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भारतीय ताराभौतिकी संस्थान
INDIAN INSTITUTE OF ASTROPHYSICS
कोरमंगला / KORAMANGALA
बेंगलूर / BANGALORE - 560 034.

No: PUR/IMP/UVIT-ISO/JPL/69/08-09.

January 13, 2009

M/s.

Dear Sirs,

The Director, Indian Institute of Astrophysics, Bangalore invites Sealed Tenders (**both Commercial Bid & Technical Bid**) for the **Import of "NUV High Pass Filter and NUVB 15 Interference Filters - 2/3 Nos. each"** detailed in the Tender Form hereto annexed. The terms and conditions are also enclosed may be noted and if you are in a position to quote for the supply in accordance with the requirement, please submit your quotation in the attached Tender Form. The Tender documents are available on IIA web site www.iiap.res.in/tenders.htm

The Tender bids must be in foreign currency only. Your completed Tender bids (**both Commercial Bid & Technical Bid**) must reach this office in sealed separate envelopes duly superscribed with the name of the supply and due date on or before **15.00 Hrs. latest by 13.02.2009**. The Technical bids will be opened in presence of the bidders or authorized representative at **15.30Hrs. on 13.02.2009**. Incomplete Technical Bids are liable for rejection. Commercial/Price bids will be considered only for the qualified Technical Bidders.

Thanking you,

Yours faithfully,

Administrative Officer
For Director

Encl.: as above.



PUBLIC TENDER DOCUMENT NO: PUR/IMP/UVIT-ISO/JPL/69/08-09.
DT: 13.09.2009

TENDER FORM

FROM:

TO

THE DIRECTOR,
Indian Institute of Astrophysics.,
Bangalore-560 034.

Sir,

I/We hereby offer to supply the Items/Equipment indicated below at the price hereunder quoted and agree to hold this office open till _____. I/We shall be bound to supply the Items/Equipment hereby offered upon the issue of the Purchase Order communicating to the acceptance thereof on or before the expiry of the last mentioned date. You are at liberty to accept any one or more of the items of such Items/Equipment. I/We notwithstanding that the offer in this tender has not been accepted in whole, shall be bound to supply such items and such portion or portions of one or more of the items as may be specified in the said Purchase Order communicating the acceptance.

Sl. No.	Description of the item(s)	Qty.	Unit	Rate	Dely. Period
1.	NUV – High Pass Filters	2/3	Nos.		
2.	NUVB 15 Interference Filters as per the specification in Annexure A	2/3	Nos.		

(Both Commercial and Technical bids must be submitted separately in a Separate sealed envelopes)

(Tender bids must be in Foreign currency only)



Place at which the Delivery is required : Indian Institute of Astrophysics
Bangalore – 560 034.

Date by which the supplies are required : 4/8 weeks from the date of order.

2. I/We have understood the items of the tender annexed to the invitation to the Tender and have thoroughly examined the specifications/drawing and /or pattern quoted or referred to herein and/are fully aware of the nature of the items/Equipment required and my/our offer is to supply the items/Equipment strictly in accordance with the requirements subject to the terms and conditions contained in the Purchase Order communicating the acceptance of this tender either in whole or in part.

Date:

Signature and Seal of Supplier



Annexure A

Specifications:

I. NUV HIGH (FREQUENCY) PASS FILTER1: To transmit < 230 nm range and reject > 240 nm

Reflectivity	NO specifications	
Mean Transmission	< 230 nm	T > 15%
Out of Band Blocks		
Reflection	No specification	
Transmission	240 – 400 nm	< 1%
Deviation from mean transmission	< 230 nm	< +-10%
Coating uniformity	< 3% variation in Transmission	
Angle of incidence	0 deg., i.e. Normal	

Physical parameters:

Shape	Circular
Physical Diameter	50.00 + 0.0/ -0.1 mm
Thickness	2.97 +- 0.03mm
Optical Diameter	> 46 mm
Material	UV Grade Silica
S/D	40/20
Transmitted Wavefront	1/4 @633nm for any 20 mm sub pupil
Micro roughness	< 2 nm
Wedge angle	< 1.5 minute

A. Optical Parameters

1. Angle of incidence of 0 deg., and unpolarized light.
2. The filter coating shall be uniform over the entire area and free of pin holes; the total area covered by the pin holes to be $< 10^{-4}$ of the total area of the filter. Non-uniformity in reflectivity and transmission should be $< 3\%$ mean reflectivity and transmission.
3. Surface quality (scratch/dig): 40-20 (Both surfaces of substrate)
4. Transmitted wave front flatness: For any 20 mm diameter area of the full surface : $\lambda/4$ or better ($\lambda = 633 \text{ nm}$)
5. Micro roughness : < 20 Angstroms.
6. Wedge angle should be < 1.5 arc minutes after coating.



(B) Additional Parameters

1. Storage Temperature : -25 to 55 deg. centigrade
2. Operating Temperature : 0 to 40 deg. centigrade
3. Variation in transmission with temperature : < 2% for every 10 degrees change in temperature at any wavelength in the range < 230 nm. This is design specification and need not be demonstrated.
4. Usage : Onboard Satellite

2. NUVB – 15 Interference Filter

1.	Pass band (nm) (50% of peak transmission)	200 - 230 nm
2.	Mean Transmission	> 15%
3.	Ripple peak to peak	< +/-10% of Mean
4.	Central Wavelength	215 +/- 2 nm
5.	Half Power Bandwidth	30 +/- 2 nm
6.	Substrate material	UV Grade Silica
7.	Diameter Optical Diameter	50.00 +0.0/-0.05 > 46 mm
8.	Thickness	2.97 mm
9.	Thickness Tolerance	+/- 0.03 mm
10.	Micro roughness	< 20A rms
11.	Surface Quality (scratch/dig)	40 / 20
12.	Coating Uniformity	< 3% in Transmission
13.	Flatness of Transmitted wave front	f /4 @633nm
14.	Out of Band Blocking	Transmission < 1% for > 240 nm , and < 5% for < 190 nm
15.	Angle of Incidence	Normal, i.e. 0 deg
16.	Quantity	2/3 Nos.

(A) Physical parameters

1. Shape : Circular
2. Dimensions of substrate
 Diameter : 50 +0.0/- 0.05 mm
 Thickness tolerance : +0.03/ -0.03 mm



(B) Optical Parameters

1. Minimum usable diameter : 46 mm
2. Surface quality (scratch/dig) : 40-20 (Both surfaces of substrate)
3. Flatness of transmitted wave front : For any 20 mm diameter area of the surface : $\lambda/4$, or better ($\lambda = 633$ nm)
4. Micro roughness : < 20 A rms
5. The filter coating shall be uniform over the entire area and free of pin holes ; the total area covered by the pin holes to be $< 10^{-4}$ of the total area of the filter. Non-uniformity in transmission should be < 3 % of the mean transmission.
6. Wedge angle should be less than 1.5 arc minutes after coating.

(C) Additional Parameters for

1. Storage Temperature : -25 to 55 deg. centigrade
2. Operating Temperature : 0 to 40 deg. centigrade
3. Variation in transmission with temperature : $< 2\%$ for every 10 degrees change in temperature. The specifications on transmission to be valid in the operating temperature range of 0 to 40 deg centigrade. This is design specification and need not be demonstrated.
4. Usage : Onboard Satellite

II Quality assurance provisions / Requirements:

1. Materials/Coating requirements:

- (i) The supplier/vendor should provide the spectral characteristic curves as plots and data tables for the High pass filters and all the filters in the form of EXCEL file after the design is completed but before the actual coating starts for the final approval of the coating design of the High pass filters and interference filters. This data should be provided for the operating temperature range (0, 10, 20, 30, 40 deg. centigrade)
- (ii) All the materials used for fabrication of the High pass filters and filters shall be of space qualified type and the substrate materials used for fabrication of the filters shall be free from strain, internal stresses and internal defects like bubbles, fractures etc. **Same batch of materials** shall be used for fabrication of all the components including **witness samples and flight components**.



- (iii) All materials used for filter fabrication shall meet the CVCM (Collected Volatile Condensable Material) <0.1% (preferably 0.01%) and TML (Total Mass Loss) < 1% (preferably 0.1%) requirements when subjected to 24 hrs vacuum test at 125 deg C (pressure $\leq 10^{-6}$ Torr).
- (iv) **Two witness** samples of High pass filters of 25 mm diameter and 2 witness samples of NUVB15 interference filters of 25 mm diameter shall be supplied. The thickness of the witness samples shall be in the range 1 to 3 mm. The witness samples must be cleaned and otherwise processed prior to coating in the same manner as the flight components so as to represent the flight components fully.
- (v) A mark on the edge of the component (such as an arrow \square) should indicate the direction of surface 1 (the incident beam direction). The fabricator should provide the appropriate identification marking for each component.
- (vi) The following information about the coated components should be supplied to UVIT team :
 - The reflectance and transmittance curves of High pass filters at 0 deg. incident beam in the spectral range mentioned in section I
 - The transmission of UV interference filters in the spectral range mentioned in section I
- (vii) The ion beam assisted deposition is preferred. The technique used shall be specified.
- (viii) The anti-reflection coating on both sides of the filter for the transmission band is preferred.
- (ix) Transmission and Reflectivity specifications refer to a collimated beam meaning any scattered component is lost.

2. Environmental Test Requirements:

The environmental tests are intended to verify the design and workmanship of the components and are applicable to the **witness samples and the flight components**. The **witness samples** for each band shall undergo **qualification level tests** and measurements as per the sequence given in **Table 1** and the **flight components** shall undergo **acceptance tests** as per the sequence given in **Table 2**. The methods and procedures for measurement of parameters along with the test equipment used for their calibration and individual parameter limits should be supplied prior to qualification. The environmental specifications for the various environment tests are as follows.



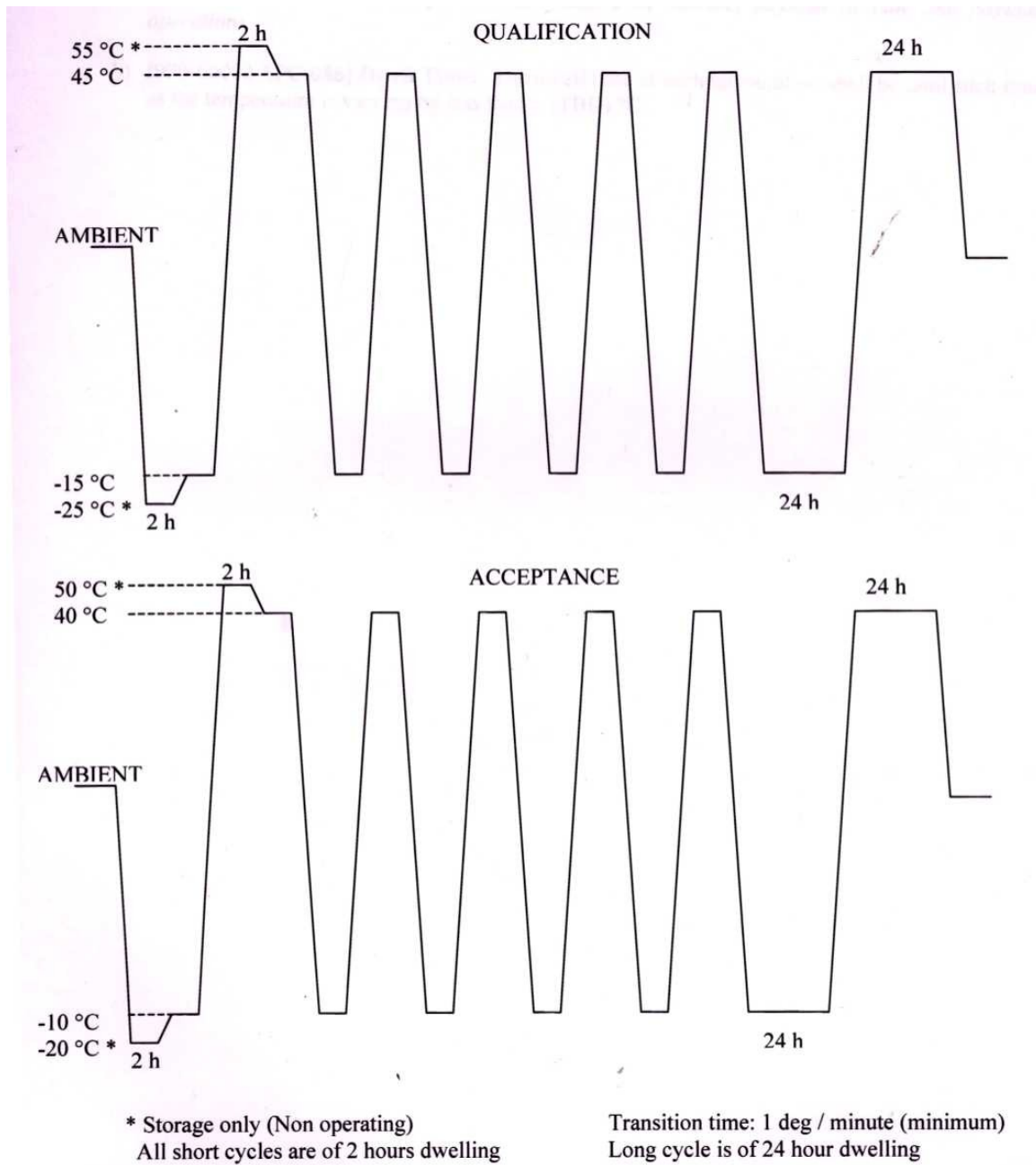
(i) Storage test:

Test	Temperature (deg. centigrade)	Duration (hrs)
Cold	25 ± 1	24 ± 0.1
Hot	55 ± 1	24 ± 0.1
Humidity RH 85% \square 0/ N5%	55 ± 1	24 ± 0.1

Temperature rise/pull down time = 1 deg. C/minute (minimum)

(ii) Thermal cycling:

Temp. Range (deg. C) : 25 to +55
Tolerance (deg. C) : ± 2
Dwell time at each extreme Temp : 2 hrs \pm 5 minutes
Temperature rise/decrease time : 1 deg C/min (minimum)
No. of cycles : 5 cycles
Vacuum : 1.0E -5 Torr or better





Thermal Vacuum Test Profiles

- (iii) **Adhesion & Abrasion** : Adhesion and abrasion test to be performed on the witness samples as per the relevant items in the applicable MIL standards.

3. Performance Compliance Matrix:

Test and measurements shall be conducted to verify the performance of the components. The parameters to be measured at various stages of fabrication and environmental testing at individual component level are given Table 1 and 2. The interferograms of the surface figure measurements shall be provided.

i. TEST & MEASUREMENT SEQUENCE OF WITNESS SAMPLES : TABLE 1

Test condition	Witness 1	Witness 2
Initial Test	VI, SR	VI, SR
Post Storage Test	VI, SR	-
Post Thermal cycling	-	VI, SR
Post Adhesion/ Abrasion	VI	-

SR: Spectral Response VI: Visual Inspection
All parameters as per specifications in Section I

(ii) TEST & MEASUREMENT SEQUENCE OF FLIGHT COMPONENTS : TABLE 2

No.	Parameter	At substrate level	After coating	After Thermal Cycling
1.	Substrate Material	X (name)	-	-
2.	Physical Dimension : Diameter (mm)	X	-	-
3.	Clear Aperture : Diameter (mm)	-	X	-
4.	Center Thickness (mm)		X	-
5.	Wedge Angle (arc min)	X	-	-
6.	Transmitted wave front flatness ($\lambda = 633$ nm)	X	-	-
7.	Surface roughness (A)	X	-	-
8.	Surface quality (scratch/dig)	X	X	X
9.	Spectral response (reflectivity / transmission)	-	X	X

X : Measurement to be done
All parameters as per specifications in Section I



4. Test results:
Properties of the materials (mechanical, chemical and optical) used for High pass filter mirror and filter fabrication and compliance certificates shall also be supplied. Spectral transmission curves of the **flight components** along with **witness samples** (before and after each environment/acceptance test) shall be supplied in the form of percentage reflectivity or transmission versus wavelength (plots) along with the digital test data in tabular form. Any additional tests required as per Table 2 shall be done and documented as curves/tables.

5. Acceptance / Rejection criteria:

The components shall retain their mechanical integrity and shall not visually show any sign of chipping, cracking of glass. The acceptance of final product is based upon its compliance with all the specifications/requirements laid down in the earlier sections of this enquiry, the rejection criteria being deviations from the specifications mentioned in **Section I**.

6. Quality Control requirements:

The manufacturer shall ensure the quality control for releasing a high quality product

The quality control shall also include, but not limited to, the following process qualification details of coating, sealing/cementing

- (i) List of materials and material vendors
- (ii) Traceability including batch number, fabrication lot number and component identification.
- (iii) Cleanliness/contamination control

7. Shelf-Life:

The components shall be capable of operation without any degradation in performance for a storage period of 10 years and an operational period of 7 years with a design goal of 15 years. The manufacturer shall also specify the storage conditions and cleaning procedures of the components.



8. Packaging:

All deliverable components are to be packed as per **MIL-0-16898** and protection measures shall be incorporated for damages of the components against humidity, dust and shock (clear and proper handling instructions for customs personnel shall be given on the packages).

9. Inspection rights:

UVIT Team reserves the right to participate/monitor any of the tests. The supplier shall submit a schedule of activities including major milestones like environment tests, acceptance test, etc in advance.

10. Quotation:

The manufacturer/Vendor shall submit separate quotations for 2 and 3 flight components with 2 witness samples.

11. Deliverables:

The following is the list of deliverables. All components must be delivered along with qualification & acceptance tests documents, spectral characteristics and data sheets of each flight component and all witness samples.

Components	High pass filter Mirror	Witness sample
Quantities	2 / 3	2

Components	NUVB15	Witness sample
Quantities	2/ 3	2



12. Delivery Schedule:

The flight worthy components should be supplied within 24 weeks after the receipt of the purchase order. The fabricator should give detail time schedule of the various activities leading to the supply of the flight components and witness samples.

13. Applicable documents :

The latest versions of the following documents form a part of the specifications given in section I above.

- (i) MIL-O-13830 : Optical components for fire control instruments; general specifications covering the manufacture, assembly and inspection of.
- (ii) ESA-PSS-01-702 : A thermal vacuum test for the screening of space materials.
- (iii) MIL-M-13508C : Mirrors, glass, front surfaces aluminized for optical elements.
- (iv) MIL-C-675C : Coating of optical glass elements
- (v) MIL-C-48497 : Durability requirements for single or multilayer interference coating.
- (vi) MIL-O-16898 : Optical elements packing



Annexure -B

INSTRUCTIONS TO SUPPLIERS

1. Tenders should be sent in sealed and superscribed envelopes with mention of Tender No. date and date of opening. Only one Tender should be sent in each envelope.
2. Late and Delayed Tender will not considered at all.
3. Duties, Taxes where legally leviable and intended to be claimed should be distinctly shown separately in the Tender.
4. a) Your quotation should be valid for 90-120 days from the date. of opening of Tender
b) Prices are required to be quoted accordingly to the units indicated in the annexed tender form. When quotations are given in terms of units other than those specified in the tender form, relationship between the two sets of units must be furnished.
5. a) All available Technical Literature(s), Catalogue(s) and other data in support of the specifications and details of the item(s) should be furnished along with the offer.
b) Approximate net and gross weight of the items offered shall be indicated in your offer. If dimensional details are available the same should indicated in your offer.
c) Air freight/sea freight charges up to Bangalore Airport may be sent along with the offer.



d) SPECIFICATIONS:

Items/Equipment offered should strictly conform to our specifications. Deviation, if any should be clearly indicated by the Supplier in their quotation. The Supplier should also indicate the Make/type No. of the stores offered and provide catalogue(s), Technical literature(s) and sample(s), wherever necessary along with the quotations. Test certificates wherever necessary should be forwarded along with the supplies. Whenever options are called for in our specifications, the Supplier should address all such options. Wherever specifically mentioned by us the Supplier could suggest changes to specifications with appropriate response for the same.

1. Corrections, if any, must be attested. All amounts shall be indicated both in words as well as in figures. Where there is difference between amounts quoted in words and figures, amount quoted in words shall prevail.
2. The Supplier should supply along with the tender, the Banking information for payment or any other purpose
3. A complete set of instruction and operation manual should be supplied.
4. Final performance should be guaranteed.



TERMS AND CONDITIONS OF CONTRACT

1. DEFINITIONS:

- a) The terms 'Purchaser' shall mean the Director, Indian Institute of Astrophysics, Bangalore-560 034.
- b) The term 'Supplier' shall mean, the person, firm or company with whom or with which the order for the supply of Items/Equipment is placed.
- c) The terms 'Purchase Order' shall mean the communication signed on behalf of the Purchaser by an officer duly authorized intimating the acceptance on behalf the Purchaser on the terms and conditions mentioned or referred to in the said communications accepting the tender or offer of the supplier for supply of Items/Equipment.

2. PRICES:

The price may please be indicated on unit basis only.

Duty Exemption:

Please note that we may issue "Customs duty Exemption Certificate", if acceptable under the Govt. of India notification No. 51/96 valid till 2011.

3. GUARANTEE AND REPLACEMENT:

The Supplier shall guarantee that the Items/Equipment supplied shall comply fully with the specifications laid down, for material workmanship and performance. The Guarantee should be for a period of one year minimum from the date of supply.



4. **PACKING, FORWARDING AND INSURANCE:**

The Contractor will be held responsible for the stores being sufficiently and properly packed for transport by air, to withstand transit hazards and ensure safe arrival at the destination. The packing and marking of packing shall be done by and at the expenses of the contractor. The Purchaser will not pay separately for transit insurance, all risks in transit being exclusively of the Supplier and the Purchaser shall pay only for such Items/Equipment as are actually received in good condition, in accordance with contract.

5. **TEST CERTIFICATE:**

Wherever required Test Certificate should be sent before dispatch of the Items.

6. **ACCEPTANCE OF ITEMS/EQUIPMENT:**

a) It is expressly agreed that the acceptance of Items/Equipment, for is subject to final approval by the Purchaser, whose decision shall be final.

7. **DELIVERY PERIOD:**

Delivery is the essence of the contract. The supplier should adhered to delivery schedule as indicated in the Purchase order.

8. **EXTENTION OF DELIVERY TIME:**

As soon as it is apparent that Supplier dates cannot be adhered to, an application shall be sent by the Supplier to the Purchaser. If failure, on the part of the Supplier to deliver the Items/Equipment in proper time shall have arisen from any cause which the Purchaser may admit as reasonable ground for an extension of the time (and his decision shall be final he may allow such additional time as he considers it to be justified by the circumstances of the case) . In case of Letter of Credit the banking charges for the LOC amendment will be on suppliers account.



9. **PAYMENT:**

Preference will be given to the supplier whose payment terms is on Site Draft. _

10. **SECURITY FOR PAYMENT:**

Successful Supplier will have to furnish in the form of a Bank Guarantee or any other form as called for by the Purchaser towards any payments before supply of Items/Equipment. In case of payment through Letter of Credit the banking charges out side India and Inside India will be on suppliers account.