC6 or ASTM A182Gr.F11 CL2. Material shall be |                  |
|                    | 28       | Packing Material                     |                 |        |              | PTFE                                                                       |                  |
|                    | 29       | Trim Type                            |                 |        |              | Single Seat                                                                |                  |
|                    | 30       | Rated Travel                         |                 |        |              | Mfr. Std.                                                                  |                  |
|                    | 31       | Type of Bonnet                       |                 |        |              | Plain                                                                      |                  |
|                    | ACTUATOR | 32                                   | Type            |        |              |                                                                            | Pneumatic Piston |
| 33                 |          | Hand Wheel Location                  |                 |        |              | Side                                                                       |                  |
| 34                 |          | Spring Action                        |                 |        |              | Open                                                                       |                  |
| POSITIONER         | 35       | Signal                               |                 |        |              | 4-20mA HART                                                                |                  |
|                    | 36       | Type                                 |                 |        |              | Smart Positioner                                                           |                  |
|                    | 37       | Gauges                               |                 |        |              | Reqd. 2 nos                                                                |                  |
| AIR SET            | 38       | Set Pressure                         |                 |        |              | Vendor to furnish                                                          |                  |
| TIGHTNESS          | 39       | Leakage Class                        |                 |        |              | ANSI IV (Standard)                                                         |                  |

- 1 Design temperature: 65 deg. C; Design Pressure: 165 Kg/cm2.
- 2 Mol.Wt. : 28.01 Kg/Kmol; Sp. Heat Ratio: 1.4
- 3 Modified equal % trim characteristic is also acceptable.
- 4 Asbestos free gasket and stem packing shall be used.
- 5 Radiography shall be performed after heat treatment.
- 6 Vendor should provide type test certificate with the offer.