Annexure A: List of work in minor fabrication

Sr. No.	Description	Quantity
1	Dismantling of existing Transfer Device, tubing & fittings, Installation of ALP, Supply & Installation of tubing and tube fittings	1 No.
2	Supply, Installation, Configuration and Integration of Multiloop Controller	1 No.
3.	Testing of the final system for functionality	1 No.

Annexure A: Technical Specifications for the Modification of Vacuum Assisted ALP Test Set-up

1.0 Description of Existing System

The test set up is for testing performance and calibration of vacuum assisted air lift transfer between process tanks. The system has been installed and in is in operation at BARC, Trombay, Mumbai. The overall scheme of the system is provided in the Fig. 1 in the annexure. The important components of the test set-up are the following

1. SS cylindrical tanks – 3 nos.

   1 no. source tank and 2 nos. destination tanks

2. Air Lift transfer device – 3 nos.

3. Air Ejector for Vacuum generation – 1 no.

   Control Valve in compressed air supply line to control vacuum level. Rotameter to measure air flow rate, Absolute Pressure Transmitter to measure vacuum

4. Tank Level measurement by air-purge method – 3 nos.

   DP Transmitters along with purge rotameters and accessories

5. Air Lift air supply

   Required air lift flow is generated by mass flow controllers and accessories including air header, PRV, etc.

6. SS tubing (10 mm OD) – around 20 metres

   All lines including process lines for transfer of liquid between tanks, process air lines, instrumentation purge and impulse lines are of 10 mm OD SS tubing.

7. Sight Glass – 1 no.

   To view the rise of water level in the transfer lines by the application of Vacuum.

8. Wired Instrumentation Panel with cabling for monitoring of parameters and control of air lift flow.

2.0 Modifications required in the Existing System

The following modifications (in 2.1 & 2.2 below) are required to be carried out in the existing system.

2.1 Installation of Air Lift Pump (ALP) along with associated tubing.

There are three air lift devices (F1, F2, F4 in Fig 1) installed in the system. One of the same, F1 has to be replaced with an ALP. The ALP will be provided as Free Issue Material (FIM) to the contractor. The material of construction (MOC) is SS 304L

The FIM, ALP device, consist of two components as follows

1. ALP Vent Pot
2. ALP Foot piece

Refer to Fig.2 in the annexure for the dimensional details of the FIM.

The installation work shall involve the following activities

1. Dismantling and removing air lift device F1 (refer Fig.1) along with associated tubing (around 5 meters) and tube fittings.
2. Mounting of ALP vent pot using MS angles/ suitable structural components, taking support from the main support frame of the system.
3. Integrating the ALP with the rest of the system by tubing connection. The inlet/ outlet ends of the Vent pot and Foot piece are of 10 mm OD SS tubes. Suitable union/ tee/ male connector fitting shall be used to integrate the components. Kindly refer to hook-up diagram in Fig. 3. The tubing shall be 10 mm OD, MOC SS 304L. The tubing required will be of around 5 meters. Double ferrule type compression fittings of MOC SS 316 shall be used. Ferrule hardness shall be 95 HRB or better. The necessary **tubing and tube fittings for carrying out the work shall be in supply scope of the contractor**.

2.1.1 Tubing installation:

Standard procedures shall be followed for tube laying and bending, swaging of fittings, etc. The double ferrule type compression fittings shall be first finger tightened, marked at this position and finally wrench tightened by one and one quarter turn further.

2.1.2 Leak Testing: The system shall be leak tested using compressed air and soap solution as per standard procedure. It shall be ensured that the modified system is leak-tight.

2.2 Supply, Installation, Integration of Multi-loop controller

A multi-loop controller is required to be supplied and integrated to the system by installing in the control panel. The specification of the controller is provided as below

Technical specifications of Multi-Loop Controller

2.2.1 A microprocessor based Proportional-Integral-Derivative (PID) Controller, which can be programmed for changing set point based on one of the 4-20 mA inputs.

2.2.2 Input: The controller shall have a minimum of 2 nos. of 4 - 20 mA, process inputs.

2.2.3 Output: The controller output shall be from 4 - 20 mA

2.2.4.1 Proportional Band/ Gain setting: Proportional band shall be settable from 1 to 9999.9.

2.2.4.2 Integral Action setting: Integral action setting in minutes per repeat shall be settable from Off to 999.9 secs/ minutes

2.2.4.3 Derivative Action setting: Adjustable over a range of from Off to 999.9 secs/ minutes

2.2.4.4 Dead Time Compensation can be added to improve performance of the controller.

2.2.5 Set-point variation: The controller shall be configured for varying the Set-point based on the input value from one of the 4 – 20 mA inputs. There shall be different mathematical operators/ blocks available so that it is possible to program the set point to vary as per a mathematical relationship with respect to the second 4 – 20 mA input. Fig 4 in the annexure shows the variation of the set point with respect input 2 of the controller

2.2.6 Auto-Manual Transfer: Transfer between automatic and manual modes shall be bumpless in either direction.

2.2.7 Input Sampling: The controller input signals shall be sampled at a frequency of at least 10 Hz.

2.2.8 Mounting: Controller shall be panel mounted with front fascia flush to the panel front surface. The size of the cut-out on the panel is 96 mm by 96 mm.

2.2.9 Operator Interface: The system shall have user-friendly operator interface. The following features shall be ensured

2.2.9.1 The instrument shall display inputs, output and set point values.

2.2.9.2 The operator shall be able to set the set point and changeover from Auto to Manual mode and vice versa from the front panel.

2.2.9.3 Programming/ configuration change and tuning shall be possible. Adequate security to prevent unauthorized changing of configuration shall be provided.

2.2.10 Power Supply: 230 V, 50 Hz. AC

2.2.11 Environmental performance: The instrument shall be able operate smoothly without any significant drift in the following environmental conditions

2.2.11.1 Temperature: 0°C - 55°C

2.2.11.2 Relative Humidity: 5 to 95% RH non condensing

2.2.12 Quantity Required: 1 No.

2.2.13 **Installation of Multi-Loop Controller**

The Controller shall be mounted on the control panel for monitoring and control of the Vacuum assisted ALP transfer test set-up system. The spare cut-out provided on the panel shall be used for the same.

2.2.13.1 Wiring: The inputs and output of the instrument shall be wired to the panel terminals and integrated to the system. The panel wiring diagram, field cable terminations, etc. details shall be provided to the contractor for carrying out the wiring job as desired. Additional wires required, if any and all accessories required for the wiring job shall be provided by the supplier.

2.2.13.2 Configuration: The controller has to be configured for the control of vacuum pressure parameter. The vacuum pressure 4-20 mA input shall be the feed-back input for the PID control loop. The set-point shall be derived from the second 4-20 mA input. The programming for changing the set-point, using mathematical operators/ blocks, based on the mathematical relationship with the second input shall be carried out.

2.2.13.3 Tuning: Tuning of the Controller shall be carried out to get the optimum set of PID values for the smooth control of the process system.

2.2.13.3 Testing: The system shall be successfully tested after integration and configuration.

3.0 Free Issue Material (FIM)

For the Modifications in the existing Vacuum Assisted ALP Test Set-up, following free issue material shall be provided to the Contractor for installation as per the drawings enclosed

1. ALP Vent Pot, MOC, SS 304L: 1 No.
2. ALP Foot Piece, MOC SS 304L: 1 No.

(Items shall be handed over to contractor for installation at BARC. The material shall not be taken out of BARC premises.)

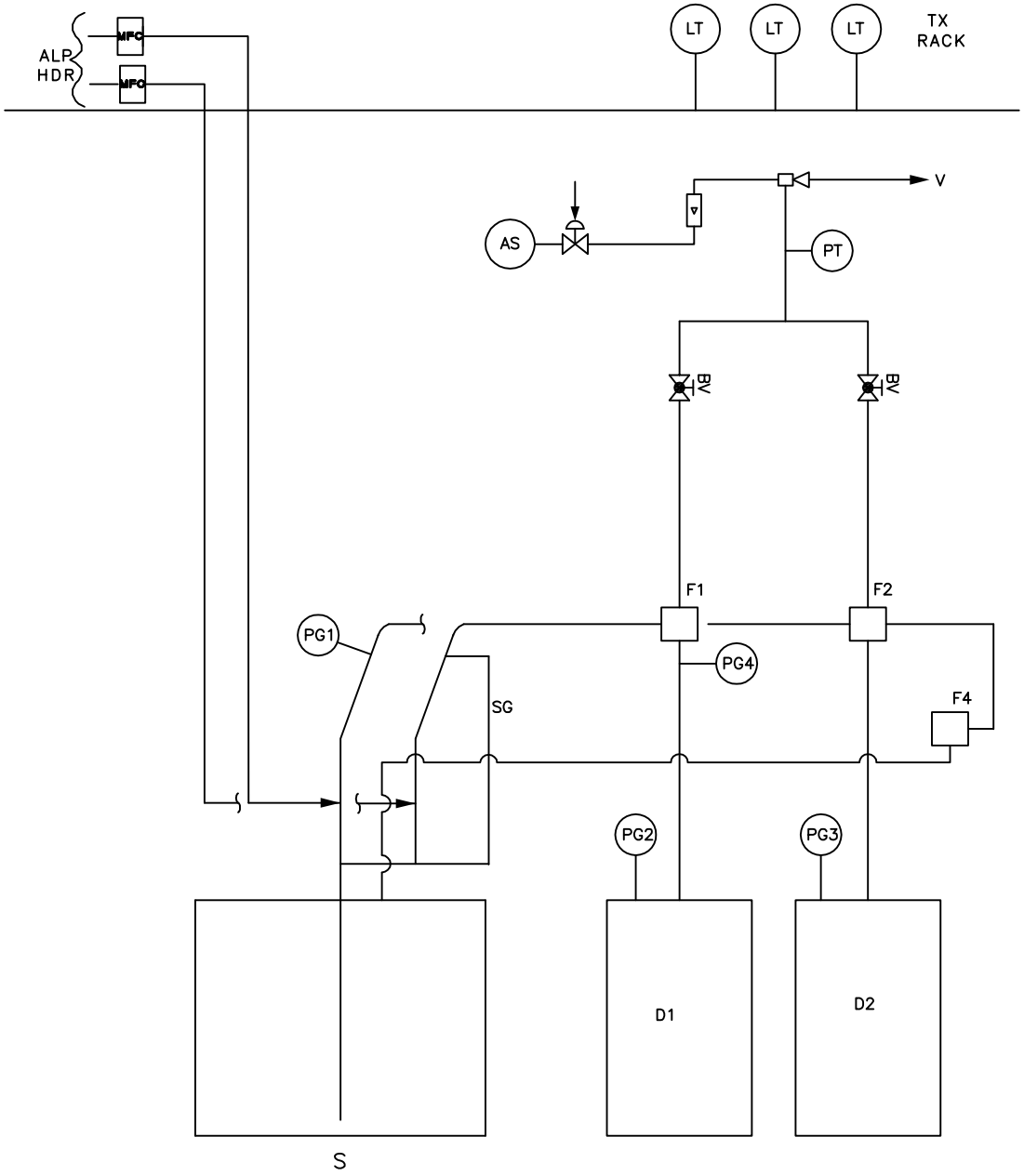
4.0 Bill of Quantities of Bought – out items

	Supply (Qty)		Total	
Item Description	**Instlln**	**Spares**	**Supply**	**Units**
Multi-loop Controller	1	0	1	No.
SS Tube Fittings				
Male Connector, 1/4" NPTM x 10 OD	2	2	4	Nos.
Union, 10 OD x 10 OD	6	2	8	Nos.
Union Tee, 10 OD x 10 OD x 10 OD	1	1	2	Nos.
10 mm OD SS 304L Tubing	5	0	5	Metres

5.0 Following format shall be completely filled and submitted along with the quotation.

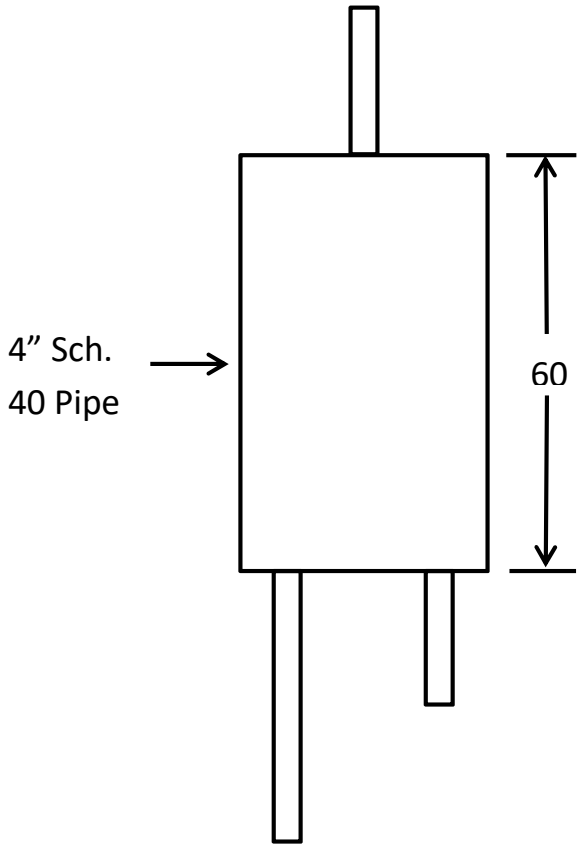
Sr. No.	Description	Quantity	Rate (Rs.)	Total (Rs.)
1	Dismantling of existing Transfer Device, tubing & fittings, Installation of ALP, Supply & Installation of tubing and tube fittings	1 No.		
2	Supply, Installation, Configuration and Integration of Multiloop Controller	1 No.		
3.	Testing of the final system for functionality	1 No.		
4.	Total (incl. Taxes)			

Annexures

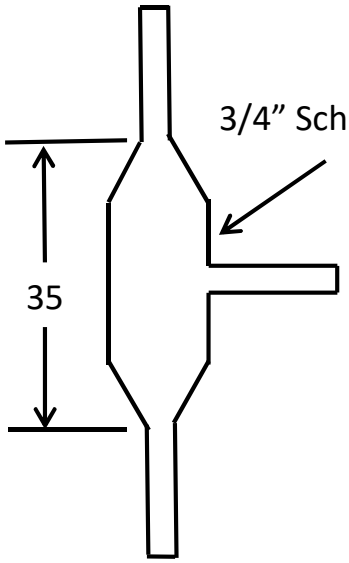


LEGEND & ABBREVIATION		
SR. NO.	LEGEND	DESCRIPTION
1		BALL VALVE
2	MFC	MASS FLOW CONTROLLER
3		ROTAMETAR
4	PG	PRESSURE GAUGE
5	V	VENT
6	S	SOURCE TANK
7	F1,F2,F3,F4	FLOOT TANK 1,2,3,4
8	SG	SIGHT GLASS
9	D1,D2,D3	DESTINATION TANK 1,2,3

FIG. 1: FLOWSHEET OF TEST SETUP



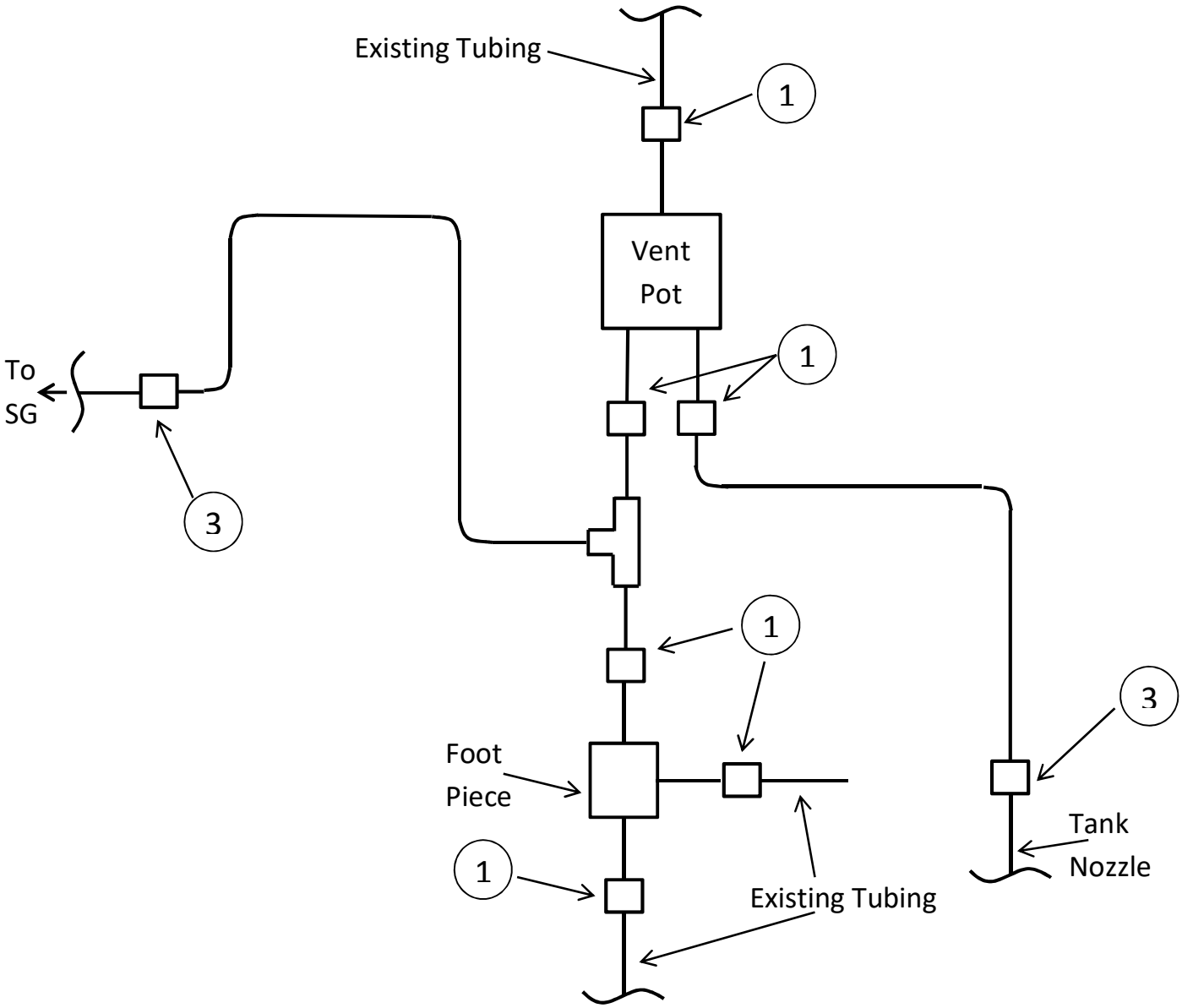
ALP Vent Pot



ALP Foot Piece

NB: All Ends are 10mm OD SS Tubing

Fig.2: ALP Components



BOQ

Item	Description	Quantity
1	10mmOD X 10mmOD Tube SS Union	06 nos
2	10mmOD X 10mmOD X 10mmOD Tube SS Union Tee	01 no
3	¼"NPT (M) X 10mmOD Tube SS Male connector	02 nos

Fig 3: Hook up Diagram for ALP Tubing

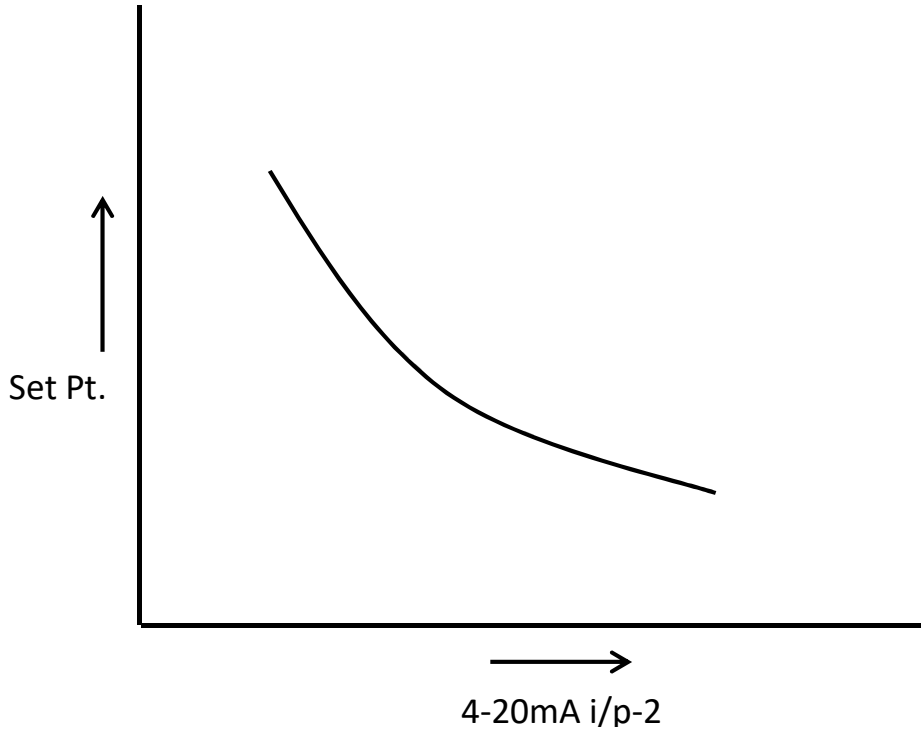


Fig. 4: Controller Set-point variation with input variable

Terms & Conditions:

Scope of work: Dismantling of transfer devices and associated lines in the existing system, supply installation and testing of items as per technical specifications enclosed in the experimental set-up located at OTF Building, BARC, Trombay premises.

Completion Schedule: The job shall be completed within 90 days from the date of issue of work order on the firm

Acceptance Criterion: The work shall be complete in all respect. The system shall be tested at the site for functionality as per the technical specifications.

Price: The price shall be inclusive of applicable GST.

Place of work: OTF Building, BARC, Trombay, Mumbai

Sub-contract clause:
The contractor shall not sub contract any part of the work without a written consent from the purchaser. The contractor shall be responsible to the purchaser for all work of the subcontractor if allowed by purchaser.

Warranty/ Guarantee: Warranty of all items shall be minimum one year from the date of supply.

Validity of offer: The offer shall be valid for a period of 90 days

Free Issue Material: The items to be provided as Free Issue Materials for installation and integration into the system are listed in clause 3.0 of the Technical specifications of the job.

Payment terms:

1. No advance payment shall be made.
2. The payment will be made- as per Government procedure after the job is completed satisfactorily in all respects and has been approved by the officer supervising the job.
3. Payment shall be made only on satisfactory completion of work and on production of GST compliant invoice in triplicate, advance Stamp receipt, ECS details of the firms, and guaranty/warranty certificate.
4. Xerox copy of PAN card shall accompany the bill.
5. Payment of GST will be made only if GST 'registration number is clearly indicated along with other details specifically indicated GSTN, Pan & Location of Supply in Invoice. The copy of GST registration certificate shall accompany the bill and GST will be reimbursed on production of documentary evidence in respect of payment of GST to concerned authority.
6. Income tax and any other tax as applicable will be deducted.
7. Contractors are required to submit/ furnish undertaking in pursuance to section 206 AB & 206 CCA in the Income Tax Act 1961, as per proforma enclosed herewith.
8. Receipted delivery challan of all bought out items required as per the technical specifications shall be submitted.

Liquidated damages on extension of delivery time:

In the event of grant of extension of delivery period, the Government shall be entitled to recover at its discretion from the contractor agreed liquidated damages at 0.5%(half percent) per week of the total values of the work in areas subject to a ceiling of 10% of the total value of the contract whether any loss is suffered by Government on account of such delay or not.

Confidentiality Clause :

No party shall disclose any information to any third party concerning the matters under this contract generally. In particular, any information identified as "Proprietary" in nature by the disclosing party shall be kept strictly confidential by the receiving party and shall not be disclosed to any third party without the prior written consent of the original disclosing party.

This clause shall apply to the sub-contractors, adviser or the employees engaged by a party with equal force.

Restricted information" categories under Section-19 of the Atomic Energy Act, 1962 and "Official Secrets" under Section-5 of the Official Secrets Act, 1923: Any contravention of the above-mentioned provision by any contractor, sub-contractor, consultant, adviser or the employees of a contractor will invite penal consequences under the aforesaid legislation.

Prohibition against use of BARC's name without permission for publicity purposes: The contractor, sub-contractor, consultant, adviser or the employees engaged by the contractor shall not use BARC's name for any publicity purpose through any public media like Press, Radio, TV or Internet without the prior written approval of BARC.

Arup Debdas

(Arup Debdas)
SO/G

TO WHOMSOEVER IT MAY CONCERN

Undertaking pursuant to Section 206 AB of the Income Tax Act 1961
Declaration confirming filing of Income Tax Return from immediate two preceding years.

I, _____ [Name], in the capacity of Individual/ Proprietor/ Partner/ Director/Authorized signatory of _____ [Entity Name] with PAN _____ , do hereby make the following declaration as required under the relevant provisions of the Income Act, 1961 (hereinafter referred as 'the Act'):

1. That I/We am/are authorized to make this declaration in the capacity as Individual/ Proprietor/Partner/Director.
2. I/We hereby declare and confirm that I/We do not fall under the definition of 'specified person' as provided in section 206AB of the IT Act.
3. I/We have duly filed return of income for FY 18-19 & FY 19-20 within due date as per Section 139(1) of the Income-tax Act, 1961 - **Yes / No (strike out whichever is not applicable)**.
4. If return has been filed the details are as follows:

I/We, _____ having PAN _____, hereby confirm that the provision of Section 206 AB is not applicable in my/our case as I/we am/are regular in filing of Income Tax Return. The details (along with proof of documents) of acknowledgement numbers and date of filing of Income Tax Returns for last two financial years are furnished below:

S.No.	Financial Year / (Assessment Year)	Date of Filing Income Tax Return	ITR Acknowledgement Number
1	2018-19 / (2019-20)		
2	2019-20 / (2020-21)		

5. I/We hereby take responsibility for any loss/liability fully including any Tax, interest, penalty, etc. that may arise due to incorrect reporting of above information.

All the aforesaid representations are true and correct, and we/I agree to furnish any evidence required at any time in support thereof.

On behalf of _____

<< Name of the authorised signatory>>

<<Designation>>

Name of the Entity:

Seal :

Date :