VOLUME - IA

Technical Conditions of Contract (TCC) for "Mechanical Tie-In, Contro Trace" Works

FOR

IOCL Paradip-Standby SRU (525TPD) Train project

BHARAT HEAVY ELECTRICALS LIMITED

	Technical Conditions Of Contract (TCC) **PROJECT ENGINEERING & SYSTEMS DIVISION** **HYDERABAD**	Ref No: HY/PE&SD/Projects/TCC/2020-21/Tie-In/01 Rev. No. 01

TECHNICAL CONDITIONS OF CONTRACT (TCC)

FOR

"MECHANICAL TIE-IN AND CONTRO TRACE" WORKS
FOR

IOCL PARADIP-STANDBY SRU (525TPD) TRAIN PROJECT

Revisions: Refer to record of revisions	Prepared By:	Checked By:	Approved By:	Date
				25.06.2021
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Volume IA
Part I
Contract specific details

Chapter I- Project Information

1. **Introduction:** Indian Oil Corporation Limited (IOCL), the owner/ customer is intending to install a Standby Sulphur Recovery Unit (SRU) train of 525 TPD along with Tail Gas Incinerator at Paradip Refinery, Odisha. IOCL has appointed Technip India Limited as Project Management Consultant (PMC) for the project. The work has been awarded to BHEL on LSTK basis.

2. Project Details

1	Customer	:	IOCL, Paradip, Odisha
2	Project Information	:	IOCL Paradip-Standby SRU (525TPD) Train project
3	Location	:	Paradip, Odisha
4	Address Detail	:	IOCL, Paradip, Jagatsinghpur District, Odisha, India
5	Nearest Railway Station	:	Paradip Railway Station
6	Road Approach	:	118KM from Bhubaneswar via Cuttack and NH 53
7	Nearest Air Port	:	Biju Patnaik Airport, Bhubaneswar, Odisha, 125KM
11	Ambient Air Temperature (Average)	:	a) Maximum : 39^0 C b) Minimum : 16^0 C
12	Average Relative Humidity	:	71 %
13	Climatic Condition	:	Tropical Climate

Bidder is advised to visit the project site and appraise himself about the local conditions and infrastructure available in the area for fulfilling their commitments under the contract. BHEL will not admit any claims whatsoever on account of Contractor's non-familiarization of local conditions.

Chapter II- Scope of Work

Scope: Customer shall provide plant shutdown April, 2022 tentatively, for carrying out various shutdown activities. Accordingly, Mechanical tie-in works in existing system and controtrace bolt on heating system is planned to be carried out in this period. Scope of work shall be read in conjunction with relevant documents as per chapter II, Vol IA, Part II.

1. The scope of work shall comprise but not limited to the following: (All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

(A) **Execution of Piping Tie-ins**: Creation of Piping branch off/ extension on the existing piping with a Valve.

(B) **Installation of ControTrace®** on existing Tail Gas lines in SRU Units 086, 087, 089 & 211.

Detailed scope of work shall be as per technical specifications.

2. General Scope of work shall comprise but not limited to the following:

1. The terminal points decided by BHEL are final and binding on the contractor for deciding the scope of work and effecting the payment for the work done up to the terminals.
2. Receipt of materials from BHEL Store and Transportation to Erection site, stacking, storage and preservation.
3. The scope of works also includes Erection and Commissioning of piping including pipes, valves, flanges, fittings, fasteners etc. as required, making the system complete in all respects.
4. Pre assembly, installation, testing and commissioning Trial operation of the erected equipment along with accessories.
5. Lifting, laying, bolt tensioning, bolt torque tightening, supporting and installation, pre and post weld heat treatment, inspection, non-destructive testing including radiography and hydro test, water/steam flushing, card board blasting, air drying, argon / nitrogen purging and other testing of piping installations, above and below ground.
6. Fabrication and installation, setting and commissioning of pipe supports, guides, anchors and spring supports as required.
7. Installation and Dismantling of temporary piping.
8. Any temporary piping to be carried out for commissioning of any equipment is within the quoted rates.
9. Installation of any necessary blind or additional valves to isolate lines to facilitate phased commissioning and start-up is covered under the scope within the quoted rates.
10. Execute all mechanical jobs identified during owner / Licensors check list, Technical audits, pre-commissioning and commissioning, including additional supports required to restrain pipe movement avoiding interference with nearby structural / piping.

11. Installation of all valves and other miscellaneous in line / on line items is also included. Open ends of piping valves shall be protected with wooden blanking plates securely fastened with wire or by plastic insert plugs.
12. Cleaning, pickling, if required, water / steam flushing, air drying disposal of fluids offsite, reinstatement, preservation of piping and miscellaneous items following hydro test, nitrogen purging, cleaning, chemical cleaning, painting, insulation, as per specifications is covered under the scope within the quoted rates.
13. Testing of welds/flanged joints.
14. Execute final painting and labelling including supply of paints, painting of all equipments, piping (including small-bore piping), and structures like platform, supports etc.
15. Preparation of As-Built Drawings.
16. The following materials that will go as a part of the permanent system of the plant will be supplied by BHEL at free of any charges:
    Pipes, valves, flanges, fittings, fasteners, insulation, controtrace material.
17. Steam Tracing on Tail Gas lines in existing SRU units 086, 087, 089 & 211 is to be replaced with ControTrace®, a proprietary Bolt-on Heating System from Control Southeast Inc., USA. Detailed scope of work shall be as per chapter I, Vol IA, Part II of TCC.
18. For the small-bore steam supply lines, structural supporting (Approx. 6MT) has to be done.
19. Contractor shall use scaffolding wherever required within the quoted rates. Scaffolding shall be properly designed and approved by BHEL/IOCL. For scaffolding details, please refer annxure-II of the TCC.
20. Being a shutdown period work, contractor shall be required to work 24/7 throughout (Or as and when required as per BHEL site In-charge instructions) the contract period.
21. Statutory approvals viz. IBR etc. shall be obtained by contractor.
22. Existing structure to be extended to facilitate approach/ Platforms for Tie-In pints.

Chapter III- Facilities in the scope of BHEL/Contractor

S. No.	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.1	**ESTABLISHMENT**			
3.1.1	**FOR CONSTRUCTION PURPOSE**:			
a	Open space for office (as per availability)	Yes		
b	Open space for storage (as per availability)		Yes	
c	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
d	Bidder's all office equipment, office / store / canteen consumables		Yes	
e	Canteen facilities for the bidder's staff, supervisors and engineers etc.		Yes	
f	Firefighting equipment like buckets, extinguishers etc.		Yes	
g	Fencing of storage area, office, canteen etc. of the bidder		Yes	
3.1.2	**FOR LIVING PURPOSES OF THE BIDDER**			
a	Open space for labor colony (as per availability)		Yes	
b	Labor Colony with internal roads, sanitation, complying with statutory requirements		Yes	
3.2.0	**ELECTRICITY**			

S. No.	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.2.1	Electricity For construction purposes		Yes	Electricity shall be provided by IOCL/ BHEL at one point on chargeable basis. Further distribution from IOCL/ BHEL feeder point shall be done by contractor. No separate payment for downstream power distribution shall be made. Contractor shall install a calibrated energy meter at feeder point for billing purpose.
3.2.2	Electricity for the office, stores, canteen etc. of the bidder		Yes	
3.2.3	Electricity for living accommodation of the bidder's staff, engineers, supervisors etc.		Yes	
3.3.0	**WATER SUPPLY**			
3.3.1	For construction purposes		Yes	Water shall be provided by IOCL at one point on chargeable basis. Further distribution shall be done by contractor.–Further distribution from IOCL supply point shall be done by contractor. No separate payment for downstream water distribution shall be made**.**
3.3.2	Water supply for bidder's office, stores, canteen etc.		Yes	
3.3.3	Water supply for Living Purpose		Yes	
3.4.0	**LIGHTING**			
a	For construction work (supply of all the necessary materials) 1. At office/storage area 2. At the preassembly area 3. At the construction site /area		Yes	

S. No.	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
b	For construction work (execution of the lighting work/ arrangements) 1. At office/storage area 2. At the preassembly area At the construction site /area		Yes	
c	Providing the necessary consumables like bulbs, switches, etc. during the course of project work		Yes	
d	Lighting for the living purposes of the bidder at the colony / quarters		Yes	
3.5.0	**COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER**			
a	Téléphone, fax, internet, intranet, e-mail etc.		Yes	
3.6.0	**COMPRESSED AIR wherever required for the work**		Yes	
3.7.0	**Demobilization of all the above facilities**		Yes	
3.8.0	**TRANSPORTATION**			
a	For site personnel of the bidder		Yes	
b	For bidder's equipment and consumables (T&P, Consumables etc.)		Yes	

3.9 Open Space:

Minimum Open space as made available by customer will be provided at free of charges to the contractor, for construction of temporary office shed, fabrication yard and storage area at the job site, contractor's stores shed(s). This is subjected to availability of space from customer. Non-availability of space due to any reason whatsoever shall not entitle the vendor for any claim against BHEL on account of cost and time implications.

BHEL shall not provide to the contractor any residential accommodation to any of his staff and the contractor has to make his own arrangements.

Contractor has to make his own arrangements for labour colony.

Location and area requirement for office / storage sheds / fabrication yard shall be discussed and mutually agreed to.

3.10 Construction power will be provided to the contractor at one points within plant area by BHEL on chargeable basis at the applicable rate of IOCL. Feeder Rates are as follows:

Cat No	Load Demand	Feeder Rating	Cost/ Month (Rs.)
1	Up to 32A	415V, 32A	25000
2	>32A to 63A	415V, 63A	50000
3	>63A to 125A	415V, 125A	100000
4	>125A to 250A	415V, 250A	200000

3.10.1 In the event of power requirement (and or availability of power) is for less than one month pro- rata cost will be arrived on the basis of above rates. The required digital Energy meter for measuring the consumption and MD shall be provided and installed by the contractor. Any dispute regarding consumption, the BHEL engineer's decision is final. The contractor shall make his own arrangement for further distribution (as required within plant boundary and outside plant boundary) with necessary isolator / LCB etc.

3.10.2 Provision of distribution of electrical power from the given points to the required places with proper distribution boards, approved cables and cable laying including supply of all materials like cables, switch boards, pipes etc., observing the safety rules laid down by electrical authority of the State/ BHEL / their customer with appropriate statutory requirements shall be the responsibility of the tenderer / contractor.

3.10.3 The required energy meter for measuring power consumption shall be arranged by the contractor and taken care by the contractor. Necessary "Capacitor Banks" to improve the Power factor to a minimum of 0.9 shall be provided by the contractor at his cost. Penalty if any levied by customer on this account will be recovered from contractor's bills.

3.10.4 Contractor has to make their own arrangements for electricity requirement for labour colony at their cost. Any duty, deposit involved in getting the Electricity for contractors use i.e. Office shed, labour colony etc. shall be borne by the bidder.

3.10.5 BHEL is not responsible for any loss or damage to the contractor's equipment as a result of variations in voltage / frequency or interruptions in power supply.

3.11 Construction Water: Subject to availability, Construction water shall be provided by IOCL on chargeable basis. The cost of water supply shall be recovered from CONTRACTOR'S running/ final account bill at 0.25%.

However, in case BHEL/ IOCL is not able to provide construction water due to any reason whatsoever, CONTRACTOR shall be responsible for making all arrangements for Construction water at his cost. Any statutory requirements/ documentation etc. to this effect shall be met by the CONTRACTOR.

Non-availability of water due to any reason shall not entitle the CONTRACTOR for any claim against BHEL on account of cost and time implications.

3.12 ONLINE SITE CONSTRUCTION MANAGEMENT SYSTEM (SCMS):

3.12.1 Two Nos of computers and printers (MFP) of latest configuration (preferably i5 processor, 8GB Ram, 1 TB Hard disk, with internet provision on all the computers), along with one data entry operator per computer to be arranged by contractor for reporting of daily progress, billing, updating details in online SCMS package of BHEL, etc., within the quoted rate.

3.13 CONSUMABLES: All electrodes including stainless steel electrodes required shall be arranged by the contractor at his cost. The Contractor shall use the BHEL / Customer approved quality electrodes only.

3.13.1 The contractor shall provide within finally accepted price / rates, all consumables like welding electrodes (including alloy steel and stainless steel), all gases (inert, welding, and cutting), soldering material, dye penetrants, radiography films. Other erection consumables such as wrap cloth, tapes, jointing compound, grease, lubricants, M-seal, Araldite, petrol, CTC / other cleaning agents, grinding and cutting wheels are to be provided by the contractor. Steel, H&S, packers, shims, wooden planks, scaffolding and pre-assembly materials, hardware items etc. required for temporary works such as supports, scaffoldings and bed are to be arranged by him. Sealing compounds, gaskets, gland packing, wooden sleepers, for temporary work, required for completion of work are to be arranged by him.

3.13.2 All consumables to be used for the job shall have to be approved by BHEL prior to use.

3.13.3 All the shims, gaskets and packing, which go finally as part of equipment, shall be supplied by BHEL free of cost.

3.13.4 In the event of failure of contractor to bring necessary and sufficient consumables, BHEL shall arrange for the same at the risk and cost of the contractor. The entire cost towards this along with standard BHEL overhead shall be deducted from the contractor's immediate due bills.

3.14 GASES:

3.14.1 All the required gases like Oxygen / Acetylene / Argon / Nitrogen required for work shall be supplied by the Contractor at his cost. It shall be the responsibility of the contractor to plan the activities and store sufficient quantity of these gases. Non-availability of gases shall not be considered as reason for not attaining the required progress.

3.14.2 BHEL reserves the right to reject the use of any gas in case required purity is not maintained.

3.14.3 The contractor shall submit weekly / fortnightly / monthly statement report regarding consumption of all consumables for cost analysis purposes.

3.14.4 The contractor shall ensure safekeeping of the inflammable cylinder at a separate place away from normal habit with proper security etc.

3.15 ELECTRODES SUPPLY AND STORAGE

3.15.1 It shall be the responsibility of the contractor to obtain prior approval of BHEL, before procurement, regarding suppliers, type of electrodes etc. On receipt of the electrodes at site, it shall be subject to inspection and approval by BHEL. The contractor shall inform BHEL details regarding type of electrodes, batch number and date of expiry etc. Test certificates for electrodes and other consumables should be submitted to BHEL Engineer as per requirement.

3.15.2 Shortage of any of the electrodes or the equivalent suggested by BHEL shall not be quoted as reason for deficiency in progress or for additional rate. Contractor shall submit weekly/ fortnightly/ monthly statement/ report regarding consumption and available stock of all types of electrodes for avoiding stoppage of work on consumable scarcity.

3.15.3 Storage of electrodes shall be done in an air conditioned / controlled humidity room as per requirement, at his own cost by the contractor.

3.15.4 All low hydrogen electrodes shall be baked / dried in the electrode-drying oven (range 375 deg. C - 425 deg. C) To the temperature and period specified by the BHEL Engineer before they are used in erection work and each welder should be provided with one portable electrode drying oven at the work spot. Electrode drying oven and portable drying ovens shall be provided by contractor at his cost.

3.15.5 In case of improper arrangement of procurement of above electrodes BHEL reserves the right to procure the same from any source and recover the cost from the contractor's first subsequent bills at market value plus departmental charges of BHEL communicated from time to time. Postponement of such recovery is not permitted.

3.15.6 BHEL reserves the right to reject the use of any electrodes at any stage, if found defective because of bad quality, improper storage, date of expiry, unapproved type of electrodes etc. It shall be the responsibility of the contractor to replace at his cost without loss of time.

3.16 POSSESSION OF GENERATORS

As there are bound to be interruptions in regular power supply, power cut/ load shedding in any construction sites, suitable extension of time, if found necessary only be given and contractor is not entitled for any compensation. It shall be the responsibility of the tenderer / contractor to provide, and maintain the complete installation on the load side of the supply with due regard to safety requirements at site. It shall be responsibility of the contractor to have at least one diesel operated welding generator sets to get urgent and important work to go on without interruptions. The consumables required to operate the generators are to be provided by tenderers. This may also be noted while quoting. No separate payment shall be made for this contingency.

13.17 LIGHTING FACILITY:

Adequate lighting facilities such as flood lamps, hand lamps and area lighting shall be arranged by the contractor at the site of construction, pre assembly yard and contractor’s material storage area etc. at his cost.

3.18 CONTRACTOR'S OBLIGATION ON COMPLETION

On completion of work, all the temporary buildings, structures, pipelines, cables etc. shall be dismantled and leveled and debris shall be removed as per instructions of BHEL by the contractor at his cost. In the event of his failure to do so, the expenditure towards clearance of the same will be recovered from the contractor. The decision of BHEL Engineer in this regard shall be final.

Sl. No	Description PART II 3.9.0 CONSTRUCTION FACILITIES	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.9.1	**Engineering works for construction:**			
a	Providing the construction drawings for all the works covered under this scope	**Yes**		Drawing schedule shall be finalized at the time of kick off meeting
b	Drawings for construction methods			NA
c	As-built drawings – where ever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes		Yes	In consultation with BHEL
d	Shipping lists etc. for reference and planning the activities		Yes	In consultation with BHEL
e	Preparation of construction (Concreting B/W, etc.) schedules and other input requirements		Yes	In consultation with BHEL
f	Review of performance and revision of site construction schedules in order to achieve the end dates and other commitments	Yes	Yes	In consultation with BHEL
g	Weekly construction schedules based on S. No. e. hard copy to Construction manager, by email to HO.		Yes	In consultation with BHEL
h	Daily construction / work plan based on S. No. g. hard copy to Construction manager, by email to HO.		Yes	In consultation with BHEL
i	Periodic visit of senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two Weeks.		Yes	
j	Arranging the materials required for Work		Yes	
k	Coordination for inspection & checking and getting clearance from customer		Yes	

Sl. No	Description PART II 3.9.0 CONSTRUCTION FACILITIES	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
1	Preparation of formats for completion of activities		Yes	
3.10	**Work Permits, gate pass etc. from customer for manpower, machinery and material**		Yes	
3.11	Ambulance Services for contractor's site staff: As and when required		Yes	

Chapter IV- Tools & plants to be deployed by Contractor

LIST OF TOOLS AND PLANT:

The following tools and equipment but not limited to, are required for the efficient execution of the works. The contractor shall make them available for construction purposes, including all consumables likely to be used at his own cost at the time of mobilization.

SL NO	ITEM	QUANTITY
1	Crane of required capacity for lifting of the material	AS REQUIRED
~~2~~	~~18 T Hydra/25 T Crawler Crane or above capacity as required~~	~~AS REQUIRED~~
3	HYDRA CRANE (12T/ 14T)	AS REQUIRED
4	TRACTOR-TRAILOR	-DO.
5	ELECTRICAL WINCH 2T/ 5T/ 10T	-DO.
6	HYDRAULIC TEST PUMP 0-16 KG/SQCM	-DO.
7	RESISTANCE HEATING MACHINES WITH ACCESSORIES	AS REQUIRED
8	WELDING GENERATOR, K-320	-DO.
9	WELDING TRANSFORMER (300/450 AMP)	-DO.
10	WELDING RECTIFIER	-DO.
11	INVERTER TYPE RECTIFIER	-DO.
12	HYDRAULIC PIPE BENDING MIC	AS REQUIRED
13	CHAIN PULLEY BLOCK 5T, 3T,	-DO.
14	PULL LIFT (6T, 5T, 3T, 1.5T)	-DO.
15	HYDRAULIC JACK (20T, 10T, 5T)	-DO.
16	SINGLE SHEAVE SNATCH PULLEY (10T, 5T)	-DO.
17	D SHAKLES (20T, 10T, 5T)	-DO.
18	TURN BUCKLES (3T, 5T, 8T, 10T, 15T)	-DO.
19	TIG WELDING SET	-DO.
20	OXYGEN REGULATOR	-DO.
21	ACETYLENE REGULATOR	-DO.
22	CUTOGEN 5	-DO.
23	OXYGEN HOSE 10 MM	-DO.
24	ACETYLENE HOSE 10 MM	-DO.

25	ELECTRODE DRYING OVEN	-DO.
26	PORTABLE ELECTRODE DRYING OVEN	-DO.
27	COPPER WELDING CABLE 600 AMP. 400 AMP	-DO.
28	ALUMINIUM CABLE 600 AMP, 400 AMP	-DO.
29	THERMAL-CHALK 100 DEG c TO 800 DEG C	-DO.
30	ELECTRODE BAKING OVEN	-DO.
31	THEODOLITE (1 SEC ACCURACY)	-DO.
32	SPIRIT LEVEL 12 INCH, 0.1 MM ACCURACY	-DO.
33	MAGNETIC PARTICLE TESTING M/C	-DO.
34	HARDNESS TESTER WC	-DO.
35	DRILLING M/C OF DIFFERENT SIZES	-DO.
36	GRINDING M/C OF DIFFERENT SIZES	-DO.
37	TRIP TORQUE WRENCH	-DO.
38	ALUMINUM TELESCOPIC LADDER	-DO.
39	MANILA ROPES OF DIFFERENT SIZES	-DO.
40	STEEL WIRE ROPES OF DIFFERENT SIZES	-DO.
41	DYE PENETRANT TEST KIT	-DO.
42	RECORDABLE UT MACHINE	As Required
43	PMI MACHINE	As Required
44	RT SOURCE WITH OPERATOR/ARRANGEMENT	As Required
45	NON CONTACT TEMPERATURE GAUGE	As Required
46	DEWATERING PUMP 5 HP	-DO.
47	AIR COMPRESSOR	As Required
48	DG SET (FOR WELDING IN AREAS IN CASE OF NON AVAILABILITY OF ELECTRCIAL POWER	As Required

Tools required for installation of controtrace panels (need to arrange by contractor):

- Wrenches - 5/8"-(x2) 3/4" 7/8"-(x2) 1-1/16" 1-1/8" 1-1/4".
- ¾" to 1½" Ton Come Along (Chain Lever).
- Hammer (Ball Pein and Sledge Hammer)
- Tin Snips
- Tape Measure, Level & Markers

LIST OF CONSUMABLES TO BE PROVIDED BY YOU WITHIN ACCEPTED RATES:

SI.NO.	Description	Quantity	Remarks
1	Gases like O2, CO2, Argon, DIA, LPG and Others as per requirement (FOR CONSTRUCTION PURPOSE AND NOT FOR COMMISSIONING USES	As required	Sufficient stock has been maintained.
2	Filler wire for both SS and others as required	As required	.--do--
~~3~~	~~Ordinary Portland Cement~~	~~As required~~	~~.--do--~~
~~4~~	~~Grouting materials/ Grouting cements~~	~~As required~~	~~.--do--~~
7	Lapping compound	.--do--	For valves servicing
9	Hydraulic oil	.--do--	For uses in different equipment and hydraulic jacks, pumps and Other applications
10	Paints for preservation, touch up painting, normal and final cum finish painting	.--do--	For painting
11	Different types of electrical lamps, tube lights , halogen lamps, sodium vapour lamps with fixtures	.--do--	As required
12	Electrodes / Filler wires as per requirement	.--do--	.--do--
13	Test pieces for welders test like plates, pipes etc.	.--do--	.--do--
14	Brazing Rods	.--do--	.--do--
15	Soldering consumables	.--do--	.--do--
16	Consumables for welding and NDTs	.--do--	.--do--
17	Thermal chalks Of different ranges	.--do--	.--do--
18	Consumables for Pre-heating, Stress Relieving, Post heating etc.	.--do--	.--do--
19	Consumables for arranging welders' qualifying works	.--do--	.--do--
20	Welders accessories	.--do--	.--do--

22	Services for effluent disposal	.--do--	.--do--
23	Rustling	.--do--	.--do--
~~24~~	-	~~. do .~~	~~. do .~~
25	CTC, Acetone as per requirement	.--do--	.--do--
26	Petrol	.--do--	.--do--
27	Diesel	.--do--	.--do--
30	Red Lead	.--do--	.--do--
31	Hemp Fibre	.--do--	.--do--
32	Asbestos Rope (Pure) 2,4,6,8,10, 12,25 mm and Other sizes as required	.--do--	.--do--
33	Insulation Adhesive Tape 20 mm Width and other sizes as per requirement	.--do--	.--do--
34	Emery Tape as per requirement	.--do--	.--do--
35	Hack-shaw of different sizes as per requirement	.--do--	.--do--
36	Emery Paper Gr. 60, 80, 100, 120. 150 , 220 and others as per requirement	.--do--	.--do--
37	Asbestos Cloth in Wax Paper IXI M —as required	.--do--	.--do--
38	PACKING BLACK PAPER IXI M	.--do--	.--do--
39	ADHESIVE TAPE 0.3 mm THICKNESS-as required	.--do--	.--do--
40	WHITE COTTON TAPE 12 mm WIDTH-as required	.--do--	.--do--
41	GRAPHITE POWDER FINE QUALITY - as required	.--do--	.--do--
42	GRAPHITE FLAKES as required	.--do--	.--do--
43	RAW LINESEED OIL as required	.--do--	.--do--
44	DOUBLE BOILED LINSEED OIL AS REQUIRED	.--do--	.--do--
45	CYLINDER OIL AS REQUIRED	.--do--	.--do--
46	ENAMEL PAINT (OF REQUIRED COLOUR) AS REQUIRED	.--do--	.--do--
47	MOBILE VELOCITE OIL 'S' AS REQUIRED	.--do--	.--do--

48	TURPENTINE OIL AS REQUIRED	.--do--	.--do--
49	TRICHLORO ETHYLENE AS REQUIRED	.--do--	.--do--
50	METHYLATED SPIRIT AS REQUIRED	.--do--	.--do--
51	MOBILOX GREASE 2 (IOC) AS REQUIRED	.--do--	.--do--
52	SERVOGEM -2,3 GREASE AS PER REQUIREMENT	.--do--	.--do--
53	OTHER SPECIAL GREASE AS PER REQUIREMENT	.--do--	.--do--
54	RUST BAN (ESSO) AS PER REQUIREMENT	.--do--	.--do--
55	MOLYKOTE PASTE AS PER REQUIREMENT	.--do--	.--do--
56	BIRKOSITE AS PER REQUIREMENT	.--do--	.--do--
57	WASHING SODA AND SOAP AS PER REQUIREMENT	.--do--	.--do--
58	COTTON WASTE AS PER REQUIREMENT	.--do--	.--do--
59	CLEAN RAGS AS PER REQUREMENT	.--do--	.--do--
60	WHITE CLOTH (CEARSE) AND USED CLOTHS AS REQUIRED	.--do--	.--do--
61	SACK CLOTH AS PER REQUIREMNT	.--do--	.--do--
62	JELLEY SOAP OR BAR SOAP AS PER REQUIREMENT	.--do--	.--do--
63	EMERY CLOTH 100 mm WIDTH ROLL GR. 60,	.--do--	.--do--
	100, 120, 150,220 AND OTHERS AS PER	.--do--	.--do--
	REQUIREMENT	.--do--	.--do--
64	SAND PAPERS GR. 60, 80 ,120 AND OTHER AS PER REQUIREMENT	.--do--	.--do--

65	EMERY PASTE (VALVE LAPPING COMPOUND) GR. 60, 80, 100 & 220 AND OTHERS AS PER REQUIREMENT.	.--do--	.--do--
66	GRINDING WHEELS, STONES OF DIFFERENT SIZES AS PER REQUIREMENT	.--do--	.--do--
67	WELDING ELECTRODES (CARBON STEEL, CS NACE, CS HIC+NACE, M.S., ALLOY STEEL AND FILLER WIRES, STAINLESS	.--do--	.--do--
	STEEL BOTH FERROUS AND NON FERROUS) EXCEPTING THOSE SUPPLIED BY BHEL AS	.--do--	.--do--
	PER RELEVANT ANNEXURE) AS PER	.--do--	.--do--
	REQUIREMENT	.--do--	.--do--
68	SOLDERING STICK (LEAD -TIN ALLOY) AS PER REQUIREMENT	.--do--	.--do--
69	SOLDERING WIRE (SILVER ALLOY) AS PER REQUREMENT	.--do--	.--do--
70	SOLDERING FLUX (SILVER ALLOY) AS PER REQUIREMENT	.--do--	.--do--
71	BRZING FLUX,'BORAX AS REQUIRED	.--do--	.--do--
72	SOLDERING FLUX (LEAD-TIN ALLOY) AS REQUIRED	.--do--	.--do--
73	MS GAS WELDING WIRE AS REQUIRED	.--do--	.--do--
74	DP TEST KIT WITH MAGNIFYING GLASS AS REQUIRED	.--do--	.--do--

75	IRON AND STEEL SECTIONS AS REQUIRED	.--do--	FOR ARRANGING SCAFFOLDING AND FIXTURES ETC.
76	MS BOLTS AND NUTS WITH TWO PLAIN WASHERS AND ONE SPRING WASHER AS REQUIRED.	.--do--	As required
77	MS ANGLES ASSORTED AS REQUIRED	.--do--	.--do--
78	MS CHANNELS ASSORTED AS REQUIRED	.--do--	.--do--
79	ROUNDS FLATS,MS PLATES ASSORTED AS REQUIRED	.--do--	.--do--
80	ENGINEERS BLUE / PRUSSIAN BLUE AS REQUIRED	.--do--	.--do--
81	CHALK PIECES-WHITE,COLOUR AND POWDER AS REQUIRED	.--do--	.--do--
82	TEINE AS REQUIRED	.--do--	.--do--
83	BATTERY CELLS 1.5 VOLTS TORCH LIGHT	.--do--	.--do--
	CELLS, PENCIL BATTERY ETC.AS REQUIRED	.--do--	.--do--
84	RED AND BLUE PENCILS AS REQUIRED	.--do--	.--do--
85	GALVANISED STEEL WIRE Imm DIA AND OTHER SIZES AS REQUIRED	.--do--	.--do--
86	FLANNEL CLOTH 1M WIDTH AS PER REQUIREMENT	.--do--	.--do--
87	SPLIT PINS 2mm TO 6 mm AND OTHER SIZES	.--do--	.--do--
88	WOOD SCREWS 3/4' TO 3 AS PER REQUIREMENT	.--do--	.--do--
89	LEAD SHEET 3 mm AND 4 mm THICKNESS AS PER REQUIREMENT	.--do--	.--do--

90	TARPAULINE3X3 M AND M AND M AND OTHER SIZES AS PER REQUIREMENT	.--do--	.--do--
91	VULCANISED RUBBER FIBRE 0.5 MXO.5 MX15 mm THICKNESS AS PER REQUIREMENT	.--do--	.--do--
92	PLYWOOD 1M X 2M X 3mm AND OTHER SIZES AS PER REQUIREMENT	.--do--	.--do--
93	NAILS-WIRE 1' TO 3'AS PER REQUIREMENT	.--do--	.--do--
94	CANDLES MEDIUM SIZE AS PER REQUIREMENT	.--do--	.--do--
95	PORTABLE SWITCH BOARD CONTAINING 15 AMPS TP METAL CLAD SWITCH WITH FUSE 3X15 AMPS, SWITCHES AND 3 PLUG SOCKETS AS PER REQUIREMENT	.--do--	.--do--
96	WOODEN PLANK PULLEYS AS REQUIRED	.--do--	.--do--
97	ANY OTHER WE-MS AS REQUIRED TO COMPLETE THE JOBS	.--do--	.--do--

BHEL will not provide any tool, plants, facilities or any testing facility/apparatus for the work. It will be contractor's responsibility to arrange all required tools, plants and other testing apparatus, etc. at their own cost. The prices quoted & finalized are inclusive of the charges towards providing such T&P. No extra payment will be entertained because of this.

However, subject to availability, BHEL may provide few T&P to the contractor for expediting and in larger interest of the project. In case any such facility is provided to the contractor, BHEL will make necessary recovery in the running account/final bills towards the hire charges. A departmental charge @ 5% will also be affected such cases. The decision of BHEL on the hire charges will be final and binding on contractor.

Chapter V- Time Schedule

5.1 TIME SCHEDULE

5.1.1
The entire work of "Mechanical Tie-in and Contro Trace" as detailed elsewhere in the Tender Specification shall be completed within **90 (Ninety) Days** from the date of commencement of work at site. Out of the 90 Days, only 30 Days shall be available for performing actual work, as customer has planned the plant shutdown for 1 months only.

5.1.2
During the total period of contract, the contractor has to carry out the activities in a phased manner as required by BHEL and the program of milestone events.

5.1.3
The work shall be commenced on the mutually agreed date between the bidder and BHEL engineer. The decision of BHEL in this regard shall be final and binding on the contractor. The scope of work under this contract is deemed to be completed only when so certified by the site Engineer.

5.2 COMMENCEMENT OF CONTRACT PERIOD

The date of commencement of contract period shall be the mutually agreed date between the bidder and BHEL engineer to start the work. In case of discrepancy, the decision of BHEL engineer will be final.

5.3 MOBILISATION

5.3.1
The activities for this work shall be started as per directions of Construction manager of BHEL.
5.3.2
The contractor should mobilize man power in order to complete the work in **90 (Ninety) Days.**
5.3.3
Requisite Material, men and machinery should be arranged in order to complete the project within stipulated time.
5.3.4
The contractor has to augment his resources in such a manner that following major milestones of the project are achieved on specified schedules:

In order to meet above schedule in general, and any other intermediate targets set, to meet project, contractor shall arrange & augment all necessary resources from time to time on the instructions of BHEL.

5.4 CONTRACT PERIOD

For the purpose of contract, the period shall be taken as **90 (Ninety) Days.** Completion of the work shall be as per BHEL Bar Charts revised from time to time. In order to expedite the work, the contractor has to deploy manpower as per site requirement without any extra cost to BHEL.

5.5 GUARANTEE PERIOD

The guarantee period of twelve months shall commence from the date of completion of all works as certified by the BHEL site engineer.

5.6 PROTECTION OF WORK

The contractor shall have total responsibility for protecting his works until it is taken over by the Employer. No claim will be entertained by the Employer or the representative of the Employer for any damage or loss to the Contractor's works and the Contractor shall be responsible for complete restoration of the damaged works to original conditions to comply with the specification and drawings. Should any such damage to the Contractor's Works occur because of other party not being under his supervision or control, the Contractor shall make his claim directly with the party concerned.

If disagreement, conflict, or dispute develops between the Contractor and the other party or parties concerned regarding the responsibility for damage to the Contractor's Works the same shall be rectified. The Contractor shall not cause any delay in the repair of such damaged Works because of any delay in the resolution of such disputes. The Contractor shall proceed to repair the Work immediately and no cause thereof will be assigned pending resolution of such disputes.

5.7 Establishment of Construction power supply arrangement shall be completed within 30 Days from the date of commencement of work.

5.7 Shutdown period:

1. Shutdown period is of 1 (One) months only. However, contract period for this work has been considered as **90 (Ninety) Days**, in order to plan and execute the activities, which can be done before the shutdown starts. Contractor shall plan the work accordingly.

1. In case, contractor is not able to complete the shutdown period scope of work within the shutdown period, contractor shall have to complete it during running plant condition at his risk and cost, by taking all precautionary and necessary required measures in line with IOCL approvals.

5.8 **Tentative schedule**

Sl No	Description	Duration
1	Pre-Shutdown Activities	45Days
2	Shutdown Activities	30Days
3	Post-Shutdown activities	15Days

5.8 Tentative L-1 Schedule for Shutdown activities

Sl No	Activity Description	Duration (Days)
A	**Mechanical Tie-In Works**	
1	**Shutdown activities**	**28**
1.1	Removal of insulation from existing pipelines for Tie-Ins	**5**
1.2	Cutting of pipeline/ Removal of blind flanges from existing line for Tie-In	**21**
1.3	Installation of Tie-In (Welding, bolting etc.)	**22**
1.4	Radiography of welded location	**21**
1.5	Cleaning, painting of completed Tie-In points	**12**
1.6	Re-Insulation of completed Tie-In points	**12**
1.7	Backfilling/ Concreting of excavated underground Tie-Ins	**2**
B	**Contro trace® Works**	
1	**Shutdown activities**	**29**
1.1	Removal and disposal of existing insulation and steam tracing pipeline	**15**
1.2	Installation of Contro Trace® panels	**18**
1.3	Installation of steam pipeline	**19**
1.4	Checking and commissioning of Contro Trace® panels	**2**
1.5	Re-Insulation works	**6**

Chapter VI- Statutory Regulation

6.1 BUILDING & OTHER CONSTRUCTION WORKERS (REGULATION OF EMPLOYMENT AND CONDITIONS OF SERVICE) ACT, 1996 (BOCW Act) AND RULES OF 1998 READ WITH BUILDING & OTHER CONSTRUCTION WORKERS CESS Act, 1996 & CESS RULES, 1998 and

INTER-STATE MIGRANT WORKMEN ACT, 1979 (IN CASE BIDDER ENGAGE MANPOWER FROM OTHER STATE)

In case any portion of work involves execution through building or construction workers and/or inter-state migrant workers, then compliance to the above titled Acts as applicable shall be ensured by the contractor and contractor shall obtain license and deposit the cess under the Act. In the circumstances, it may be ensured as under:-

It shall be the sole responsibility of the contractor in the capacity of employer to forthwith (within a period of 15 days from the award of work) apply for a license to the Competent Authority under the BOCW Act and/or ISMW Act as applicable and obtain proper certificate thereof by specifying the scope of its work. It shall also be responsibility of the contractor to furnish a copy of such certificate of license / permission to BHEL within a period of one month from the date of award of contract.

It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under these acts and rules including that of payment / deposit of cess as per the applicability under above referred Acts within a period of one month from the receipt of payment.

It shall be the responsibility of the sub-contractor to furnish the receipts / challans towards deposit of the cess together with the number, name and other details of beneficiaries (building/Inter-state Migrant workmen) engaged by the sub-contractor during the preceding month.

It shall be the absolute responsibility of the sub-contractor to make payment of all statutory payments & compensations to its workers including that is provided under the Workmen's Compensation Act, 1923.

Chapter VII: HSE (Health, Safety, Environment) and PPE (personal Protective Equipment) Guidelines

1. Contractor shall follow all the HSE guidelines as mentioned chapter IX off SCC and IOCL (Annexure-I).
2. Contractor shall deploy one (1) number of qualified and experienced safety officer for the entire period of contract.
3. Contractor shall submit the biodata of safety officer to BHEL/Customer (IOCL), for approval.
4. In case of any dispute/ contradiction, IOCL HSE rules and guidelines shall prevail.

Chapter VIII- Field quality control plan

1. Work shall be executed as per approved field quality control plan (FQCP). Indicative quality control plan of IOCL is attached as Annexure-XIII. Contractor shall prepare, submit the field quality control plan in line with IOCL QCP.

Submitted FQCP shall be reviewed and approved by BHEL/IOCL/ TECHNIP.

Chapter IX- Contro Trace® Works

1. Scope of work shall be as per approved drawings and technical specifications.
2. Contro trace® material supplier shall provide Erection & Commissioning supervision for this work.
3. Contractor shall provide all the tools & tackles required for successful completion of this work.
4. Contractor shall provide following manpower exclusively for successful completion of this work:
   i) Skilled manpower-Minimum 12 Nos
   ii) Unskilled manpower- Minimum 6 Nos
5. Material supplier shall train the manpower to execute the work successfully.
6. Contractor shall extend all the needed support to supplier's supervisory staff.
7. In case contractor fails to supply required manpower/ tools & tackles required for this work, BHEL reserves the right to deploy the same at risk and cost of contractor. Administrative cost shall also be applicable, over and above the procurement cost.

Chapter X- Pre-Shutdown Activities

Customer (IOCL) shall give plant shutdown for one (1) month only, in the month of April, 2022. Contractor shall have to carry out all the work in that period only. In order to achieve that, contractor shall deploy multiple gangs at parallel fronts simultaneously and work shall be done 24Hrs x 7Days (Round the clock). Contract period of this work has been kept as three (3) months to carry out all the pre shutdown activities in order to be ready for shutdown works.

Contractor shall mobilize minimum 1.5 Months (45Days) before the shutdown start (Or as per instructions of BHEL Construction manager) to carry out the pre shut down activities.

The list of pre shut down activities shall comprise but not limited to the following:

1. **Marking of Tie-In Points:** Contractor shall mark all the tie-in points on the existing pipelines as per approved drawings.
2. **Scaffolding:** Being a brown field refinery work, safety is of utmost importance in this work. Contractor shall install scaffoldings at required places during pre-shut down period to utilize the time efficiently. Contractor shall not remove and re-install the scaffoldings to use at multiple locations during shutdown period, as it will consume time. As completing works on time is essential for this contract, contractor shall install separate scaffoldings at required workplaces.
3. **Approvals:** As this is a brown field refinery work, it contains various approvals to be taken from customer, which will take time. Customer's approval according authorities shall be occupied one week before shut down starts. Therefore, It is essential for Contractor to obtain following (But not limited to) approvals during pre-shutdown period**:**
   - **i)** Labor License
   - **ii)** Gate passes of staff, labor, machines, materials etc.
   - **iii)** Safety Training of contractor's staff
   - **iv)** Work Permits
   - **v)** Other required approvals in consultation with BHEL/ IOCL
4. Contractor shall prepare piping spools, edge preparation, and structure fabrication (If any) during pre-shutdown period up to maximum extent possible, as per approved drawings and specifications.

Volume IA

Part-II

Technical Specifications: Mechanical Tie-In and controtrace Works

1.0 REFERENCE DOCUMENTS

(1) Piping Tie-in Drawing SRU-3, WHB & Incinerator Area (Unit - 088 & 090) South of Creek, Drg.No. 080557C-088-DW-0052-001_C
(2) O&U - Overall Roads, Paving & U/G Services Schematics, Drg. No. PDRP0275-8310-45-600-8029_S3 (Specifically for Tie-ins 088-TP-043/044)
(3) ControTrace® Technical Notes, Doc. No. 080557C-088-TEN-1300-001_A
(4) Piping Tie-in List
(5) Tie-in Piping BOQ
(6) Tie-in Valves BOQ
(7) Tie-in BOQ TP Wise Summary
(8) ControTrace® Line List
(9) Technical Specification for Bolt-on Heating System (ControTrace®), Doc. No. PY 52 735, Rev.00
(10) ControTrace® - Core Piping Isometrics and Gas

All the reference documents are attached with TCC as annexures.

2.0 SHUTDOWN ACTIVITIES

IOCL communicated that the shutdown is planned in April-2022.

The following are the activities to be carried out during the shutdown:
(A) Execution of Piping Tie-ins: *Creation of Piping branch off/ extension on the existing piping with a Valve.*
(B) Installation of ControTrace® on existing Tail Gas lines in SRU Units 086, 087, 089 & 211.

3.0 PIPING TIE-INS

3.1 Introduction

As per clause 3.20, of reference doc (1)

> 3.20 The CONTRACTOR's scope of work includes providing required piping tie-ins from existing headers within planned shutdown window provided by IOCL. If there is any difficulty in completing the tie-ins within the shutdown window, contractor shall consider hot tapping or any other latest methods. Shutdown duration / time schedule will be provided to successful bidder.

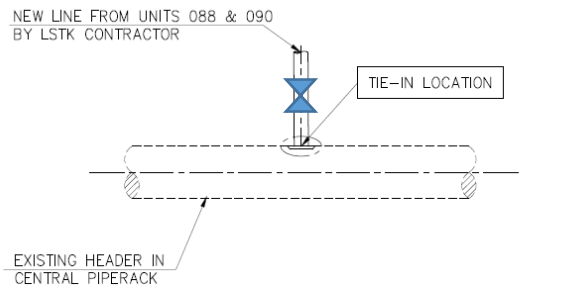
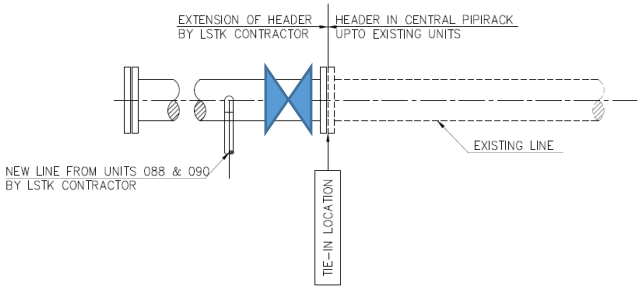
In order to avoid (practically infeasible) hot tapping solutions to create the Piping Tie-ins, it is proposed to complete the Piping Tie-ins in the planned shutdown.

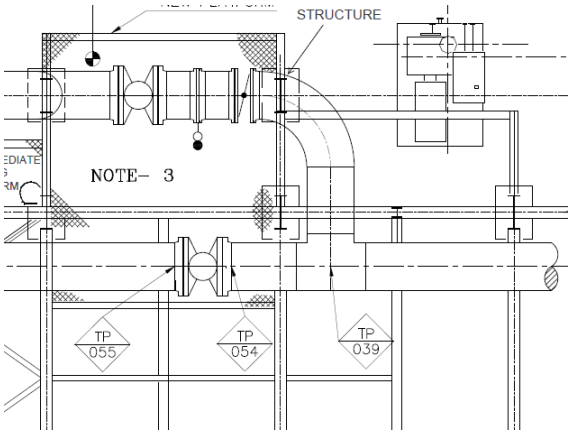
3.2 Scope of Work

- Piping Tie-ins (Hookup with existing Plant) along with the Valves shall be created as per the Contractual requirement, during the planned shutdown.
- There are a total 58 nos of Tie-ins + Optional 4 to 8 Tie-ins depending on the requirement.
- Necessary Piping Spools including Jacketed Piping Spools need to be fabricated and installed along with the Tie-in Valve, as per the detailed Piping Tie-in drgs (which shall be provided by Oct'21).
- Estimated Piping Tie-in BOQ is attached.

3.3 Types of Tie-ins

There are 3 types of Piping Tie-ins:

Type-I	**26 Nos** Create Piping Branch-off on Existing Pipe Header Sizes: 4" to 68" Branch Sizes: 2" to 24"	 TYPE-I CONNECTION (INDICATIVE LOCATION: BETWEEN GRIDS 407 & 408)
Type-II	**14 Nos** Extension of Existing Piping Header Sizes: 2" to 48"	 TYPE-II CONNECTION (INDICATIVE LOCATION: BETWEEN GRIDS 393 & 394)

Type-III	**18 Nos** Modification of Piping - Introduction of a new Valve / Tee in an existing Pipe Sizes: 3" to 48"	
Total	**58 Nos**	

In addition, 4 to 8 more Type-I Tie-ins (Optional) of 1.5" branch size may have to be executed, based on the requirement for ControTrace®.

3.4 Tie-in MOC

There are 5 types of Materials involved:

Material	Type-I	Type-II	Type-III	Total
Carbon Steel	**6 Nos** Header: 8" to 68" Branch: 3" to 8"	**7 Nos** 6" to 48"	**10 Nos** 3" to 48"	**23 Nos** 3" to 48"
Carbon Steel Galvanized	**6 Nos** Header: 4" to 6" Branch: 2" to 4"	-	-	**6 Nos** 2" to 4"
Carbon Steel NACE NACE+HIC	**3 Nos** Header: 10" to 42" Branch: 3" to 24"	**3 Nos** 4" to 36"	**8 Nos** 3" to 48"	**14 Nos** 3" to 48"
Carbon Steel IBR	**8 Nos** Header: 10" to 24" Branch: 3" to 10"	**4 Nos** 2" to 24"	**-**	**12 Nos** 2" to 24"
Stainless Steel	**3 Nos** Header: 10" to 14" Branch: 2" to 10"	**-**	**-**	**3 Nos** 2" to 10"

3.5 Tie-in Location & Elevation*

Material	Type-I	Type-II	Type-III
Central Pipe Rack Grid N 407-408 (Near New Unit 088)	**22 Nos** 110.0M to 120.0M	-	-
Central Pipe Rack Grid N 393-394 (Near Existing Unit 087)	-	**14 Nos** 112.0M to 120.0M	-
West Side of New Unit 088 (Underground)	**2 Nos**	-	-
Existing TGTU-1 (Unit 089)	-	-	**18 Nos** 103.0M to 124.0M
Yet to Decide	**2 Nos**	-	-

** Reference Grade Elevation : 100.0M*

3.6 Material Supply

The following material will be supplied:

A	Piping Bulk Items		
1	Pipes & Fittings	-	Pipe will not be supplied in prefabricated condition.
2	Flanges	-	Material will be supplied in loose condition in standard length. Pipe shall be cut to required length as per Isometric. Surface preparation shall be done at site by Tie-In contractor.
3	Gaskets		

4	Bolting Material	- Primer and Painting shall be applied at site by Tie-In contractor. - Apart from the standard piping spools, around 8 to 12 Jacketed Piping Spools need to be fabricated at site.
5	Gaskets	

B	Valves	- Valves shall be supplied in fully finished condition, duly painted
1	Conventional Gate Valves	
2	Gate Valves (Fully Jacketed)	
3	Ball Valves	
4	Triple Offset Butterfly Valves	
5	On/Off PO Triple Offset Butterfly Valves	
6	On/Off PO Rotary Plug Valves	
7	On/Off PO Ball Valves	

4.0 INSTALLATION OF CONTROTRACE®

4.1 Introduction

Steam Tracing on Tail Gas lines in existing SRU units 086, 087, 089 & 211 is to be replaced with ControTrace®, a proprietary Bolt-on Heating System from Control Southeast Inc., USA.

ControTrace®

- Is a fully engineered bolt-on heating system, for efficient Steam tracing of pipe lines
- Supplied as fully pre-fabricated bolt-on ControTrace® Panels complete with Steam supply connection and drain connection on either ends
- Bolt-on Panel is made up of individual ControTrace® elements (2" x 1" Rectangular sections) shaped to match the OD of the Pipe
- No welding is envisaged to the Parent pipe and also among the Panels
- Max length of any ControTrace® segment is 12m. Steam Jump overs between panels, from panels to jacketed valves, shall be with flexible hoses, to be supplied along with the package.
- Special Jackets shall be designed and supplied to be installed on the existing Valves

4.2 Scope of Work

- Removal and disposal of Existing Thermal Insulation including cladding etc. as per IOCL/ BHEL site engineer's instructions.
- Removal and disposal of Existing Steam Tracing piping as per IOCL/ BHEL site engineer's instructions.
- Removal of existing damaged piping as per IOCL/ BHEL site engineer's instructions. Installation of new piping in place of removed damaged piping.
- Installation of ControTrace® on existing pipeline.
- Steam supply piping connections from LP Steam Header to ControTrace® Panels
- Condensate drain connections from ControTrace® Panels to nearest condensate manifolds / Steam trap stations

- Installation of Steam Supply manifolds, Condensate manifolds and Steam Trap Stations, as applicable.
- Installation of Thermal Insulation

4.3 Scope & Location

- Details provided in the ControTrace® Line List

4.4 Material Supply By BHEL On Free Issue Basis For Erection By Contractor:

The following material will be supplied:

1	ControTrace® Package	Includes Bolt-on ControTrace® Panels formed from ControTrace® Elements, Heating Jackets for Valves and other inline components, Bolting Material, Flexible metal Jump over hoses for Steam connectivity, Heat Transfer Compound, Installation Hardware
2	Piping Package for LP Steam Piping	Valves, Steam Traps, Steam supply manifolds, Condensate manifolds for return condensate, Steam Trap stations, Pipes, Fittings, Flanges, Gaskets & Bolting
3	Thermal Insulation Package	Mattresses, Ancillaries and Aluminium Cladding

5.0 ADDITIONAL DATA

1	Existing Insulation	Existing Steam tracing and the Insulation on the existing lines where the controtracing has to be installed are to be removed and disposed of as per the direction of IOCL/ BHEL site Engineer. The Tonnage of the same is estimated as 40 Mt (This is inclusive of the existing mineral wool, Cladding, insulation auxiliaries).
2	Existing steam tracing data	The Existing Steam tracing lines Data is estimated as 30 M T .These are the small bore lines and Are banded on to the Main lines.
3	New Thermal Insulation Package	After the removal of the existing insulation , and Installation of the Controtracing package , New Thermal Insulation has to be installed and is estimated as 40 Mt (This is inclusive of the mineral wool , Cladding ,insulation auxiliaries) Bifurcation of quantities is as follows : a. Minwool : 15 MT b. Cladding and auxillaries :25 MT
4	Valve weight	The weight of the Tie-in valve weight is estimated as 40 MT
5	RADIOGRAPHY	1. 100 % Radiography is to be done for all the Tie-in activity. (i.e where all the Welding activity is involved for installation of tie-in valve). 2. Radiography shall be carried out during night time.
6	Inch dia	Total inch DIA total is 3700 (of which CS is 3471 & SS is 178). Total Inch meter: 5830 (of which CS is 5394 & SS is 437).
7	Pipe support fabrication	There is no major Pipe support fabrication involved. However for the small bore steam supply lines, supporting has to be done , same may be envisaged as around 6 MT.
8	Inch Meter (Erection of Controtrace)	Total Inch meter for the Erection of the contro trace in the existing Piping is 35,000.
9	Valve supply	Following Bronze valve to be supplied in loose condition as per VMS 513FE (Annexure-XVI) : 1. Size: 2" ; Qty : 2 No's; VMS : 513 FE 2. Size: 3" ; Qty : 3 No's; VMS : 513 FE 3. Size: 4" ; Qty : 1 No's; VMS : 513 FE Vendor's list : A. AV VALVES LIMITED B. H. SARKER & COMPANY C. LEADER VALVES LTD D. SANT VALVES PVT LTD

		E. ZOLOTO INDUSTRIES

Chapter II- List of Documents

Work shall be performed as per below listed documents, customer/ BHEL specifications, and approved drawings issued by BHEL:

Sl No	Description	Reference	Remarks
1	Plot Plan	Annexure-I	
2	HSE & PPE	Annexure-II	
3	Piping Tie-in Drawing SRU-3, WHB & Incinerator Area (Unit - 088 & 090) South of Creek, Drg. No. 080557C-088-DW-0052-001_C	Annexure-III	
4	O&U - Overall Roads, Paving & U/G Services Schematics, Drg. No. PDRP0275-8310-45-600-8029_S3 (Specifically for Tie-ins 088-TP-043/044)	Annexure-IV	
5	ControTrace® Technical Notes, Doc. No. 080557C-088-TEN-1300-001_A	Annexure-V	
6	Piping Tie-in List	Annexure-VI	
7	Tie-in Piping BOQ	Annexure-VII	
8	Tie-in Valves BOQ	Annexure-VIII	
9	Tie-in BOQ TP Wise Summary	Annexure-IX	
10	ControTrace® Line List	Annexure-X	
11	Controtrace brochure for Installation	Annexure-XI	
12	ControTrace® - Core Piping Isometrics and GAs	Annexure-XII	
13	Quality Control Plans for Piping Works	Annexure-XIII	
14	Job Specifications For Piping Works	Annexure-XIV	
15	Construction Specification for Piping Works	Annexure-XV	
16	Valve material specification 513FE	Annexure-XVI	
17	Tie-In Drawings	Annexure-XVII	