

INTER – UNIVERSITY ACCELERATOR CENTRE (IUAC)

ARUNA ASAF ALI MARG, POST BOX NO. 10502

NEW DELHI-110067

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NOTICE INVITING TENDER

Tender No: - IUAC/NIT/11/2018-19

Name of the Work	:	Supply of two (2) numbers of Anti-Compton Shield(ACS) BGO Detectors.
Last Date and Time of Submission of Tender	:	03.10.2018 at 3 P.M.
Date & Time for opening of Tender (Technical bid, Part-A)	:	03.10.2018 at 3.30 P.M
Date & Time for opening of Tender (Price bid, Part-B). bidders.	:	To be intimated later on to qualified
Address for submission of tender	:	Administrative Officer(S&P) Inter–University Accelerator Centre Aruna Asaf Ali Marg, Post Box: 10 502 New Delhi-110067. E-mails: joseph@iuac.res.in & rps@iuac.res.in
Place of opening of the Tender	:	Committee Room, IUAC

GENERAL CONDITIONS OF TENDER:

1. Submission of Tender:

Tenders should be submitted in sealed envelopes in two Parts separately, i.e. "Technical bid" (Part-A) and "Price bid" (Part-B). Both the parts should be further sealed in an envelope super-subscribing NIT No & name of work, due date for opening, bidder's name & address. The tender duly filled in may be sent to above mentioned address either by post or hand delivered in the tender box kept in the area near west side

entrance, after ensuring that due entries are made in the register kept at the counter. It should not be handed over to any employee of the Centre. No tender shall be accepted later than the time schedule specified above. Tender once submitted will remain with the IUAC and never be returned to the bidders.

2. Technical Bid (Part-A) :

In this bid, the bidder should submit his company profile, organizational setup, credentials, list of plant, machinery & tools in his possession, experience details, copies of work orders of similar works successfully executed during last three years. Minor deviations in respect of NIT conditions are acceptable. The deviations should be mentioned in the technical bid. The bidders are required to attach entire NIT (except for the price bid part) duly signed & stamped as a token of acceptance to the NIT conditions with this bid.

The following specific conditions / documents to attach are essential for pre-qualification: -

- I. Copies of one single work order approx. Rs 1 crore (US\$200000) and above similar to present one executed during the preceding three financial years, successfully.
- II. List of reputed clients from India and abroad along with address, contact person, email address etc. should be provided.
- III. Confirmation of full technical details as given in Annexure I should be submitted. Detail technical information of the equipment should be provided.
- IV. No major deviation from technical specifications mentioned in the annexure I is acceptable. Deviation if any should be mentioned in technical bid.
- V. Entire NIT (Except Price bid) duly signed & stamped by the bidder as a token of acceptance.
- VI. IUAC reserves the right to inspect the sites / work places as claimed by the bidders, where they have supplied similar system successfully.

3. Price Bid (Part-B) :

In this bid the bidder is required to quote his items rates/ prices for each item separately mentioned in the scope of work & technical specifications. The rates / price should be on FOB basis. The supplier should send their techno-commercial representatives for discussion, if necessary, and should be empowered to take financial decision on the spot. The bidders should quote unconditional rates, neatly written without any overwriting, white fluid, erasing etc. and duly signed & stamped on all pages.

4. Validity of Tender and delivery period : Tender shall be valid for our acceptance without any change in rates and NIT conditions for a period of 180 days from the date of opening of price bid. Delivery of detectors should be done within 180 days from the date of opening Letter of Credit.

5. Escalation: No escalation over and above items rates quoted by the bidder shall be paid till the completion of work under any circumstance. Tenders should be unconditional.

6. Completion time: The time shall be the essence of this contract and entire work as

titled above is to be completed in all respects within a period of time mentioned above.

Any delay in supplying the items for reasons attributable to the supplier is liable for liquidated damages as per the relevant clause of NIT. Under the force majeure conditions or delay due to reasons beyond control of the bidder, IUAC may grant suitable time extension for which the bidder has to request along with the justification/reasons well in advance to the Director, IUAC for approval without any prejudice to price escalation. The decision of the Director will be final and binding on the bidder.

7. Scope of Work: Fabrication and testing of the Anti-Compton Shield (ACS) detectors as per specifications in Annexure 1. Price should be quoted item wise for the entire detector and spares (pre-amplifier cards, signal cables and PMT) must be mentioned. Detailed time frame for delivery of detectors need to be given as per specifications given in Annexure 1.

8. Correspondence: All the correspondence in respect of tender / contractual obligation shall be made to A.O.(S&P), Inter – University Accelerator Centre, Aruna Asaf Ali Marg, New Delhi-110067.

9. Terms of Payment:

i) 90% payment will be released against shipment through L/C.

ii) Balance 10% payment will be made after successful testing & acceptance of the Anti-Compton Shield (ACS) detectors by IUAC personnel or within a period of 90 days whichever is earlier.

10. Guarantee/Defect liability period :- The contractor should guarantee for the works/items executed/supplied by him from the manufacturing/engineering defect and bad material/workmanship for a period of one year from the date of acceptance by IUAC. During this period if any replacement of items and/or repairs/rectification is needed, supplier shall make the same free of cost.

11. Arbitration Clause: Any dispute and differences whatsoever arising under or in connection with the contract will be settled by the arbitration in accordance with the rules and Arbitration of the UNCITRAL/ the rules of conciliation and Arbitration of International Chamber of Commerce (ICC) (Retain what ever is agreed to and delete the other). The venue of arbitration will be in India and arbitration proceeding will be administered by Indian Council of Arbitration (ICA). The applicable law to the contract will be law of India or such other may be agreed up on.

12. IUAC reserves the right to reject any or all the tenders in full or in part without assigning any reasons whatsoever, and the decision of the Centre in this regard will be binding on all the bidders. Tenders not complying with any of the provisions stated in this tender document are liable to be rejected. Director, IUAC reserves the right to accept or reject any tender without assigning any reason and does not bind himself to accept the lowest

tender.

13. Liquidated damages:

In case the work is delayed beyond the specified completion period for reasons attributable to the contractor, deductions on account of Liquidated damages @1/2% of the contract value per week will be deducted subject to a maximum of 5% of the total cost.

14. Any dispute arising out of this contract will be subjected to jurisdiction of New Delhi/Delhi.

Annexure I

Anti-Compton Shield for Clover detector - quantity 2

Specifications for the Anti-Compton shield

EUROGAM (II) modified BGO anti-Compton shield for Clover detector having the following specifications

General:

The Compton suppression detector should be made of 16 optically independent BGO side elements, designed to hold the Canberra Eurisys Clover Ge detector, as per the attached drawing. Each BGO should be provided a compatible photomultiplier (specifications are given below) and each PMT should be removable and provided with a Voltage Divider network.

The assembly is mounted in an Aluminum Housing, provided with a annular well to contain Canberra HPGe Standard Clover detector.

Locking arrangements for secure alignment of the Clover Ge detector should be provided in both sides of the shield.

The assembly is provided with interconnection signal cables and High Voltage bias cables with distribution box for gain matching.

The assembly should also include Tungsten (Heavymet) collimator of 40 mm length. This collimator should be removable if so desired.

One spare PMT with RC base should be also included.

THE DIMENSIONS OF THE SHIELD SHOULD BE SUCH THAT IT CAN WORK AS A COMPTON SUPPRESSOR FOR THE CANBERRA CLOVER DETECTOR OF MODEL CLOV 4x50x70 AS PER THE ATTACHED DRAWING.

A DRAWING (IN PDF AS WELL AS AUTOCAD DWG FILE) SHOWING THE FITTING OF THE CLOVER WITHIN THE SHIELD WITH PROPER DIMENSIONS SHOULD BE PROVIDED WITH THE QUOTATION.

External Shape of the detectors:

External and internal housing should be made of hard anodized aluminium for protection and to ensure optimum sliding coefficient between adjacent detectors and/or internal Germanium detector.

A back flange machined out of a massive single piece of aluminum alloy should house the phototubes, mu-metal shields, voltage dividers and preamplifiers. This rigid structure should be strong enough to hold the weight of BGO crystals assembled in this detector.

The front part of the detector toward the target would support the heavy metal collimator which can be added separately.

BGO Crystal:

BGO crystals should be prepared for optimum internal light collection and transmission towards -the photomultiplier photo-cathodes.

1) BGO Crystals

- a) 16 nos, Optically isolated.
- b) Dimensions 20 mm thick x 250 mm long, width 44 mm or larger

Phototubes and Voltage Dividers:

The assembly should include all required interconnection cables and cables to HV supply and signal processing electronics.

Signal pulses and high voltage supply should be connected on standard Lemo sockets. All signals are interloped with short LEMO cables. One cable is provided from the last PMT to a BNC cable connector (male) with a length of at least 5 m.

A high voltage filter should be provided also on each voltage divider.

16 pieces of LEMO cable connectors should be connected to a junction box where 16 pieces of trim potentiometers are present to provide the gain equalization of all 16 PMTs. A single cable is to be provided to bias ACS with SHV connector which has to be fed into High Voltage power supply.

Main specifications of these phototubes are as follows:

2) PMT

- a) 16 nos.
- b) Removable HTV R (1 1/8" 10 stage Hamamatsu R-3998-02 or equivalent)
- c) Bialkali borosilicate window.
- d) Maximum supply voltage ~ 1200 V (**positive**)
- e) Typical gain ~ 10^6

- f) The PMT should have an integral removable voltage divider, with time response of about 2 ns, and fixed focus.
- g) All the PMT's must be factory gain matched to 5%.
- h) Provisions for gain matching.
- i) Lemo 0 series connectors for HV.
- j) Lemo 00 series connectors for signal.
- k) All inter-connecting signal cables (16 nos, 10 cm long) should be provided
- l) High voltage cables (LEMO0 to HV distribution box) 16 nos 50 cm long
- m) Signal cable (LEMO-BNC) one - 5 m long
- n) HV cable from HV supply to Distribution Box (LEMO-SHV) one - 5 m long

3) ACS Housing

Energy Resolution:

Pulse height resolution for each segment should be $< 18\%$ or better at 662 keV gamma rays with source placed inside the middle of the BGO well.

Peak to valley ratio:

Peak-to-Valley ratio for ^{241}Am (59.5 keV) should be better than 20 : 1

Heavy metal collimator:

At least 40mm thick

General Information:

All necessary manuals for repair and trouble shooting should be provided on delivery. Warranty period should be described in the accompanying document. All necessary detail drawings should be provided

The crystals should be housed in an Aluminium can which is square shaped. The well should be square shaped to accommodate the clover detector. The inside opening of the shield should be compatible for using with Clover detectors of dimension mentioned in fig 1. The approximate outer physical dimensions of the shield are shown in fig 2. For mechanical compatibility with existing shields, the mounting holes on the shield should conform to figure 3.

The tapered heavy-met collimator of thickness 40 mm has to be provided to collimate the gammas detected by Clover Germanium detector. The nominal distance from the

target to the front face of the collimator is 137 mm, covering an angle of 29° at the target. The Clover capsule when housed within the shield should go in nominally 336 mm from the back plane of the shield.

Locking arrangement for the mounting the Clover detector inside the ACS for any orientation of the shield should be provided.

(4) Shield Specifications

The Pulse Height Resolution for the individual crystals should be 18% or better with for 662 keV ¹³⁷Cs source in the centre of the well.

Peak-to-valley ratio is 15:1 per crystal or better for ²⁴¹Am 60 keV gamma ray

Low energy limit < 10 keV

Heavy met collimator 4 cm thick.

The quotation should include all the interconnecting signal and high voltage cables.

An optional fast low noise pre-amplifier/buffer (50 ohms cable driver) may also be quoted for having the following specifications

gain-band width product : 180 MHz or better
output drive capability : 100 mA short circuit protection.
voltage supply ±12 V (NIM standards).

Test results and data sheets should be provided. Sample test report for Compton suppression figure of typical clover with ACS for 1.3 MeV gamma rays to be provided.

Technical drawings of the assembly and the individual crystals should be provided.

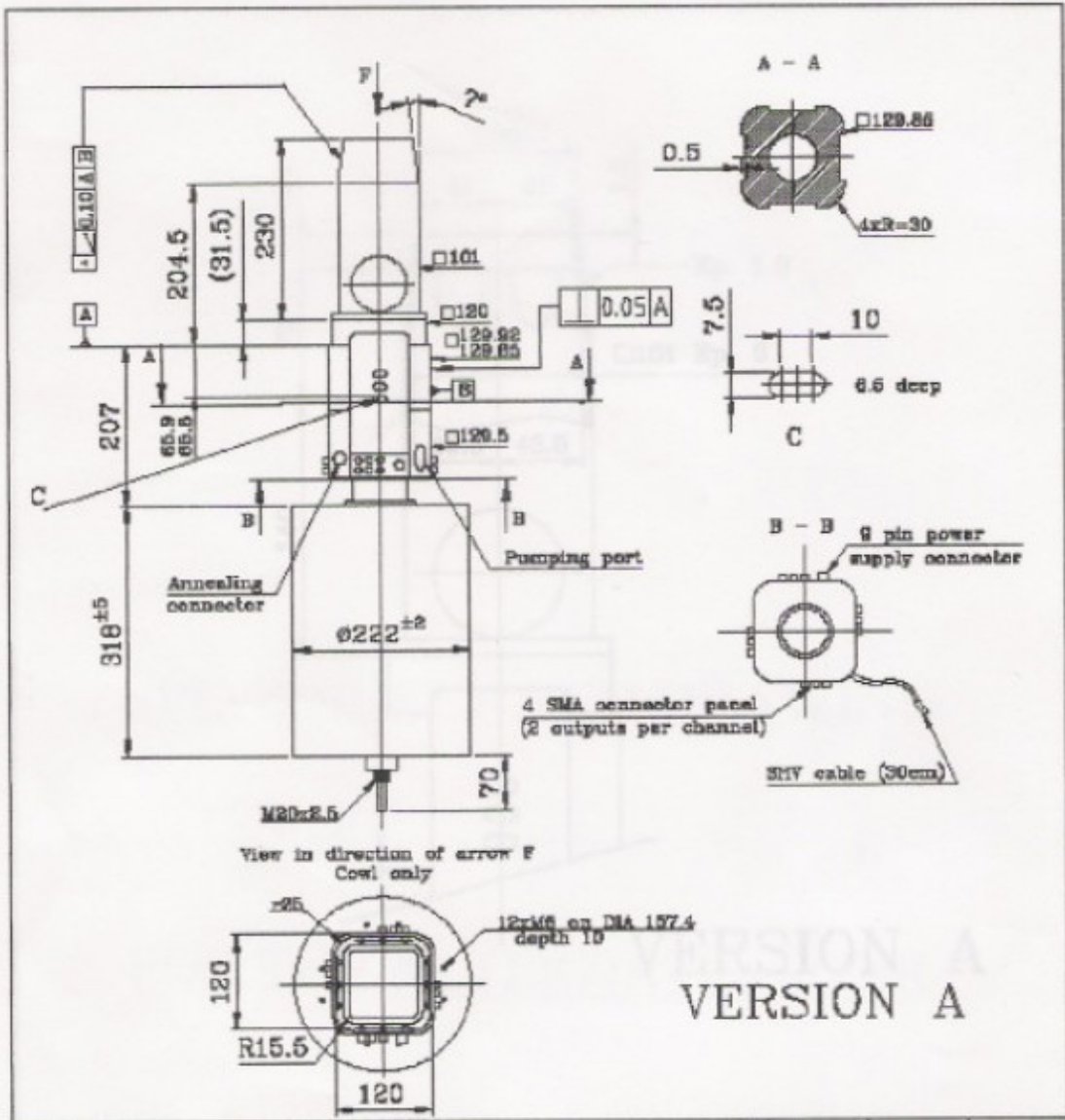
The PMT's have to be wired for negative High Voltage.

Necessary spares may be suggested. **One spare photomultiplier tube with RC base should be included in the price quote for each ACS.**

Total quantity of Anti-Compton Shield (ACS) BGO detectors to be procured is two in numbers.

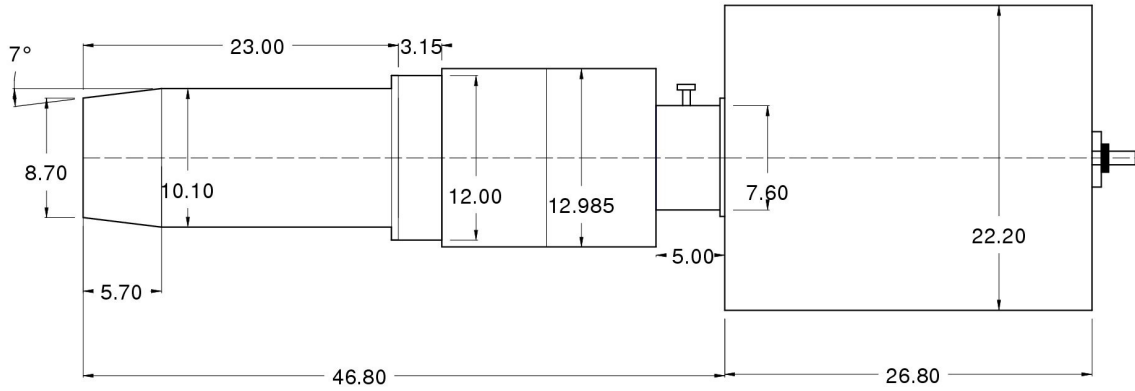
Note :

Manuals and test data sheets with specific details of the test setup / equipment used should be provided for each detector. A certificate with regards to the purity of the BGO crystals should also be provided free of cost.

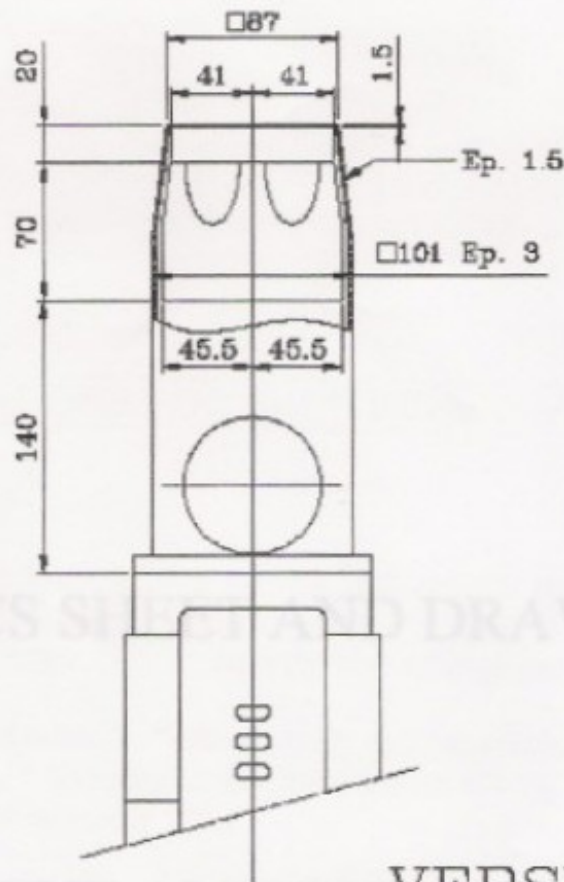


VERSION A

A	12.11.03	First issue	LAAS	GUTKNECHT	SAFIN
Index	Date	Modifications	Designed by	Verified by	Approved by
		Scale: 1/7 Unit : mm	<p>CANBERRA FRANCE 1 chemin de la Renouée B.P. 881 Parc des Tanneries F-67380 LINGOLSHHEIM Tel (33) 03 87 79 55 - Fax (33) 03 87 79 63</p>		
Customer:		General tolerances: ±0.2			
Ref:		Copy of this document is submitted to Canberra approval			
Customer approval		CLOVER 4x50x70			
Date		CRYSTAL LOCATION			
Signature		Activity	Type	Number	Index
		10	PC	475828	A 1/3



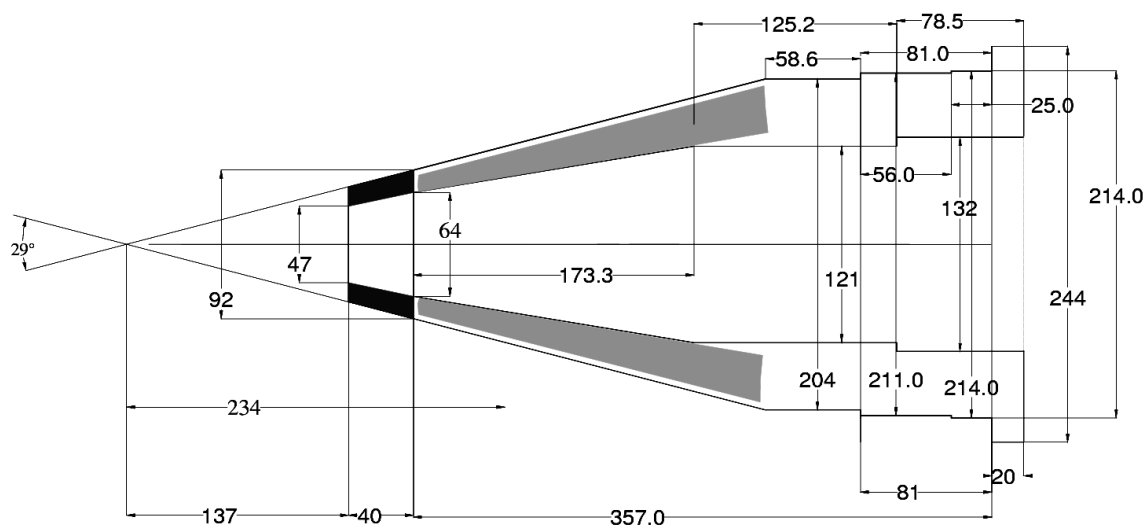
CLOVER DETECTOR



VERSION A

A	7/11/03	First Issue						
Index	Date	Modifications	Designed by	Verified by	Approved by			
		Scale: 1/3	Unit : mm			CANBERRA FRANCE 1 chemin de la Roseraie B.P. 211 Parc des Tanneuses F-67080 LINGOLSHIEIM Tél (03) 84277430 - Fax (03) 84278423		
Customer:		General tolerances: ±0.2		CANBERRA		Copy of this document is submitted to Canberra approval		
Ref:				CLOVER 4x50x70		CRYSTAL LOCATION		
Customer approval								
Date		Signature						
Activity	Type	Phase	Reference n°	Index	Folio			
10	PC	4	75832	-A	1/3			

Fig 1: Mechanical dimensions (in cm) of the Clover detector



ACS SHIELD (COMPACT DESIGN)

Fig 2: ACS Design (all dimensions in mm)

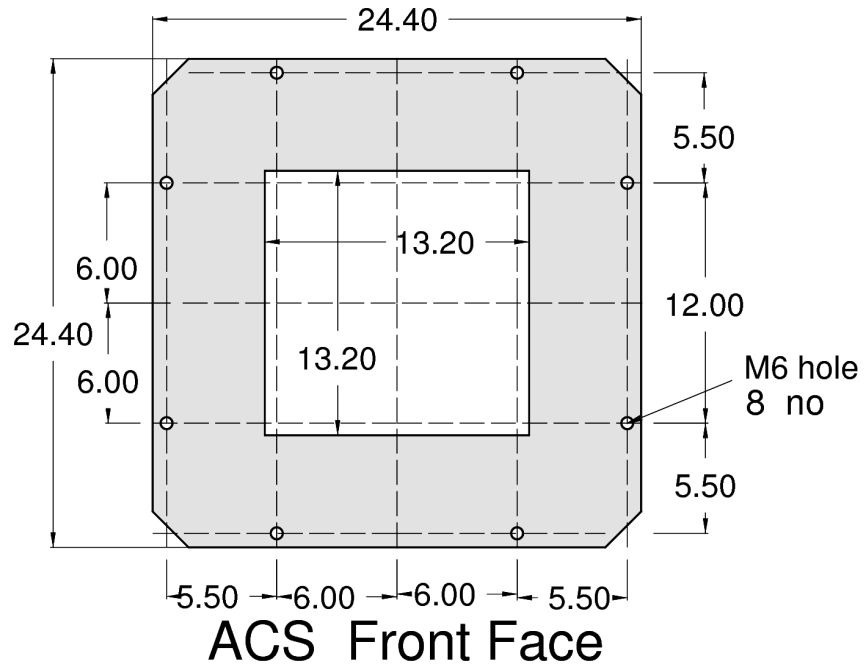


Fig 3. ACS mounting holes (all dimensions in cm)

I accept all the above mentioned terms and conditions

(signature of bidder)

Note: Entire NIT (excepted price bid) is to be attached with “Technical bid (Part-A)” duly signed and stamped by the bidder.