

1. WORK DESCRIPTION – CRYO WELDING FACILITY

Sl. No.	Work Description	Quantity	Unit
1	SS Butt welding: Size Ø 6 x 1mm	2000	No of Joints
2	SS Butt welding: Size Ø 8 x 1mm	3000	No of Joints
3	SS Butt welding: Size Ø 10 x 1mm	1000	No of Joints
4	SS Butt welding: Size Ø 12 x 1mm	1000	No of Joints
5	SS Butt welding: Size Ø 15 x 2mm	1000	No of Joints
6	SS Lap joint welding: Thickness 1 to 5mm	1300	Length (m)
7	SS corner fillet joint: Fillet size 1mm	1800	Length (m)
8	SS corner fillet joint: Fillet size 2mm	400	Length (m)
9	SS butt welding: Thickness 1 to 4mm	1000	Length (m)
10	Aluminium fillet joint: Fillet size upto 6mm	100	Length (m)
11	Retrieval of welded joints	500	Length (m)

2. Terms and conditions for Welding works (Sl.no 1 to 11):**2.1 Services provided by IPRC:**

- 2.1.1 Furnishing of job details
- 2.1.2 Provision of welding machine, accessories and consumables
- 2.1.3 Supply of electricity, water, components and interface elements
- 2.1.4 Weld parameters
- 2.1.5 Contractor has to strictly adhere to the weld parameters and equipment and other accessories provided by the focal point

2.2 Contractor's Scope:

- 2.2.1 Maintaining a panel of six welders fully qualified to carry out the weldments mentioned in the work contract
- 2.2.2 Deputing six welders from the panel on day to day basis at Cryo welding facility, CUSEI&W/CEAD/CSEG/EAIE, Mahendragiri.

2.3 Inspection:

The work shall be subjected to inspection by IPRC. The focal point of the facility, in which the work package is executed shall be at his discretion, perform inspection on his own or arrange for inspection. The scope of inspection shall be as follows

- 2.3.1 Witnessing of welder's performance qualification test to be performed by the contractor
- 2.3.2 Performance of fit-up check of the tacked assemblies

2.3.3 Carrying out NDT qualification

In the case of rejection of weld in radiographic test, it shall be the responsibility of the contractor to rectify the defect (or) re-execute the work without additional charges. Contractor has to strictly follow the rework weld parameters and procedures given by the focal point

2.4 Welding Procedure:

The contractor shall employ the welding procedure specified by IPRC

2.5 Welder performance qualification:

2.5.1 The welder employed by the contractor possesses a valid performance qualification certificate; the same shall be submitted to IPRC for review

2.5.2 Welder employed by the contractor with performance qualification certificate shall be put into work, after successful completion of performance qualification test in compliance with ASME section IX.

2.5.3 After receiving the order, the contractor has to produce necessary welders to create a panel of six welders. Based on the welder's performance qualification test results and clause 2.2.1, six welders will be selected for the contract by IPRC. If the test results in the batch are not satisfactory, contractor has to produce next batch of welders till the panel is created. If the contractor fails in producing the welders for creating a panel within three to four weeks, the contract will be summarily cancelled.

2.5.4 Welders those who are passing the performance qualification and meeting the conditions as per clause 2.5 will be selected for work. Rejection of any of the test weldments will disqualify the welder

2.5.5 Test coupon and radiographic test for the purpose of welder's performance qualification shall be arranged by IPRC.

2.5.6 The work executed by the contractors shall be so sound as to be qualified by 100% radiographic test, Dye penetrant test and MSLD helium leak test

2.5.7. After employing the welders in the welding activities at CUSEI&W/CEAD/CSEG/EAIE, Mahendragiri, if the rejection rate produced by the welder is exceeding 20% of the joints welded by the welder, then the welder will be disqualified. Contractor has to produce the qualified welder within a reasonable time period mutually accepted by the contractor and IPRC.

2.5.8 Finalization of welders shall be decided by IPRC based on

2.5.8.1 National Trade certificate on TIG welding

2.5.8.2 Performance qualification test certificates produced by the contractor

2.5.8.3 Welder's performance qualification test results

2.6 Description of Work:

2.6.1 Welding and NDT:

The scope of work for weld joints shall be inclusive of all operations associated with making of each joint including cleaning, marking-out, cutting, profiling, beveling, grinding, aligning, fitting-up, electrode grinding, application of heat ban paste, checking the temperature and final welding, together with final cleaning of welds. NDT will be done by IPRC. Electrodes and filler wires will be supplied by IPRC. Welding accessories viz. welding helmet, welding gloves, aprons etc will be provided by IPRC.

2.6.1.1 SS Butt welding and NDT (work items 1 to 5, 9):

The welding shall be carried out by GTAW/TIG with Argon (purity 99.9995%) purging both inside and outside the pipe. Equipments, accessories and consumables will be provided by IPRC for test and flight hardware. X-ray & DP testing will be done by IPRC

2.6.1.2 SS lap and corner welding and NDT (work items 6 to 8):

The welding shall be performed as mentioned in clause 2.6.1.1. DP test will be done by IPRC

2.6.1.3 Aluminium corner welding and NDT (work items 10):

Aluminium hardware has to be scrapped before welding. The welding shall be performed as mentioned in clause 2.6.1.2 in AC TIG process, DP test will be done by IPRC

2.6.1.4 Retrieval of welded joints (work item 11):

The work shall involve removing the weldments by grinding between the pipes, fittings, interface elements and flow components and retrieving fittings to re-usable state.

2.7 Any defects noticed in the weld joints shall be reworked and rectified at free of cost.

1. WORK DESCRIPTION – ELECTRON BEAM WELDING FACILITY

Sl. No.	Work Description	Quantity	Unit
1	HEICO(Beam generator calibration)	300	No of times
2	Beam Alignment	300	No of times
3	SW(Oscillation) Calibration	300	No of times
4	Cathode change	20	No of times
5	Mounting of the Hardware	300	No of times
6	Fitup checking of the hardware	300	No of times
7	Inspection and Cleaning of the hardware	300	No of times
8	EB welding of 15mm Butt joint Nickel alloy with backup	15	No of Joints
9	EB welding of 18mm Butt joint SS	15	No of Joints
10	EB welding of 3.5mm Butt joint Nickel alloy with backup	15	No of Joints
11	EB welding of 2mm Butt joint SS with backup	180	No of Joints
12	EB welding of 4mm Butt joint SS with backup	40	No of Joints
13	EB welding of 5mm Butt joint SS without backup	22	No of Joints
14	EB welding of 3mm Butt joint SS without backup	22	No of Joints
15	Weekly maintenance of the equipment	104	No of times
16	Monthly maintenance of the equipment	24	No of times
17	Yearly maintenance of the equipment	2	No of times
18	Cleaning of the chamber	208	No of times
19	Post weld preparation activities	300	No of times
20	DOP verification	300	No of times
21	Ultrasonic cleaning	300	No of times

2. Terms and conditions for Welding works (Sl.No 1 to 21):**2.1 Services provided by IPRC:**

2.1.1 Furnishing of job details

2.1.2 Provision of welding machine, accessories and consumables

2.1.3 Supply of electricity, water, components and interface elements

2.1.4 Weld parameters

2.1.5 Contractor has to strictly adhere to the weld parameters provided by the focal point

2.2 Contractor's Scope:

Deputing one operator and one assistant for the Electron Beam welding Operations at Cryo welding facility, IPRC.

2.3 Inspection:

The work shall be subjected to inspection by IPRC. The focal point of the facility, in which the work package is executed shall be at his discretion, perform inspection on his own or arrange for inspection. The scope of inspection shall be as follows

2.3.1 Supervision and overseeing of the works carried out by the operator

2.3.2 Verification of the fitup prepared by the operator.

2.3.3 Carrying out NDT qualification of the jobs welded by the operator

2.4 Welding Procedure:

The Operator shall employ the welding procedure specified by IPRC

2.5 Operator performance qualification:

2.5.1 The operator has to undergo Operator qualification test as per standard under the supervision of the focal point. Based on successful operator qualification as per the standards the operator shall be inducted for the regular activities.

2.5.2 Operator who is passing the Operator performance qualification test will be selected for work. Rejection of any of the test weldments will disqualify the Operator.

2.5.3 Test coupon and radiographic test for the purpose of Operator's performance qualification shall be arranged by IPRC.

2.5.4. Finalization of operator shall be decided by IPRC based on

2.5.4.1 Educational qualification certificates

2.5.4.2 Operators performance qualification test results

2.6 Description of Work:

2.6.1 HEICO(Beam Generator Calibration, work item 1)

The HEICO shall be performed as per the operation manual instructions and under the supervision of engineer in charge.

2.6.2 Beam Alignment(work item 2)

The Beam Alignment shall be performed as per the operation manual instructions and under the supervision of engineer in charge.

2.6.3 SW Calibration(work item 3)

The SW calibration shall be performed as per the operation manual instructions and under the supervision of engineer in charge

2.6.4 Cathode change(work item 4)

The cathode change shall be performed as per the operation manual instructions and under the supervision of engineer in charge

2.6.5 EB Welding of hardware(work item 5 to 14)

The cleaning and mounting shall be done as per the instructions of respective authority. Mounting of the hardware, fitup checkup shall be done by the operator and verified by the engineer in charge. Subsequent to this, the chamber shall be closed for evacuation and program shall be executed in test mode to verify the input process parameters and welding shall be performed.

2.6.6 Maintenance activities of the Electron Beam Welding Machine(work item 15 to 21)

The Weekly, monthly and yearly maintenance activities shall be carried out as per the manual instructions and under the supervision of the Engineer in charge. Post weld preparation activities, DOP verification and cleaning of the hardware will be carried out as per instructions of the checklists.

2.7 Any defects noticed in the weld joints shall be reworked and rectified at free of cost.