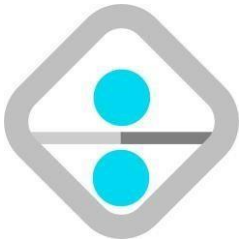
BHARATIYA RESERVE BANK NOTE MUDRAN PRIVATE LIMITED

VARNIKA

Expression of Interest (EOI)

For identifying suitable suppliers for supply of raw materials required for manufacturing of varnish and inks for banknote printing

EOI 001/MYS/VARNIKA-11/2023-24 dated 09.08.2023



Issued by:

SENIOR GENERAL MANAGER (PP)

VARNIKA

BHARATIYA RESERVE BANK NOTE MUDRAN (P) LTD (BRBNMPL)

(Wholly Owned subsidiary of Reserve Bank of India)

Note Mudran Nagar, Mysuru – 57003

Tel No: +91 - 821 – 2469079, 2469080

EMAIL: cvgiridhar@brbnmpl.co.in

Website: www.brbnmpl.co.in

NATIONAL EXPRESSION OF INTEREST (EOI) FOR IDENTIFYING SUITABLE SUPPLIERS FOR SUPPLY OF RAW MATERIALS REQUIRED FOR MANUFACTURING OF VARNISH AND INKS FOR BANKNOTE PRINTING

Not Transferable

***Security Classification: Non-*Security**

EOI 001/MYS/VARNIKA-11/2023-24 **Dated: 09.08.2023**

This EOI document contains 99 Pages

Document is given to:

M/s_____

Address_____

Details of contact person in BRBNMPL regarding this tender:

(Shri C V Giridhar)
Deputy General Manager

For and on behalf of

SENIOR GENERAL MANAGER (PP),
VARNIKA
BHARATIYA RESERVE BANK NOTE MUDRAN (P) LTD
(Wholly Owned Subsidiary of Reserve Bank of India)
Note Mudran Nagar, Mysuru – 570003
Tel No: 0821-2469079, 2469080
EMAIL: cvgiridhar@brbnmpl.co.in
Website: www.brbnmpl.co.in

NOTICE INVITING TENDER

BHARATIYA RESERVE BANK NOTE MUDRAN (P) LTD
(Wholly Owned subsidiary of Reserve Bank of India)
VARNIKA
Note Mudran Nagar, Mysuru – 570003
Tel No: 0821-2469079, 2469080

EOI 001/MYS/VARNIKA-11/2023-24 **Dated: 09.08.2023**

1. Bharatiya Reserve Bank Note Mudran Private Limited (BRBNMPL) is a wholly owned subsidiary of Reserve Bank of India having two printing presses one at Mysuru, Karnataka & the other at Salboni, West Bengal, for banknote production. As a part of backward integration and Make in India initiative, BRBNMPL has set up its own Ink manufacturing facility (Varnika) for manufacturing of varnishes and ink required for printing banknotes.

2. Expression of Interest (EOI) is invited for enlisting of vendors for supply of raw materials, only from Indian manufacturers or authorized representatives/dealers, distributors and stockists of Indian manufacturers. The raw materials are used in manufacture of varnish and inks (Offset, Intaglio and Numbering process) for banknote printing.

3. Vendors can participate directly or can authorize only one representative/ Distributor/ Dealer/ Stockists for participating in this EOI. (Bidders should qualify as Class-I or Class-II supplier as per the Preference to Make in India order dated 15/06/2017 and its amendments).

4. Details of approximate annual requirement of various raw materials are as below:

Sl. No.	Name of the Raw Material	Approx. Quantity Required per Annum (in Kg)
1	Invisible Fluorescent Yellowish Green	900
2	Invisible Fluorescent Yellow	100
3	Fluorescent Green	1050
4	Invisible Fluorescent Orange	150
5	Invisible Fluorescent Bluish Green	100
6	Invisible Fluorescent Greenish Blue	60
7	Calcium carbonate GCC Fine Powder	3,00,000
8	Hydrophobic Fumed Silica	35,000
9	Hydrophilic Fumed Silica	1,700
10	Solvent Type C10-13	38,000
11	Solvent Type C11-14	42,000
12	Solvent Type C14-18	10,000

Sl. No.	Name of the Raw Material	Approx. Quantity Required per Annum (in Kg)
13	Solvent Type C16-20	57,000
14	Micronized Polyethylene Wax	8,000
15	Carnauba Wax	31,000
16	Rosin Modified Phenolic Resin GV	9,000
17	Rosin Modified Phenolic Resin HD	10,000
18	Rosin Modified Phenolic Ester	58,000
19	Alkyd Resin	1,38,000
20	Alkyd Resin HD	4,000
21	Bentonite Clay	650
22	Lanolin (Pharmaceutical Grade)	500
23	Talc (Hydrated Magnesium Silicate)	900
24	Drier – Metal Drier [Cobalt Bis (2-Ethylhexanoate) and Zirconium Carboxylate Mixed Drier]	2000
25	Food Grade Fumaric Acid	13,000

Quantities mentioned above are only indicative. Two-part tender will be issued among the empaneled vendors for future procurement of above raw materials

5.

Type of Tender (Two Bid / PQB / EOI / RC / Development / Indigenization / Disposal of Scrap / Security item etc.	Expression of Interest (EOI)
Date of Publication of EOI documents	09.08.2023
Price of the EOI Document	Free
Closing date and time for receipt of EOI	14:30 hrs on 13.09.2023
Place of receipt of EOI along with samples	Administrative Building, BRBNMPL, Note Mudran Nagar, Mysuru-570003
Time and date of opening of EOI	13.09.2023 at 15:00 hrs.
Place of opening of EOI	Administrative Building, BRBNMPL, Note Mudran Nagar, Mysuru-570003
Nominated Person / Designation to receive bulky documents (Clause 21.1 of GIT)	Shri. C V Giridhar, Deputy General Manager, BRBNMPL, Mysuru

6. The interested vendors may obtain further information about this EOI from the above office. EOI documents may be downloaded from the BRBNMPL website: www.brbnmpl.co.in or can also be obtained from the office of Varnika, BRBNMPL, Mysuru.

7. On prior appointment, interested vendors may visit Varnika to understand the functional requirement of the proposed raw material required to be supplied/developed. For security reasons, the vendors are required to provide details of their representative/s who will be visiting Varnika, BRBNMPL, Mysore.
8. Vendors shall ensure that their offer, duly sealed and signed, complete in all respects as per instructions contained in the EOI, are dropped in the tender box, **along with the samples**, located at the address given above on or before the closing date and time indicated in the Para 5 above. The offers received within the last date prescribed in EOI will be evaluated and eligible vendors will be empaneled. Two-part tender will be issued among the empaneled vendors for future procurement of above raw materials.
9. In the event of any of the above mentioned dates being declared as a holiday / closed day for the purchase organization, the tenders will be sold / received / opened on the next working day at the appointed time.
10. Vendors may also download the EOI from the website and submit their offer by utilizing the downloaded document.
11. The EOI documents are not transferable.
12. Purchaser reserves the right to cancel the EOI / Reject all offers / Re-float the EOI without assigning any reason thereof. Purchaser also reserves the right to accept the EOI in whole or in part. Incomplete offers submitted not in accordance with the directions issued shall be liable for rejection.
13. Purchaser is not responsible for any postal delay and the EOI proposals may not be accepted for opening after due date and time. Any offers received after the due date will be evaluated and enlisted in the vendor base if found qualified. But these offers will not be considered for the immediate requirement of materials.
14. Interested vendors must satisfy themselves about all the details required to be filled in the EOI before submission of offer.
15. Vendors are required to stamp and provide their authorized signature on every page of the EOI document and all the supporting documents to be submitted.
16. Vendors shall mention the **serial number and name of the raw material** for which they are submitting their offer.
17. Submission of free sample is mandatory requirement for participation in this EOI. Offers submitted without free sample may be liable for rejection. Existing vendors need not submit samples for the materials which they are already supplying to Varnika.
18. Vendors submitting sample must compulsorily mention the product code and product batch number.
19. Applicable guidelines - Public Procurement Policy for Micro and Small Enterprises (MSEs) Order, 2012', Public Procurement (Preference to Make in India) Order, 2017' and order dated 16/09/2020, Ministry of Finance No 6/18/2019-PPD dated 23rd Jul 2020 (GFR 2017) and all related procurement guidelines issued by Government of India time to time. (Please refer attached annexures for reference).

A. Terms of Reference:

Vendor shall provide

i. Monthly capacity to supply each of the raw material for which the vendor is intending to participate in the offer.

ii. Material - wise indicative delivery time (ex-factory) required for the supply.

B. Procurement Process

Following are the details of vendor empanelment process of BRBNMPL.

i. Expression of Interest is being invited for empanelment of vendors for procurement of following raw materials from Indian manufacturers or authorized representatives/dealers, distributors and stockists of Indian manufacturers.

ii. Details of samples to be submitted along with EOI document:

Sl. No.	Name of Raw Material	Sample quantity to be submitted (grams)
1	Invisible Fluorescent Yellowish Green	25
2	Invisible Fluorescent Yellow	25
3	Fluorescent Green	50
4	Invisible Fluorescent Orange	50
5	Invisible Fluorescent Bluish Green	25
6	Invisible Fluorescent Greenish Blue	25
7	Calcium carbonate GCC Fine Powder	2000
8	Hydrophobic Fumed Silica	500
9	Hydrophilic Fumed Silica	250
10	Solvent Type C10-13	1000
11	Solvent Type C11-14	1000
12	Solvent Type C14-18	1000
13	Solvent Type C16-20	1000
14	Micronized Polyethylene Wax	1000
15	Carnauba Wax	2000
16	Rosin Modified Phenolic Resin GV	500
17	Rosin Modified Phenolic Resin HD	500
18	Rosin Modified Phenolic Ester	1500
19	Alkyd Resin	3000
20	Alkyd Resin HD	500

Sl. No.	Name of Raw Material	Sample quantity to be submitted (grams)
21	Bentonite Clay	500
22	Lanolin (Pharmaceutical Grade)	500
23	Talc (Hydrated Magnesium Silicate)	500
24	Drier – Metal Drier [Cobalt Bis (2-Ethylhexanoate) and Zirconium Carboxylate Mixed Drier]	500
25	Food Grade Fumaric Acid	500

iii. Samples will be on Free of Cost (FOC) basis i.e., on no cost-no commitment basis. Samples will be tested at VARNIKA, for their suitability for manufacturing of varnishes / inks for banknote printing. During sample evaluation, physical and chemical resistance properties of the sample will be tested as per the test methods mentioned in the technical specification.

iv. Vendors qualified in this EOI (satisfactory performance of samples and meeting the qualifying criteria) and enlisted as empanelled vendors will be invited to participate in two-part tender.

v. It shall be noted, if found necessary, purchaser may seek additional samples from the vendor/s, for extensive trials.

vi. At the purchaser's discretion, facility visit of the supplier will be carried out, if required.

C. Samples

i. Samples – If Vendor is interested in taking part in all materials, they shall provide samples for all the materials. Samples should pass the quality parameters mentioned in the technical specifications.

ii. Vendors may submit more than one sample for one raw material. Existing vendors need not submit samples for the materials which they are already supplying to Varnika.

iii. Vendor shall ensure that the samples are packed in air tight sealed spill proof containers to avoid spillage during transit.

iv. The samples shall be properly labelled with EOI reference number and name of the raw material as per the EOI document.

v. The offer document and the samples shall be submitted in separate packages with proper tracking.

vi. The samples and the offer document shall be addressed to:

Senior General Manager (PP),
VARNIKA
Bharatiya Reserve Bank Note Mudran (P) Ltd
Note Mudran Nagar,
Mysuru – 570003

D. Qualifying Criteria

The following are the qualifying criteria which must be fulfilled by the intending vendor:
General Terms:

I. If representatives, dealers, distributors or stockists are taking part in the EOI, the credentials of their principal manufacturer will be ascertained to meet the eligibility criteria.

II. Net worth of the firm should not be negative and also should not have eroded by more than 30% year-on-year in the last three years, ending on 31st March 2022. Please enclose the details of last three years' ending 31st Mar 2022 financial standings data (P/L accounts, Balance sheets) are duly certified by Chartered Accountant (CA).

III. The vendor must have an annual capacity to manufacture or supply at least 30% of requirement of the item to which they are intending to participate. Please provide a statement confirming the above on your letterhead.

IV. Principal manufacturers/OEMs, manufacturers under license or their authorized dealers / distributors / representatives who are exclusively appointed by the principal manufacturers / OEMs (Indian manufacturers only) shall be eligible to apply or to take part in the EOI. One Principal manufacturer / OEM can authorize only one dealer / distributor / representative for a particular tender. Similarly, one authorized Dealer/Distributor/Representative can represent only one Principal manufacturer / OEM in a particular tender. There can be only one offer from either:-

1. The Principal manufacturer/OEM directly; or
2. Any of its branch/division/subsidiary; or
3. Authorized Dealer/Distributor/Representative on behalf of the Principal manufacturer/OEM

Note:

I. In this EOI, either the Principal manufacturer/OEM or its authorized Dealer/ Distributor/Representative can bid but both cannot bid simultaneously in the same tender.

II. In case the vendor is an authorized Dealer/Distributor/Representative, then

a) the vendor should have been associated as authorised Dealer/ Distributor/Representative of the same or other Principal Manufacturer/OEM for same set of services as in present bid (supply, installation, satisfactorily commissioning, after sales service as the case may be) for same or similar 'Product' for past three years ending on 31st March 2022 and

b) the principal manufacturer/OEM should meet all the pre-qualification criteria without exemption.

E. Past Experience:

I. The Vendor or their principal manufacturer should have supplied the raw materials for

manufacturing varnish/printing inks during last five years as on date of submission.

II. The Vendor should provide names of the ink manufacturing companies to whom they have supplied respective material in the past indicating the quantities supplied annually during the last five years. (Previous Purchase Order copies to be enclosed).

III. One Vendor can provide more than one variety for each schedule for which he intends to participate.

IV. Samples provided will be used in laboratory for testing purpose.

V. Samples will be checked/used in laboratory to ascertain their suitability for manufacturing bank note printing inks, which will be used for banknote printing.

VI. The bidders applying as MSE's/Startups (whether MSEs or otherwise) shall be eligible for relaxation of norms with regard to prior experience. Relaxation on prior experience for Class-I and II Local Suppliers may also be considered as per para 10 a and b of revised Make in India Order.

i) OTHER REQUIREMENTS FOR THE VENDORS

a) Vendor shall clearly indicate in the EOI if any patent or other proprietary rights are involved for the material and if so whether the vendor has unlimited legal rights to deal with them/use them. The vendor shall completely indemnify and hold harmless the Purchaser from and against any claims of infringement of any patent from any source. The abuse of patent rights resulting in cartel formation could lead to permanent disqualification of the vendor. The Purchaser reserves the right to take such action as deemed fit over the same, without assigning any reason thereof.

b) Purchaser shall seek additional documents / information from any Vendor at any point of time, if required.

c) All experience, past performance, capacity/capability related data and other necessary declarations should be certified by the authorized signatory of the vendor.

d) The vendor should clearly indicate in their EOI that they are submitting the application for one or more materials.

ii) GENERAL INSTRUCTIONS FOR THE VENDORS

a) The vendor should provide testimony in support of the above mentioned requirements wherever applicable failing which the application will be rejected summarily without further correspondence.

b) The applications as per enclosed format, are to be submitted in a sealed cover super scribing on the top of the cover "EOI 001/MYS/VARNIKA-11/2023-24 **-** National Expression of Interest (EOI) for identifying suitable suppliers for supply of raw materials required for manufacturing of varnish and inks for banknote printing" and to be submitted to The Senior General Manager (PP), VARNIKA, BRBNMPL, Note Mudran Nagar, Mysuru – 570003 by 1430 hrs. IST on or before 13.09.2023 along

with the product samples to be considered for evaluation for issue of two-part tender in the forthcoming tender.

c) Applications received on or before the due date will only be considered for evaluation. The responsibility to submit EOI before the due date and time rests with vendor and BRBNMPL will not entertain any explanation/reason for late submission.

d) BRBNMPL will not be responsible for any delay in delivery of offers.

e) The changes/Amendment to this EOI will be updated in our website (www.brbnmpl.co.in) only. Vendors requested to visit our website regularly for periodic updates.

ENCLOSURES:

1. Annexure A: Technical Specification of 25 raw materials (76 Pages)
2. Annexure B: List of documents required
3. Annexure C: Information about the participant company.
4. Annexure D: Salient features of 'Public Procurement Policy for Micro and Small Enterprises (MSEs) Order, 2012'
5. Annexure E: Conditions for start-up companies
6. Annexure F: Salient features of revised 'Public Procurement (Preference to Make in India) Order, 2017'
7. Annexure G: Procedure to be adopted when the bidder qualifies as both MSE and class-I local supplier
8. Annexure H: Restrictions of procurement from countries sharing land border with India
9. Annexure I: Declaration & Undertaking by MSEs / Start-up Companies / Entities seeking purchase preference under Make In India Policy / Women entrepreneurs / Registration with TReDS/GeM

Annexure A: TECHNICAL SPECIFICATIONS

Sl. No.	Name of Raw Material	Sample quantity to be submitted (grams)	Page number of technical specifications
1	Invisible Fluorescent Yellowish Green	25	12-14
2	Invisible Fluorescent Yellow	25	15-17
3	Fluorescent Green	50	18-20
4	Invisible Fluorescent Orange	50	21-23
5	Invisible Fluorescent Bluish Green	25	24-26
6	Invisible Fluorescent Greenish Blue	25	27-29
7	Calcium carbonate GCC Fine Powder	2000	30-32
8	Hydrophobic Fumed Silica	500	33-35
9	Hydrophilic Fumed Silica	250	36-38
10	Solvent Type C10-13	1000	39-41
11	Solvent Type C11-14	1000	42-44
12	Solvent Type C14-18	1000	45-47
13	Solvent Type C16-20	1000	48-50
14	Micronized Polyethylene Wax	1000	51-53
15	Carnauba Wax	2000	54-56
16	Rosin Modified Phenolic Resin GV	500	57-59
17	Rosin Modified Phenolic Resin HD	500	60-62
18	Rosin Modified Phenolic Ester	1500	63-65
19	Alkyd Resin	3000	66-68
20	Alkyd Resin HD	500	69-71
21	Bentonite Clay	500	72-74
22	Lanolin (Pharmaceutical Grade)	500	75-77
23	Talc (Hydrated Magnesium Silicate)	500	78-80
24	Drier – Metal Drier [Cobalt Bis (2-Ethylhexanoate) and Zirconium Carboxylate Mixed Drier]	500	81-83
25	Food Grade Fumaric Acid	500	84-86

1. INVISIBLE FLUORESCENT YELLOWISH GREEN PIGMENT:

An easier-dispersing Invisible Fluorescent Yellowish Green Pigment powder with precisely controlled particle size distribution is required for manufacturing of high quality Offset and numbering ink. These inks will be used for printing of banknotes on 100% cotton rag substrate. Printing of banknote is carried out in high speed printing machines having a speed of 10000 to 12000 sheets per hour. Under these conditions printing has to be carried out without any major printing issues like – misting, filling, transfer issues etc.

Invisible Pigment Fluorescent Yellowish Green		
1	Chemical Class	Organic luminescent pigment for security coding
2	Form	Powder
3	Light Fastness (When 7 days" air dried print is subjected to Xenotest)	**Minimum 4 in the blue wool scale of 1 to 8 or comparable to the std. available with us.**
4	Chemical resistance	**≥ 4 (in the scale of 1- 5) or comparable to the std. available with us.**
5	Glow in UV light	Should glow intense yellowish green in all UV ranges particularly in 254 nm, 312 nm & 365 nm
6	Particle Size/Fineness of Grind	<5 microns on Hegmann Guage
7	Emission wavelength while exposing the printed drawdown at offset print thickness (printed with ink having 30% fluo pigment and 70 % transparent medium) under UV light i.e. 365 nm	**Should have following peaks as close to the reference.** **1st Peak 516 nm at 100% intensity** **2nd highest Peak 527nm** **3rd highest Peak 544 nm** **However final evaluation will be done in finished ink to check the exact shade, glow, peak identification and intensity.**
8	Admissible % of iron particles	It should not exceed 0.05%
9	Application	It will be used for making high quality security bank note printing ink.
10	Shade , strength, opacity, transparency	**As per standard material kept with us ± 5% of standard (Higher colour strength is also acceptable)**

1. The supplier has to furnish a test certificate for conformity as per the above specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests. For example, manufacturing of ink, quality control of ink samples including stability of ink during retention, press performance of ink, physical and chemical resistance tests etc.
3. Performance of the sample should be stable during the entire process of ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the Purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

A. PERFORMANCE ON THE INK MANUFACTURING MACHINES

<u>General Operational Requirements</u>: - Offered Pigment shall

(i) Work efficiently on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.
(ii) The offered pigment shall wet uniformly during premixing with medium.

(iii) **The offered pigment (premix of 30% pigment with oleoresinous varnish) shall grind/disperse on triple roll mill (Max set temp 35°C) in two passes with the tolerance of additional one pass.**
(iv) Have good compatibility with varnish, extenders, other pigments, solvents, waxes etc. used in manufacturing of Banknote printing inks.
(v) Be such that the inks manufactured from the offered pigment are non-corrosive to printing plates.
(vi) **Shelf life:** The offered Pigment should have shelf life of 3 years preferably.

B. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

General Operational Requirements: - Offered Pigment should be such that

(i) Ink prepared by using this pigment should not show any abnormal behavior while running on Offset, intaglio and numbering printing machines.
(ii) Ink should be stable during the retention period i.e. minimum 2 years.

C. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using the high security offset, intaglio and numbering ink where this pigment has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability, physical and chemical resistance of inks.

PHYSICAL RESISTANCE:
Crumpling Resistance: -
Test Method: Resistance to crumpling is evaluated by means of the Crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

Rub Resistance: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered pigment shall be such that the final ink should have light fastness more than 6.

CHEMICAL RESISTANCE: The offered Pigment shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.
Chemical Resistance Properties of Dried Print: -

Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below. The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,

5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).

Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The Pigment sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls etc. The sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc. The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered pigment shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile organic compounds or odour, which would be harmful to health of the employee while working on machines and the manufacturer, shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

2. INVISIBLE FLUORESCENT YELLOW PIGMENT:

An easier-dispersing Invisible Fluorescent Yellow Pigment powder with precisely controlled particle size distribution is required for manufacturing of high quality Offset and Numbering ink. These inks will be used for printing of banknotes on 100% cotton rag substrate. Printing of banknote is carried out in high speed printing machines having a speed of 10000 to 12000 sheets per hour. Under these conditions printing has to be carried out without any major printing issues like – misting, filling, transfer issues etc.

Invisible Pigment Fluorescent Yellow		
1	Chemical Class	Organic luminescent pigment for security coding
2	Form	Powder
3	Light Fastness (When 7 days" air dried print is subjected to Xenotest)	**Minimum 4 in the blue wool scale of 1 to 8 or comparable to the std. available with us.**
4	Chemical resistance	**≥ 4 (in the scale of 1- 5) or comparable to the std. available with us.**
5	Glow in UV light	Should glow intense yellow in all UV ranges particularly in 254 nm, 312 nm & 365 nm
6	Particle Size/Fineness of Grind	<5 microns on Hegmann Guage
7	Emission wavelength while exposing the printed drawdown at offset print thickness (printed with ink having 30% fluo pigment and 70 % transparent medium) under UV light i.e. 365 nm	**Should have following peaks as close to the reference.** **1st Peak 546 nm at 100% intensity** **2nd highest Peak 562 nm** **3rd highest Peak 586 nm** **However final evaluation will be done in finished ink to check the exact shade, glow, peak identification and intensity.**
8	Admissible % of iron particles	It should not exceed 0.05%
9	Application	It will be used for making high quality security bank note printing ink.
10	Shade , strength, opacity, transparency	**As per standard material kept with us ± 5% of standard (Higher colour strength is also acceptable)**

1. The supplier has to furnish a test certificate for conformity as per the above specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests. For example, manufacturing of ink, quality control of ink samples including stability of ink during retention, press performance of ink, physical and chemical resistance tests etc.
3. Performance of the sample should be stable during the entire process of ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the Purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

A. PERFORMANCE ON THE INK MANUFACTURING MACHINES

<u>General Operational Requirements</u>: - Offered Pigment shall

(i) Work efficiently on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.
(ii) The offered pigment shall wet uniformly during premixing with medium.
(iii) **The offered pigment (premix of 30% pigment with oleoresinous varnish) shall grind/disperse on triple roll mill (Max set temp 35°C) in two passes with the tolerance of additional one pass.**

(iv) Have good compatibility with varnish, extenders, other pigments, solvents, waxes etc. used in manufacturing of Banknote printing inks.
(v) Be such that the inks manufactured from the offered pigment are non-corrosive to printing plates.
(vi) **Shelf life:** The offered Pigment should have shelf life of 3 years preferably.

B. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

General Operational Requirements: - Offered Pigment should be such that

(i) Ink prepared by using this pigment should not show any abnormal behavior while running on Offset, intaglio and numbering printing machines.
(ii) Ink should be stable during the retention period i.e. minimum 2 years.

C. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using the high security offset, intaglio and numbering ink where this pigment has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability, physical and chemical resistance of inks.

PHYSICAL RESISTANCE:
Crumpling Resistance: -
Test Method: Resistance to crumpling is evaluated by means of the Crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable Rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

Rub Resistance: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered Pigment shall be such that the final ink should have light fastness more than 6.

CHEMICAL RESISTANCE: The offered pigment shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.

Chemical Resistance Properties of Dried Print: -

Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below.

The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,
5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).
Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The Pigment sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls etc. The sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc. The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered pigment shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile organic compounds or odour, which would be harmful to health of the employee while working on machines and the manufacturer, shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

3. FLUORESCENT GREEN PIGMENT:

An easier-dispersing Fluorescent Green Pigment powder with precisely controlled particle size distribution is required for manufacturing of high quality Offset and Numbering ink. These inks will be used for printing of banknotes on 100% cotton rag substrate. Printing of banknote is carried out in high speed printing machines having a speed of 10000 to 12000 sheets per hour. Under these conditions printing has to be carried out without any major printing issues like – misting, filling, transfer issues etc.

Pigment Fluorescent Green		
1	Chemical Class	Inorganic or organic luminescent pigment for security coding
2	Form	Powder
3	Light Fastness (When 7 days" air dried print is subjected to Xenotest)	**Minimum 4 in the blue wool scale of 1 to 8 or comparable to the std. available with us.**
4	Chemical resistance	**≥ 4 (in the scale of 1- 5) or comparable to the std. available with us.**
5	Glow in UV light	Should glow intense green in all UV ranges particularly in 254 nm, 312 nm & 365 nm
6	Particle Size/Fineness of Grind	<5 microns on Hegmann Guage
7	Emission wavelength while exposing the printed drawdown at offset print thickness (printed with ink having 30% fluo pigment and 70 % transparent medium) under UV light i.e. 365 nm	**Should have following peaks as close to the reference.** **1st Peak 521 ± 8 nm at 100% intensity** **2nd highest Peak 546 nm** **However final evaluation will be done in finished ink to check the exact shade, glow, peak identification and intensity.**
8	Admissible % of iron particles	It should not exceed 0.05%
9	Application	It will be used for making high quality security bank note printing ink.
10	Shade , strength, opacity, transparency	**As per standard material kept with us ± 5% of standard (Higher colour strength is also acceptable)**

1. The supplier has to furnish a test certificate for conformity as per the above specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests. For example, manufacturing of ink, quality control of ink samples including stability of ink during retention, press performance of ink, physical and chemical resistance tests especially for rub resistance, laundry test, circulation and simulation, crumpling test etc.
3. Performance of the sample should be stable during the entire process of ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the Purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

A. PERFORMANCE ON THE INK MANUFACTURING MACHINES

<u>General Operational Requirements</u>: - Offered Pigment shall

(i) Work efficiently on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.
(ii) The offered pigment shall wet uniformly during premixing with medium.

(iii) **The offered pigment (premix of 50% pigment with oleoresinous varnish) shall grind/disperse on triple roll mill (Max set temp 35°C) in two passes with the tolerance of additional one pass.**
(iv) Have good compatibility with varnish, extenders, other pigments, solvents, waxes etc. used in manufacturing of banknote printing inks.
(v) Be such that the inks manufactured from the offered pigment are non-corrosive to printing plates.
(vi) **Shelf life:** The offered Pigment should have shelf life of 3 years preferably.

B. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

General Operational Requirements: - Offered Pigment should be such that

(i) Ink prepared by using this pigment should not show any abnormal behavior while running on Offset, intaglio and numbering printing machines.
(ii) Ink should be stable during the retention period i.e. minimum 2 years.

C. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using the high security offset, intaglio and numbering ink where this pigment has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability, physical and chemical resistance of inks.

PHYSICAL RESISTANCE:
Crumpling Resistance: -
Test Method: Resistance to crumpling is evaluated by means of the Crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable Rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

Rub Resistance: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered pigment shall be such that the final ink should have light fastness more than 6.

CHEMICAL RESISTANCE: The offered pigment shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.

Chemical Resistance Properties of Dried Print: -

Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below. The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,

5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).
Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The Pigment sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls etc. The sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc. The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered Pigment shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile or odour, which would be harmful to health of the employee while working on machines and the manufacturer shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

4. INVISIBLE FLUORESCENT ORANGE PIGMENT:

An easier-dispersing Invisible Fluorescent Orange Pigment powder with precisely controlled particle size distribution is required for manufacturing of high quality Offset and numbering ink. These inks will be used for printing of banknotes on 100% cotton rag substrate. Printing of banknote is carried out in high speed printing machines having a speed of 10000 to 12000 sheets per hour. Under these conditions printing has to be carried out without any major printing issues like – misting, filling, transfer issues etc.

Pigment Fluorescent Orange		
1	Chemical Class	Inorganic or Organic luminescent pigment for security coding
2	Form	Powder
3	Light Fastness (When 7 days" air dried print is subjected to Xenotest)	**Minimum 4 in the blue wool scale of 1 to 8 or comparable to the std. available with us.**
4	Chemical resistance	**≥ 4 (in the scale of 1- 5) or comparable to the std. available with us.**
5	Glow in UV light	Should glow intense Orange in all UV ranges particularly in 254 nm, 312 nm & 365 nm
6	Particle Size/Fineness of Grind	<5 microns on Hegmann Guage
7	Emission wavelength while exposing the printed drawdown at offset print thickness (printed with ink having 30% fluo pigment and 70 % transparent medium) under UV light i.e. 365 nm	**Should have following peaks as close to the reference.** **1st Peak 595 ± 10 nm at 100% intensity** **However final evaluation will be done in finished ink to check the exact shade, glow, peak identification and intensity.**
8	Admissible % of iron particles	It should not exceed 0.05%
9	Application	It will be used for making high quality security bank note printing ink.
10	Shade , strength, opacity, transparency	**As per standard material kept with us ± 5% of standard (Higher colour strength is also acceptable)**

1. The supplier has to furnish a test certificate for conformity as per the above specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests. For example, manufacturing of ink, quality control of ink samples including stability of ink during retention, press performance of ink, physical and chemical resistance tests etc.
3. Performance of the sample should be stable during the entire process of ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

A. PERFORMANCE ON THE INK MANUFACTURING MACHINES

<u>General Operational Requirements</u>: - Offered Pigment shall

(i) Work efficiently on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.
(ii) The offered pigment shall wet uniformly during premixing with medium.
(iii) **The offered pigment (premix of 30% pigment with oleoresinous varnish) shall grind/disperse on triple roll mill (Max set temp 35°C) in two passes with the tolerance of additional one pass.**
(iv) Have good compatibility with varnish, extenders, other pigments, solvents, waxes etc. used in manufacturing of Banknote printing inks.

(v) Be such that the inks manufactured from the offered pigment are non-corrosive to printing plates.
(vi) **Shelf life:** The offered pigment should have shelf life of 3 years preferably.

B. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

General Operational Requirements: - Offered Pigment should be such that

(i) Ink prepared by using this pigment should not show any abnormal behavior while running on Offset, intaglio and numbering printing machines.
(ii) Ink should be stable during the retention period i.e. minimum 2 years.

C. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using the high security offset, intaglio and numbering ink where this pigment has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability, physical and chemical resistance of inks.

PHYSICAL RESISTANCE:
Crumpling Resistance: -
Test Method: Resistance to crumpling is evaluated by means of the Crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

Rub Resistance: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered Pigment shall be such that the final ink should have light fastness more than 6.

CHEMICAL RESISTANCE: The offered Pigment shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.

Chemical Resistance Properties of Dried Print: -

Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below.

The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,
5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).
Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The Pigment sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls etc. The sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc. The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered Pigment shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile organic compounds or odour, which would be harmful to health of the employee while working on machines and the manufacturer, shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

5. INVISIBLE FLUORESCENT BLUISH GREEN PIGMENT:

An easier-dispersing Invisible Fluorescent Bluish Green Pigment powder with precisely controlled particle size distribution is required for manufacturing of high quality Offset and Numbering ink. These inks will be used for printing of banknotes on 100% cotton rag substrate. Printing of banknote is carried out in high speed printing machines having a speed of 10000 to 12000 sheets per hour. Under these conditions printing has to be carried out without any major printing issues like – misting, filling, transfer issues etc.

Invisible Pigment Fluorescent Bluish green		
1	Chemical Class	Organic luminescent pigment for security coding
2	Form	Powder
3	Light Fastness (When 7 days" air dried print is subjected to Xenotest)	**Minimum 4 in the blue wool scale of 1 to 8 or comparable to the std. available with us.**
4	Chemical resistance	**≥ 4 (in the scale of 1- 5) or comparable to the std. available with us.**
5	Glow in UV light	Should glow intense Bluish green in all UV ranges particularly in 254 nm, 312 nm & 365 nm
6	Particle Size/Fineness of Grind	<5 microns on Hegmann Guage
7	Emission wavelength while exposing the printed drawdown at offset print thickness (printed with ink having 30% fluo pigment and 70 % transparent medium) under UV light i.e. 365 nm	**Should have following peaks as close to the reference.** **1st Peak 513 nm at 100% intensity** **2nd highest Peak 499 nm** **3rd highest Peak 486 nm** **4th highest Paek 542 nm & 473 nm** **However final evaluation will be done in finished ink to check the exact shade, glow, peak identification and intensity.**
8	Admissible % of iron particles	It should not exceed 0.05%
9	Application	It will be used for making high quality security bank note printing ink.
10	Shade , strength, opacity, transparency	**As per standard material kept with us ± 5% of standard (Higher colour strength is also acceptable)**

1. The supplier has to furnish a test certificate for conformity as per the above specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests. For example, manufacturing of ink, quality control of ink samples including stability of ink during retention, press performance of ink, physical and chemical resistance tests etc.
3. Performance of the sample should be stable during the entire process of ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the Purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

A. PERFORMANCE ON THE INK MANUFACTURING MACHINES

<u>General Operational Requirements</u>: - Offered Pigment shall

(i) Work efficiently on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.
(ii) The offered pigment shall wet uniformly during premixing with medium.
(iii) **The offered pigment (premix of 30% pigment with oleoresinous varnish) shall grind/disperse on triple roll mill (Max set temp 35°C) in two passes with the tolerance of additional one pass.**

(iv) Have good compatibility with varnish, extenders, other pigments, solvents, waxes etc. used in manufacturing of Banknote printing inks.
(v) Be such that the inks manufactured from the offered pigment are non-corrosive to printing plates.
(vi) **Shelf life:** The offered Pigment should have shelf life of 3 years preferably.

B. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

General Operational Requirements: - Offered pigment should be such that

(i) Ink prepared by using this pigment should not show any abnormal behavior while running on Offset, intaglio and numbering printing machines.
(ii) Ink should be stable during the retention period i.e. minimum 2 years.

C. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using the high security offset, intaglio and numbering ink where this pigment has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability, physical and chemical resistance of inks.

PHYSICAL RESISTANCE:
Crumpling Resistance: -
Test Method: Resistance to crumpling is evaluated by means of the Crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable Rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

Rub Resistance: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered pigment shall be such that the final ink should have light fastness more than 6.

CHEMICAL RESISTANCE: The offered pigment shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.

Chemical Resistance Properties of Dried Print: -

Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below.

The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,

5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).

Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The Pigment sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls etc. The sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc. The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered pigment shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile organic compounds or odour, which would be harmful to health of the employee while working on machines and the manufacturer, shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

6. INVISIBLE FLUORESCENT GREENISH BLUE PIGMENT:

An easier-dispersing Invisible Fluorescent Greenish Blue Pigment powder with precisely controlled particle size distribution is required for manufacturing of high quality Offset and Numbering ink. These inks will be used for printing of banknotes on 100% cotton rag substrate. Printing of banknote is carried out in high speed printing machines having a speed of 10000 to 12000 sheets per hour. Under these conditions printing has to be carried out without any major printing issues like – misting, filling, transfer issues etc.

Invisible Pigment Fluorescent Greenish Blue		
1	Chemical Class	Organic luminescent pigment for security coding
2	Form	Powder
3	Light Fastness (When 7 days" air dried print is subjected to Xenotest)	**Minimum 4 in the blue wool scale of 1 to 8 or comparable to the std. available with us.**
4	Chemical resistance	**≥ 4 (in the scale of 1- 5) or comparable to the std. available with us.**
5	Glow in UV light	Should glow intense Greenish Blue in all UV ranges particularly in 254 nm, 312 nm & 365 nm
6	Particle Size/Fineness of Grind	<5 microns on Hegmann Guage
7	Emission wavelength while exposing the printed drawdown at offset print thickness (printed with ink having 30% fluo pigment and 70 % transparent medium) under UV light i.e. 365 nm	**Should have following peaks as close to the reference.** **1st Peak 514 nm at 100% intensity** **2nd highest Peak 500 nm** **3rd highest Peak 486 nm** **4th highest Peak 474 nm & 543 nm** **However final evaluation will be done in finished ink to check the exact shade, glow, peak identification and intensity.**
8	Admissible % of iron particles	It should not exceed 0.05%
9	Application	It will be used for making high quality security bank note printing ink.
10	Shade , strength, opacity, transparency	**As per standard material kept with us ± 5% of standard (Higher colour strength is also acceptable)**

1. The supplier has to furnish a test certificate for conformity as per the above specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests. For example, manufacturing of ink, quality control of ink samples including stability of ink during retention, press performance of ink, physical and chemical resistance tests etc.
3. Performance of the sample should be stable during the entire process of ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the Purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

A. PERFORMANCE ON THE INK MANUFACTURING MACHINES

<u>General Operational Requirements</u>: - Offered Pigment shall

(i) Work efficiently on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.
(ii) The offered pigment shall wet uniformly during premixing with medium.
(iii) **The offered pigment (premix of 30% pigment with oleoresinous varnish) shall grind/disperse on triple roll mill (Max set temp 35°C) in two passes with the tolerance of additional one pass.**

(iv) Have good compatibility with varnish, extenders, other pigments, solvents, waxes etc. used in manufacturing of Banknote printing inks.
(v) Be such that the inks manufactured from the offered pigment are non-corrosive to printing plates.
(vi) **Shelf life:** The offered Pigment should have shelf life of 3 years preferably.

B. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

General Operational Requirements: - Offered Pigment should be such that

(i) Ink prepared by using this pigment should not show any abnormal behavior while running on Offset, intaglio and numbering printing machines.
(ii) Ink should be stable during the retention period i.e. minimum 2 years.

C. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using the high security offset, intaglio and numbering ink where this pigment has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability, physical and chemical resistance of inks.

PHYSICAL RESISTANCE:
Crumpling Resistance: -
Test Method: Resistance to crumpling is evaluated by means of the Crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

Rub Resistance: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered pigment shall be such that the final ink should have light fastness more than 6.

CHEMICAL RESISTANCE: The offered pigment shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.

Chemical Resistance Properties of Dried Print: -

Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below.

The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,

5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).
Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The pigment sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls etc. The sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc. The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered pigment shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile organic compounds or odour, which would be harmful to health of the employee while working on machines and the manufacturer, shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

7. CALCIUM CARBONATE (GCC POWDER):

An easier-dispersing Calcium Carbonate GCC powder with precisely controlled particle size distribution is required for manufacturing of high quality intaglio security ink. This ink will be used for printing of banknotes on 100% cotton rag substrate. Printing of banknote is carried out in high speed printing machines having a speed of 10000 sheets per hour. Under these conditions printing has to be carried out without any major printing issues like – misting, filling, transfer issues, wipability of ink etc.

CALCIUM CARBONATE GCC POWDER		
1	Chemical Class	Calcium Carbonate (Uncoated Powder)
2	Form	Fine Powder
3	Calcium carbonate (CaCO3)	≥95%
4	Particle Size µm (D-97)	<11.5
5	Particle Size µm (D-50)	<4
6	Brightness	≥94%
7	Oil absorption, g/100 gms of the calcium carbonate	18 - 23
8	pH (10% Solution)	8.0-9.5
9	Sp. Gravity	2.65 - 2.70
10	Application	It will be used for making high quality bank note printing ink.

1. The supplier has to furnish a test certificate for conformity as per the above specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests. For example, manufacturing of ink, quality control of ink samples including stability of ink during retention, press performance of ink, physical and chemical resistance tests etc.
3. The sample should have stable performance during the entire process of ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the Purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

A. PERFORMANCE ON THE INK MANUFACTURING MACHINES

General Operational Requirements: - Offered Calcium carbonate shall

(i) Work efficiently on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.
(ii) The offered calcium carbonate shall wet uniformly during premixing with medium.
(iii) The offered calcium carbonate (premix of 40% calcium carbonate with oleo resinous varnish and other raw materials) shall grind/disperse on triple roll mill (Max set temp 30°C) in two passes with the tolerance of additional one pass.
(iv) Have good compatibility with varnish, other extenders, solvents, waxes etc. used in manufacturing of Banknote printing inks.
(v) The inks manufactured from the offered calcium carbonate are non-corrosive to printing plates.
(vi) **Shelf life:** The offered calcium carbonate should have shelf life of 3 years preferably.

B. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

General Operational Requirements: - Offered Calcium Carbonate should be such that

(i) Ink prepared by using offered Calcium Carbonate should not show any abnormal behavior while running on intaglio printing machines.
(ii) Ink should be stable during the retention period i.e. up to 2 years.
(iii) Printed sheets should withstand the scuffing forces and should not be damaged during running on numbering machines and during the high speed automated paper cutting and counting machines.

C. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using the high security intaglio ink where the offered Calcium Carbonate has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability, physical and chemical resistance of inks.

PHYSICAL RESISTANCE:
Crumpling Resistance: -

Test Method: Resistance to crumpling is evaluated by means of the Crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable Rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

Rub Resistance: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered calcium carbonate shall not affect the light fastness of final ink.

CHEMICAL RESISTANCE: The offered Calcium carbonate shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.

Chemical Resistance Properties of Dried Print: -

Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below. The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,
5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).
Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The Calcium carbonate sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls etc. The sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc. The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered Calcium carbonate shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile organic compounds or odour, which would be harmful to health of the employee while working on machines and the manufacturer, shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

8. HYDROPHOBIC FUMED SILICA:

Hydrophobic Fumed Silica is required for manufacturing of high security Intaglio, Offset and Numbering ink for banknote printing. The banknote paper is made from 100% rag cotton substrate. Printing of banknote is carried out in high speed printing machines running at a speed ranging from 10000 to 12000 sheets per hour on banknote printing machines. Under these conditions printing has to be carried out without any major printing issues like – misting, filling, transfer issues, wipability of ink etc.

HYDROPHOBIC FUMED SILICA		
1	Type	Hydrophobic Fumed Silica
2	Appearance	Fine white colour Powder
3	Specific Surface Area (BET)	90 to 145 m2/g
4	pH value in 4% dispersion	3.6 to 5.5
5	SiO_2 Content	> 99.8%
6	Loss on drying 2 Hrs @ 105°C	<=1.0 %
7	Tamped Density	Max. 70 g/l

1. The Supplier has to furnish a test certificate for conformity as per above specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests. For example, manufacturing of anti-set off paste, manufacturing of offset, intaglio and numbering ink, quality control of anti-set off paste, offset, intaglio and numbering ink samples including solubility of ink, stability of ink during retention, press performance of inks, physical and chemical resistance tests etc.
3. The sample should have a stable performance during the entire process of ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the Purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

A. PERFORMANCE ON THE VARNISH/INK MANUFACTURING MACHINES

General Operational Requirements: - Offered Hydrophobic Fumed Silica shall

(vii) Work smoothly on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.
(viii) Have good compatibility with other components such as Oil based Medium, High boiling mineral distillates, other vehicles/ varnish, extenders, pigment, solvents, waxes etc. used in manufacturing of Banknote printing inks.
(ix) Be suitable for manufacturing varnish/inks to obtain appropriate rheology (Viscosity, Tack), solid content and acid value as required for satisfactory running in intaglio printing machines**.**
(x) The inks manufactured by the offered Hydrophobic fumed silica shall be non-corrosive to printing plates.
(xi) **Shelf life:** The Hydrophobic fumed silica in sealed container/bags should have shelf life of 2 years preferably.

B. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

General Operational Requirements: - Offered Hydrophobic Fumed Silica should be such that

(i) Ink prepared by using this Hydrophobic fumed silica should work smoothly on offset, intaglio and numbering printing machines.

(ii) There should not be any set off in the printed sheets after keeping in the pile (approx. 1000 sheets) for drying.
(iii) Printed sheets should dry within the regular drying time.
(iv) Printed sheets should withstand the scuffing forces and should not be damaged during running on numbering machines and during the high speed automated paper cutting and counting machines.

C. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using high security offset, intaglio and numbering ink where the target Hydrophobic fumed silica has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability and physical and chemical resistance of inks.

PHYSICAL RESISTANCE:

Crumpling Resistance: -

Test Method: Resistance to crumpling is evaluated by means of the Crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable Rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

Rub Resistance: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered Hydrophobic fumed silica shall be such that this should not affect the light fastness of the manufactured ink.

CHEMICAL RESISTANCE: The offered Hydrophobic fumed silica shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.

Chemical Resistance Properties of Dried Print: -

Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below. The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,
5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).
Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The Hydrophobic fumed silica sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls etc. The sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc. The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered Hydrophobic fumed silica shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile or odour, which would be harmful to health of the employee while working on machines and the manufacturer shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

9. HYDROPHILIC FUMED SILICA:

Hydrophilic Fumed Silica is required for manufacturing of high security intaglio ink for banknote printing. The banknote paper is made from 100% rag cotton substrate. Printing of banknote is carried out in high speed printing machines running at a speed of 10000 sheets per hour on Banknote Printing machines. Under these conditions printing has to be carried out without any major printing issues like – misting, filling, transfer issues, wipability of ink etc.

HYDROPHILIC FUMED SILICA		
1	Type	Hydrophilic Fumed Silica
2	Appearance	Fine white colour Powder
3	Specific Surface Area (BET)	175 to 230 m2/g
4	pH value in 4% dispersion	3.7 to 4.5
5	SiO_2 Content	> 99.8%
6	Loss on drying 2 Hrs @ 105°C	<=2.0%
7	Tamped Density	Approx. 50 - 60 g/l

1. The Supplier has to furnish a test certificate for conformity as per above specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests. For example, manufacturing of anti-set off, manufacturing of colour shift intaglio medium & manufacturing of colour shift intaglio ink, quality control of anti-set off paste, colour shift intaglio medium and ink samples including solubility of ink, stability of ink during retention, press performance of inks, physical and chemical resistance tests etc.
3. The sample should have a stable performance during the entire process of ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the Purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

A. PERFORMANCE ON THE VARNISH/INK MANUFACTURING MACHINES

<u>General Operational Requirements</u>: - Offered Hydrophilic Fumed Silica shall

(xii) Work smoothly on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.

(xiii) Have good compatibility with other components such as Oil based Medium, High boiling mineral distillates, other vehicles/ varnish, extenders, pigment, solvents, waxes etc. used in manufacturing of Banknote printing inks.

(xiv) Be suitable for manufacturing varnish/inks to obtain appropriate rheology (Viscosity, Tack), solid content and acid value as required for satisfactory running in intaglio printing machines**.**

(xv) The inks manufactured from the offered hydrophilic fumed silica shall be non-corrosive to printing plates.

(xvi) **Shelf life:** The hydrophilic fumed silica in sealed container/bags should have shelf life of 2 years preferably.

B. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

<u>General Operational Requirements</u>: - Offered Hydrophilic Fumed Silica should be such that

(i) Ink prepared by using this hydrophilic fumed silica should work smoothly on intaglio printing machines.
(ii) There should not be any set off in the printed sheets after keeping in the pile (approx. 1000 sheets) for drying.
(iii) Printed sheets should dry within the regular drying time.
(iv) Printed sheets should withstand the scuffing forces and should not be damaged during running on numbering machines and during the high speed automated paper cutting and counting machines.

C. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using high security intaglio ink where the target hydrophilic fumed silica has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability and physical and chemical resistance of inks.

PHYSICAL RESISTANCE:
Crumpling Resistance: -
Test Method: Resistance to crumpling is evaluated by means of the Crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable Rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

Rub Resistance: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered hydrophilic fumed silica shall be such that this should not affect the light fastness of the manufactured ink.

CHEMICAL RESISTANCE: The offered hydrophilic fumed silica shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.

Chemical Resistance Properties of Dried Print: -

Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below. The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,
5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).
Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The hydrophilic fumed silica sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls etc. The sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc. The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered hydrophilic fumed silica shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile organic compounds or odour, which would be harmful to health of the employee while working on machines and the manufacturer, shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

10. SOLVENT TYPE C10-13

The high quality hydrocarbon solvent is used in manufacture of varnish which in turn is used in manufacture of intaglio inks for banknote printing. The banknote paper is made from 100% rag cotton substrate. Printing of banknote is carried out in high speed printing machines having a speed of 10000 sheets per hour. Under these conditions printing has to be carried out without any major printing issues like – misting, filling, transfer issues etc.

SOLVENT (Low Aromatic Solvent)		
1	Type	Solvent-Hydrocarbons, C10-C13
2	Physical state	Liquid (Free from any foreign particles and dust)
3	Colour	Water white to very light yellowish
4	Density @ 15°C	0.790 ± 0.015
5	Initial Boiling point @ 760 mm Hg	Between 177°C to 182°C
6	Final Boiling point @ 760 mm Hg	220°C Max
7	Aniline Point:	70-72°C
10	Aromatic Content	<0.5%

1. The supplier has to furnish a test certificate for conformity as per the tender specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests. For example, manufacturing of varnish, manufacturing of inks, quality control of varnish and ink samples including curing/drying of ink, stability of inks/varnish during retention, press performance of inks, physical and chemical resistance tests etc.
3. The sample should have a stable performance during the entire process of varnish/ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the Purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

A. PERFORMANCE ON THE VARNISH/INK MANUFACTURING MACHINES

General Operational Requirements: - Offered Hydrocarbon solvent shall

(i) Work smoothly while processing in the reactor at high temperature (up to 250°C) during processing of varnish.
(ii) The varnish thus manufactured shall work smoothly on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.
(iii) Have good compatibility with other components such as rosin modified phenolic resin, alkyd resins, Tung oil, High boiling mineral distillates, other vehicles/ varnish, extenders, pigment, solvents etc. used in manufacturing of Banknote printing inks.
(iv) Be suitable for manufacturing varnish/inks to obtain appropriate rheology (Viscosity, Tack) as required for satisfactory running in intaglio printing machines**.**
(v) The inks manufactured by the offered materials shall be non-corrosive to printing plates.
(vi) **Shelf life:** The Hydrocarbon solvent in sealed container/drums should have shelf life 2 years preferably.

B. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

General Operational Requirements: - Offered Hydrocarbon solvent should be such that

(i) Ink prepared by using this solvent should work smoothly on intaglio ink printing machines.
(ii) The offered solvent should not have any adverse impact on ink drying on rollers, set off in the printed sheets after keeping in the pile (approx. 1000 sheets) for drying.
(iii) Printed sheets should dry within the regular drying time.

C. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using the intaglio ink where the target solvent has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability and physical and chemical resistance of inks.

PHYSICAL RESISTANCE:
Crumpling Resistance: -

Test Method: Resistance to crumpling is evaluated by means of the Crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable Rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

Rub Resistance: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered solvent shall be such that this should not affect the light fastness of the manufactured ink.

CHEMICAL RESISTANCE: The offered solvent shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.

Chemical Resistance Properties of Dried Print: -
Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below. The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,
5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).
Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The solvent sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls, restricted poly cyclic aromatic and aliphatic hydrocarbons etc. The sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc. The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered solvent shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile organic compounds or odour, which would be harmful to health of the employee while working on machines and the manufacturer, shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

11. SOLVENT TYPE C11-14

The high quality hydrocarbon solvent is used in manufacture of varnish which in turn is used in manufacturing of high security intaglio inks for banknote printing. The banknote paper is made from 100% rag cotton substrate. Printing of banknote is carried out in high speed printing machines having a speed of 10000 sheets per hour. Under these conditions, printing has to be carried out without any major printing issues like – misting, filling, transfer issues etc.

SOLVENT TYPE 3		
1	Type	Solvent-Hydrocarbons, C11-C14
2	Physical state	Clear Transparent Liquid (Free from any foreign particles and dust)
3	Colour	Water white
4	Specific Gravity @ 15°C	0.770 – 0.810
5	Initial Boiling point @ 760 mm Hg	205°C ± 5°C
6	Final Boiling point @ 760 mm Hg	270°C Max
7	Aniline Point:	75°C to 77°C
8	Refractive index, nD20°C	1.435 to 1.445
9	Flash Point (Pensky - Mrtens closed cup)	>75 °C
10	Aromatic Content	<2%

1. The supplier has to furnish a test certificate for conformity as per the tender specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests. For example manufacturing of varnish, manufacturing of inks, quality control of varnish and ink samples including curing/drying of ink, stability of inks/varnish during retention, press performance of inks, physical and chemical resistance tests etc.
3. The sample should have a stable performance during the entire process of varnish/ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the Purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

A. PERFORMANCE ON THE VARNISH/INK MANUFACTURING MACHINES

<u>General Operational Requirements</u>: - Offered Hydrocarbon solvent shall

(i) Work smoothly while processing in the reactor at high temperature (up to 250°C) during processing of varnish.
(ii) The varnish thus manufactured shall work smoothly on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.
(iii) Have good compatibility with other components such as rosin modified phenolic resin ,alkyd resins, Tung oil , High boiling mineral distillates, other vehicles/ varnish, extenders, pigment, metallic pigments, solvents etc. used in manufacturing of Banknote printing inks.
(iv) Be suitable for manufacturing varnish/inks to obtain appropriate rheology (Viscosity, Tack) as required for satisfactory running in offset printing machines**.**
(v) The inks manufactured by the offered material shall be non-corrosive to printing plates.
(vi) **Shelf life:** The Hydrocarbon solvent in sealed container/drums should have shelf life of 5 years preferably.

B. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

General Operational Requirements: - Offered Hydrocarbon solvent should be such that

(i) Ink prepared by using this solvent should perform well on intaglio ink printing machines.
(ii) The offered solvent should not have any adverse impact on ink drying on rollers, set off in the printed sheets after keeping in the pile (approx. 1000 sheets) for drying and complete drying of the printed sheets.

C. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using the high security intaglio ink where the target solvent has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability and physical and chemical resistance of inks.

PHYSICAL RESISTANCE:
Crumpling Resistance: -

Test Method: Resistance to crumpling is evaluated by means of the Crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable Rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

Rub Resistance: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered solvent shall be such that this should not affect the light fastness of the manufactured ink.

CHEMICAL RESISTANCE: The offered solvent shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.

Chemical Resistance Properties of Dried Print: -

Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below. The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,

5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).
Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The solvent sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls, restricted poly cyclic aromatic and aliphatic hydrocarbons etc. The sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc. The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered solvent shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile organic compound or odour, which would be harmful to health of the employee while working on machines and the manufacturer shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

12. SOLVENT TYPE C14-18

The high quality hydrocarbon solvent is required for manufacturing varnish which in turn is used in manufacturing of Offset and Numbering inks for banknote printing. The banknote paper is made from 100% rag cotton substrate. Printing of banknote is carried out in high speed printing machines having a speed of 10000 to 12000 sheets per hour. Under these conditions printing has to be carried out without any major printing issues like – misting, filling, transfer issues etc.

SOLVENT (Low Aromatic Solvent)		
1	Type	Solvent-Hydrocarbons, C14-C18
2	Physical state	Liquid (Free from any foreign particles and dust)
3	Colour	Water white to very light yellowish
4	Density @ 15°C	0.820 ± 0.020
5	Initial Boiling point @ 760 mm Hg	Between 250°C to 260°C
6	Final Boiling point @ 760 mm Hg	305°C Max
7	Aniline Point:	75-85°C
8	Refractive index, nD20°C	1.455 to 1.465
9	Flash Point (Pensky - Mrtens closed cup)	>100 °C
10	Aromatic Content	<2%

1. The supplier has to furnish a test certificate for conformity as per the tender specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests. For example, manufacturing of varnish, manufacturing of inks, quality control of varnish and ink samples including curing/drying of ink, stability of inks/varnish during retention, press performance of inks, physical and chemical resistance tests etc.
3. The sample should have a stable performance during the entire process of varnish/ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the Purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

A. PERFORMANCE ON THE VARNISH/INK MANUFACTURING MACHINES

General Operational Requirements: - Offered Hydrocarbon solvent shall

(i) Work smoothly while processing in the reactor at high temperature (up to 250°C) during processing of varnish.
(ii) The varnish thus manufactured shall work smoothly on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.
(iii) Have good compatibility with other components such as rosin modified phenolic resin, alkyd resins, Tung oil, High boiling mineral distillates, other vehicles/ varnish, extenders, pigment, solvents etc. used in manufacturing of Banknote printing inks.
(iv) Be suitable for manufacturing varnish/inks to obtain appropriate rheology (Viscosity, Tack) as required for satisfactory running in offset printing machines**.**
(v) The inks manufactured by the offered material shall be non-corrosive to printing plates.
(vi) **Shelf life:** The Hydrocarbon solvent in sealed container/drums should have shelf life of 5 years preferably.

B. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

General Operational Requirements: - Offered Hydrocarbon solvent should be such that

(i) Ink prepared by using this solvent should work smoothly on offset ink printing machines.
(ii) The offered solvent should not have any adverse impact on ink drying on rollers, set off in the printed sheets after keeping in the pile (approx. 1000 sheets) for drying.
(iii) Printed sheets should dry within the regular drying time.

C. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using the offset ink where the target solvent has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability and physical and chemical resistance of inks.

PHYSICAL RESISTANCE:
Crumpling Resistance: -

Test Method: Resistance to crumpling is evaluated by means of the Crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable Rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

Rub Resistance: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered solvent shall be such that this should not affect the light fastness of the manufactured ink.

CHEMICAL RESISTANCE: The offered solvent shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.

Chemical Resistance Properties of Dried Print: -
Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below. The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,
5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).
Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The solvent sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls, restricted poly cyclic aromatic and aliphatic hydrocarbons etc. The sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc. The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered solvent shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile organic compounds or odour, which would be harmful to health of the employee while working on machines and the manufacturer, shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

13. SOLVENT TYPE C16-20

The high quality hydrocarbon solvent is required for manufacturing of Offset, Numbering and Intaglio inks for banknote printing on 100% rag content substrate. Printing of banknote is carried out in high speed printing machines having a speed of 10000 to 12000 sheets per hour. Under these conditions printing has to be carried out without any major printing issues like – misting, filling, transfer issues etc.

SOLVENT TYPE C16-20		
1	Type	Solvents - Hydrocarbons, C16-C20
2	Physical state	Clear Transparent Liquid (Free from any foreign particles and dust)
3	Colour	Water white to very light yellowish
4	Relative density @ 15°C	0.815 to 0.845
5	Initial Boiling point range @ 760 mm Hg	275°C - 280°C
6	Final Boiling point range @ 760 mm Hg	Max 320°C
7	Aniline Point:	86°C to 91°C
8	Refractive index, nD20°C	1.440 to 1.455
9	Aromatic Content	<2%

1. The supplier has to furnish a test certificate for conformity as per the tender specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests. For example, manufacturing of varnish, manufacturing of inks, quality control of varnish and ink samples including curing/drying of ink, stability of inks/varnish during retention, press performance of inks, physical and chemical resistance tests etc.
3. The sample should have a stable performance during the entire process of varnish/ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the Purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

A. PERFORMANCE ON THE INK MANUFACTURING MACHINES

General Operational Requirements: - Offered Hydrocarbon solvent shall

(i) The ink manufactured by using above hydrocarbon solvent shall work smoothly on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.
(ii) Have good compatibility with other components such as varnishes, Linseed oil, other high boiling mineral distillates, extenders, pigment, additives etc. used in manufacturing of Banknote printing inks.
(iii) Be suitable for manufacturing medium/inks to obtain appropriate rheology (Viscosity, Tack) as required for satisfactory running in offset, numbering & intaglio printing machines**.**
(iv) The inks manufactured by the offered material shall be non-corrosive to printing plates.
(v) **Shelf life:** The Hydrocarbon solvent in sealed container/drums should have shelf life of 5 years preferably.

B. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

General Operational Requirements: - Offered Hydrocarbon solvent should be such that

(i) Ink prepared by using this solvent should work smoothly on offset, numbering & intaglio ink printing machines.
(ii) The offered solvent should not have any adverse impact on ink drying on rollers, set off in the printed sheets after keeping in the pile (approx. 1000 sheets) for drying.
(iii) Printed sheets should dry within the regular drying time.

C. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using the offset ink where the target solvent has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability and physical and chemical resistance of inks.

PHYSICAL RESISTANCE:
Crumpling Resistance: -

Test Method: Resistance to crumpling is evaluated by means of the Crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable Rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

Rub Resistance: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered solvent shall be such that this should not affect the light fastness of the manufactured ink.

CHEMICAL RESISTANCE: The offered solvent shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.

Chemical Resistance Properties of Dried Print: -

Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below. The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,
5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).
Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The solvent sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls, restricted poly cyclic aromatic and aliphatic hydrocarbons etc. The sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc. The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered solvent shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile organic compounds or odour, which would be harmful to health of the employee while working on machines and the manufacturer, shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

14. MICRONISED POLYETHYLENE WAX (PE WAX):

The high quality micronized polyethylene wax (PE wax) is required for manufacturing of high security intaglio ink for banknote printing. The banknote paper is made from 100% rag cotton substrate. Printing of banknote is carried out in high speed printing machines running at a speed of 10000 sheets per hour on Banknote Printing machines. Under these conditions printing has to be carried out without any major printing issues like – misting, filling, transfer issues, wipability of ink etc.

MICRONISED POLYETHYLENE WAX (PE WAX)		
1	**Type**	Micronised polyethylene wax (Synthetic paraffin wax), long chain with relatively short side chains
2	**Appearance**	Micronized Powder
3	**Particle size (D50)**	0 – 7 µm
4	**Particle size (D90)**	0 – 14 µm
5	**Melting point / Congealing point**	96 - 100^{o}C
6	**Flash point**	>200^{o}C

1. The Supplier has to furnish a test certificate for conformity as per the tender specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests, for example manufacturing of anti set-off paste, manufacturing of inks, quality control of intermediate and ink samples, stability of inks/intermediates during retention, press performance of inks, physical and chemical resistance tests especially for set-off, rub resistance etc.
3. The sample should have a stable performance during the entire process of ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the Purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

A. PERFORMANCE ON THE INK MANUFACTURING MACHINES

<u>General Operational Requirements</u>: - Offered Wax shall

(i) Work smoothly on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.
(ii) Sample should not melt/congeal during processing at High Torque Mixers and Triple Roll Milling machines at normal operating conditions.
(iii) Have good compatibility with other components such as vehicle, varnish, extenders, pigment, solvents etc. used in manufacturing of banknote printing inks.
(iv) Disperse uniformly in the components and should not form froth or should not sediment on the ink mixing vessels.
(v) Disperse such that it is milled to the required particle size in optimum mill passes.
(vi) The Wax should not form agglomerates and disperse thoroughly such that it should be suitable for manufacturing of intaglio inks.
(vii) Be suitable for manufacturing inks to obtain appropriate rheology (Viscosity, Tack) as required for satisfactory running in Intaglio machines**.**
(viii) The inks manufactured by the offered material shall be non-corrosive to printing plates.
(ix) **Shelf life:** The wax in sealed container/bags should have shelf life of 2 years preferably.

B. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

General Operational Requirements: - Offered Wax should be such that

(i) Ink prepared by using these Wax should work smoothly on Intaglio ink printing machines.
(ii) There should not be any set off in the printed sheets after keeping in the pile (approx. 1000 sheets) for drying.
(iii) Printed sheets should withstand the scuffing forces and should not be damaged during running on numbering machines and during the high speed automated paper cutting and counting machines.

C. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using the Intaglio ink where the target wax has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability and physical and chemical resistance of inks.

PHYSICAL RESISTANCE:
Crumpling Resistance: -
Test Method: Resistance to crumpling is evaluated by means of the crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable Rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

Rub Resistance: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered Wax shall be such that these should not affect the light fastness of the manufactured ink.

CHEMICAL RESISTANCE: The offered Wax shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.

Chemical Resistance Properties of Dried Print: -

Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below. The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,
5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).
Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The wax sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls etc. The wax sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc. The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered wax shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile or odour, which would be harmful to health of the employee while working on machines and the manufacturer shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

15. CARNAUBA WAX:

The high quality Carnauba wax is required for manufacturing of high security intaglio ink for banknote printing. The ink will be used for printing of banknotes on 100% rag cotton substrate. Printing of banknote is carried out in high speed of 10000 sheets per hour. Under these conditions printing has to be carried out without any major printing issues like – misting, filling, transfer issues, wipability of ink etc.

CARNAUBA WAX		
1	**Type**	Micronized Carnauba Wax
2	**Appearance**	Light yellow powder
3	**Average Particle size**	20 – 40 µm
4	**Acid Value (mg KOH/g)**	2 – 7 mg KOH/g
5	**Drop Melting point**	80 - 88^{o}C
6	**Saponification Value (mg KOH/g)**	78 – 95 mg KOH/g

1. The supplier has to furnish a test certificate for conformity as per the tender specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests, for example manufacturing of anti set-off paste, manufacturing of inks, quality control of intermediate and ink samples, stability of inks/intermediates during retention, press performance of inks, physical and chemical resistance tests especially for set-off, rub resistance etc.
3. The sample should have stable performance during the entire process of ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the Purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

A. PERFORMANCE ON THE INK MANUFACTURING MACHINES

General Operational Requirements: - Offered Wax shall

(i) Work smoothly on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.
(ii) Sample should not melt/congeal during processing at High Torque Mixers and Triple Roll Milling machines at normal operating conditions.
(iii) Have good compatibility with other components such as vehicle, varnish, extenders, pigment, solvents etc. used in manufacturing of Banknote printing inks.
(iv) Disperse uniformly in the components and should not form froth or should not sediment on the ink mixing vessels.
(v) Disperse such that it is milled to the required particle size in optimum mill passes. The Wax should not form agglomerates and disperse thoroughly such that it should be suitable for manufacturing of intaglio inks.
(vi) Be suitable for manufacturing inks to obtain appropriate rheology (Viscosity, Tack) as required for satisfactory running in Intaglio machines**.**
(vii) The inks manufactured from the offered Carnauba Wax shall be non-corrosive to printing plates.
(viii) **Shelf life:** The Wax in sealed container/bags should have shelf life of 2 years preferably.

B. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

General Operational Requirements: - Offered wax should be such that

(i) Ink prepared by using offered wax should work smoothly on Intaglio ink printing machines.
(ii) There should not be any set off in the printed sheets after keeping in the pile (approx. 1000 sheets) for drying.
(iii) Printed sheets should withstand the scuffing forces and should not be damaged during running on numbering machines and during the high speed automated paper cutting and counting machines.

C. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using the Intaglio ink where the target wax has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability and physical and chemical resistance of inks.

PHYSICAL RESISTANCE:

Crumpling Resistance: -

Test Method: Resistance to crumpling is evaluated by means of the crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable Rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

Rub Resistance: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered Wax shall be such that these should not affect the light fastness of the manufactured ink.

CHEMICAL RESISTANCE: The offered Wax shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.

Chemical Resistance Properties of Dried Print: -

Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below. The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,
5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).
Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The wax sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls etc. The wax sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc. The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered wax shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile or odour, which would be harmful to health of the employee while working on machines and the manufacturer shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

16. ROSIN MODIFIED PHENOLIC RESIN GV:

The high quality Rosin Modified Phenolic Resin GV is required for manufacturing of security ink varnish. This varnish is used for manufacturing of security inks to print banknotes. The banknote paper is made from 100% rag cotton substrate. Printing of banknote is carried out in high speed printing machines having a speed of 10000 -12000 sheets per hour. Under these conditions printing has to be carried out without any major printing issues like – misting, filling, transfer issues, wipability of ink etc.

PHENOLIC MODIFIED ROSIN RESIN GV		
1	Type	Rosin modified phenolic resin
2	Physical state	Solid flakes/Lumps
3	Colour (Visual)	Amber
4	Colour (Gardner scale)	Max 11
5	Acid Value (mg of KOH/gm)	Max 30.0
6	Viscosity Rheometer (23°C, CP50, 25 s-1) 55% in test oil 6/9 AF new)	12 – 17 Pa.S.
	Or Viscosity by Ford Cup @30°C (50% solution in toluene)	16 – 21 Sec.
7	Cloud Point (10% in test oil 6/9 AF new)	60 - 70°C
8	Melting Point (Ball & Ring)	120 -125°C

1. The supplier has to furnish a test certificate for conformity as per the above specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests. For example, manufacturing of varnish, manufacturing of inks, quality control of varnish and ink samples including curing/drying of ink, stability of inks/varnish during retention, press performance of inks, physical and chemical resistance tests especially for rub resistance, laundry test, circulation and simulation, crumpling test etc.
3. The sample should have a stable performance during the entire process of varnish/ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the Purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

A. PERFORMANCE ON THE VARNISH/INK MANUFACTURING MACHINES

General Operational Requirements: - Offered resin shall

(i) Work smoothly and should not show any abnormal behavior while processing in the reactor at high temperature (up to 250°C) during processing of varnish.
(ii) Dissolve/Mix completely with the other raw material used in the varnish as per the varnish formulation requirement and processing parameters and as per the demand of the varnish.
(iii) The varnish thus manufactured shall work efficiently on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.
(iv) Have good compatibility with other components such as alkyd resins, High boiling mineral distillates, other vehicles/ varnish, extenders, pigment, solvents, waxes etc. used in manufacturing of Banknote printing inks.
(v) Be suitable for manufacturing varnish/inks to obtain appropriate rheology (Viscosity, Tack), solid content and acid value as required for satisfactory running in offset & intaglio printing machines**.**
(vi) The inks manufactured by the offered material shall be non-corrosive to printing plates.
(vii) **Shelf life:** The resin in sealed bags should have shelf life of minimum 10 months.

B. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

General Operational Requirements: - Offered resin should be such that

(i) Ink prepared by using varnish manufactured with this resin should not show any abnormal behavior while running on offset and intaglio printing machines.
(ii) There should not be any set off in the printed sheets after keeping in the pile for drying.
(iii) Printed sheets should dry within the regular drying time.
(iv) Printed sheets should withstand the scuffing forces and should not be damaged during running on numbering machines and during the high speed automated paper cutting and counting machines.

C. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using the offset ink where the target Resin has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability, physical and chemical resistance of inks.

PHYSICAL RESISTANCE:
Crumpling Resistance: -
Test Method: Resistance to crumpling is evaluated by means of the Crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable Rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

Rub Resistance: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered Resin shall be such that this should not affect the light fastness of the manufactured ink.

CHEMICAL RESISTANCE: The offered Resin shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.

Chemical Resistance Properties of Dried Print: -

Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below. The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,
5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).
Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The Resin sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls etc. The sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc. The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered Resin shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile or odour, which would be harmful to health of the employee while working on machines and the manufacturer shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

17. ROSIN MODIFIED PHENOLIC RESIN HD:

The high quality Rosin Modified Phenolic Resin HD is required for manufacturing of security ink varnish. This varnish is used for manufacturing of security inks to print banknotes. The banknote paper is made from 100% rag cotton substrate. Printing of banknote is carried out in high speed printing machines having a speed of 10000 - 12000 sheets per hour. Under these conditions, printing has to be carried out without any major printing issues like – misting, filling, transfer issues etc.

PHENOLIC MODIFIED ROSIN RESIN HD		
1	Type	Rosin modified phenolic resin
2	Physical state	Solid flakes/Lumps
3	Colour (Visual)	Amber
4	Colour (Gardner scale)	Max 11
5	Acid Value (mg of KOH/gm)	Max 25.0
6	Viscosity Rheometer (23°C, CP50, 25 s-1) 40% in test oil 6/9 AR blend)	35 – 55 Pa.S.
	Or Viscosity by Ford Cup @30°C (50% solution in toluene)	140 – 160 Sec.
7	Cloud Point (10% in test oil 6/9)	100 - 110°C
8	Melting Point (Ball & Ring)	154 - 160°C

1. The supplier has to furnish a test certificate for conformity as per the above specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests. For example, manufacturing of varnish, manufacturing of inks, quality control of varnish and ink samples including curing/drying of ink, stability of inks/varnish during retention, press performance of inks, physical and chemical resistance tests especially for rub resistance, laundry test, circulation and simulation, crumpling test etc.
3. The sample should have a stable performance during the entire process of varnish/ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the Purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

A. PERFORMANCE ON THE VARNISH/INK MANUFACTURING MACHINES

General Operational Requirements: - Offered resin shall

(i) Work smoothly and should not show any abnormal behavior while processing in the reactor at high temperature (up to 250°C) during processing of varnish.
(ii) Dissolve/Mix completely with the other raw material used in the varnish as per the varnish formulation requirement and processing parameters and as per the demand of the varnish.
(iii) The varnish thus manufactured shall work efficiently on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.
(iv) Have good compatibility with other components such as alkyd resins, High boiling mineral distillates, other vehicles/ varnish, extenders, pigment, solvents, waxes etc. used in manufacturing of Banknote printing inks.
(v) Be suitable for manufacturing varnish/inks to obtain appropriate rheology (Viscosity, Tack), solid content and acid value as required for satisfactory running in offset & intaglio printing machines**.**
(vi) The inks manufactured by the offered material shall be non-corrosive to printing plates.
(vii) **Shelf life:** The resin in sealed bags should have shelf life of minimum 10 months.

B. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

General Operational Requirements: - Offered resin should be such that

(i) Ink prepared by using varnish manufactured with this resin should not show any abnormal behavior while running on offset and intaglio printing machines.
(ii) There should not be any set off in the printed sheets after keeping in the pile for drying.
(iii) Printed sheets should dry within the regular drying time.
(iv) Printed sheets should withstand the scuffing forces and should not be damaged during running on numbering machines and during the high speed automated paper cutting and counting machines.

C. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using the offset ink where the target Resin has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability, physical and chemical resistance of inks.

PHYSICAL RESISTANCE:
Crumpling Resistance: -
Test Method: Resistance to crumpling is evaluated by means of the Crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable Rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

Rub Resistance: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered Resin shall be such that this should not affect the light fastness of the manufactured ink.

CHEMICAL RESISTANCE: The offered Resin shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.

Chemical Resistance Properties of Dried Print: -

Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below. The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature ° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,
5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).
Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The Resin sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls etc. The sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc. The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered Resin shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile or odour, which would be harmful to health of the employee while working on machines and the manufacturer shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

18. ROSIN MODIFIED PHENOLIC ESTER:

The high quality Rosin Modified Phenolic Ester is required for manufacturing of security ink varnish. This varnish is used for manufacturing of security inks to print banknotes. The banknote paper is made from 100% rag cotton substrate. Printing of banknote is carried out in high speed printing machines having a speed of 10000 sheets per hour. Under these conditions printing has to be carried out without any major printing issues like – misting, filling, transfer issues, wipability of ink etc.

ROSIN MODIFIED PHENOLIC ESTER		
1	Type	Rosin modified phenol formaldehyde resin
2	Physical state	Solid flakes/Lumps
3	Colour (Visual)	Amber
4	Colour (Gardner scale)	Max 12
5	Acid Value (mg of KOH/gm)	115 - 125
6	Melting Point (Ball & Ring)	118 -123°C

1. The Supplier has to furnish a test certificate for conformity as per the above specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests. For example, manufacturing of varnish, manufacturing of inks, quality control of varnish and ink samples including curing/drying of ink, stability of inks/varnish during retention, press performance of inks, physical and chemical resistance tests especially for rub resistance, laundry test, circulation and simulation, crumpling test etc.
3. The sample should have a stable performance during the entire process of varnish/ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the Purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

A. PERFORMANCE ON THE VARNISH/INK MANUFACTURING MACHINES

General Operational Requirements: - Offered material shall

(i) Work smoothly and should not show any abnormal behavior while processing in the reactor at high temperature (up to 250°C) during processing of varnish.
(ii) Dissolve/Mix completely with the other raw material used in the varnish as per the varnish formulation requirement and processing parameters and as per the demand of the varnish.
(iii) The varnish thus manufactured shall work efficiently on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.
(iv) Have good compatibility with other components such as alkyd resins, High boiling mineral distillates, other vehicles/ varnish, extenders, pigment, solvents, waxes etc. used in manufacturing of Banknote printing inks.
(v) Be suitable for manufacturing varnish/inks to obtain appropriate rheology (Viscosity, Tack), solid content and acid value as required for satisfactory running in intaglio printing machines**.**
(vi) The inks manufactured by the offered material shall be non-corrosive to printing plates.
(vii) **Shelf life:** The offered material in sealed bags should have shelf life of minimum 10 months.

B. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

General Operational Requirements: - Offered material should be such that

(i) Ink prepared by using varnish manufactured with the offered material should not show any abnormal behavior while running on offset and intaglio printing machines.
(ii) There should not be any set off in the printed sheets after keeping in the pile for drying.
(iii) Printed sheets should dry within the regular drying time.
(iv) Printed sheets should withstand the scuffing forces and should not be damaged during running on numbering machines and during the high speed automated paper cutting and counting machines.

C. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using the intaglio ink where the target material has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability, physical and chemical resistance of inks.

PHYSICAL RESISTANCE:
Crumpling Resistance: -
Test Method: Resistance to crumpling is evaluated by means of the Crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable Rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

Rub Resistance: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered material shall be such that this should not affect the light fastness of the manufactured ink.

CHEMICAL RESISTANCE: The offered material shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.

Chemical Resistance Properties of Dried Print: -
Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below. The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,
5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).
Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The offered material sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls etc. The sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc. The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered material shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile or odour, which would be harmful to health of the employee while working on machines and the manufacturer shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

19. ALKYD RESIN:

The high quality Alkyd Resin is required for manufacturing of security ink varnish. This varnish is used for manufacturing of security inks to print banknotes. The banknote paper is made from 100% rag cotton substrate. Printing of banknote is carried out in high speed printing machines having a speed of 10000 - 12000 sheets per hour. Under these conditions, printing has to be carried out without any major printing issues like – misting, filling, transfer issues etc.

ALKYD RESIN		
1	Type	Solvent free long oil linseed isophthalic acid alkyd resin
2	Physical state	Liquid resin
3	Colour (Visual)	Light to amber brown liquid
4	Colour (Gardner scale)	Max 9 unit (Gardner scale)
5	Acid Value (mg of KOH/gm)	7 Max
6	Esterifying Agent	Pentaerythritol
7	Non-volatile content %	98 - 100
8	Viscosity@75°C (CP)	4.5 -6.5
	Or Viscosity in 60% MTO at @30°C by Ford Cup	34 ± 1

1. The supplier has to furnish a test certificate for conformity as per the above specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests. For example, manufacturing of varnish, manufacturing of inks, quality control of varnish and ink samples including curing/drying of ink, stability of inks/varnish during retention, press performance of inks, physical and chemical resistance tests especially for rub resistance, laundry test, circulation and simulation, crumpling test etc.
3. The sample should have stable performance during the entire process of varnish/ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the Purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

A. PERFORMANCE ON THE VARNISH/INK MANUFACTURING MACHINES

General Operational Requirements: - Offered Alkyd Resin shall

(i) Work smoothly and should not show any abnormal behavior while processing in the reactor at high temperature (up to 250°C) during processing of varnish.
(ii) Mix completely with the other raw material used in the varnish as per the varnish formulation requirement and processing parameters and as per the demand of the varnish.
(iii) The varnish thus manufactured shall work efficiently on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.
(iv) Have good compatibility with other components such as High boiling mineral distillates, other vehicles/ varnish, extenders, pigment, solvents, waxes etc. used in manufacturing of Banknote printing inks.
(v) Be suitable for manufacturing varnish/inks to obtain appropriate rheology (Viscosity, Tack), solid content and acid value as required for satisfactory running in offset & intaglio printing machines**.**
(vi) The inks manufactured from the offered alkyd resin shall be non-corrosive to printing plates.
(vii) **Shelf life:** The alkyd resin in new sealed barrels should have shelf life of minimum 12 months.

B. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

General Operational Requirements: - Offered alkyd resin should be such that

(iii) Ink prepared by using varnish manufactured with this alkyd resin should not show any abnormal behavior while using in offset and intaglio printing machines.
(iv) There should not be any set off in the printed sheets after keeping in the pile for drying.
(v) Printed sheets should dry within the regular drying time.
(vi) Printed sheets should withstand the scuffing forces and should not be damaged during running on numbering machines and during the high speed automated paper cutting and counting machines.

C. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using the offset, intaglio and numbering ink where the target alkyd resin has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability, physical and chemical resistance of inks.

PHYSICAL RESISTANCE:
Crumpling Resistance: -
Test Method: Resistance to crumpling is evaluated by means of the Crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable Rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

Rub Resistance: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered alkyd resin shall be such that this should not affect the light fastness of the manufactured ink.

CHEMICAL RESISTANCE: The offered alkyd resin shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.

Chemical Resistance Properties of Dried Print: -
Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below. The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,
5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).
Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The alkyd resin sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls etc. The sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc. The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered alkyd resin shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile or odour, which would be harmful to health of the employee while working on machines and the manufacturer shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

20. ALKYD RESIN HD:

The high quality Alkyd Resin HD is required for manufacturing of security ink varnish. This varnish is used for manufacturing of security inks to print banknotes. The banknote paper is made from 100% rag cotton substrate. Printing of banknote is carried out in high speed printing machines having a speed of 10000 - 12000 sheets per hour. Under these conditions, printing has to be carried out without any major printing issues like – misting, filling, transfer issues etc.

ALKYD RESIN HD		
1	Type	Solvent free long oil linseed isophthalic acid alkyd resin
2	Physical state	Liquid resin
3	Colour (Visual)	Light to amber brown liquid
4	Colour (Gardner scale)	Max 9 unit (Gardner scale)
5	Acid Value (mg of KOH/gm)	20 Max
6	Esterifying Agent	Trimethylol Propane
7	Non-volatile content %	98 - 100
8	Viscosity@75°C (CP)	7.0 – 9.0
	Or Viscosity in 60% MTO at @30°C by Ford Cup	35 ± 1

1. The supplier has to furnish a test certificate for conformity as per the above specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests. For example, manufacturing of varnish, manufacturing of inks, quality control of varnish and ink samples including curing/drying of ink, stability of inks/varnish during retention, press performance of inks, physical and chemical resistance tests especially for rub resistance, laundry test, circulation and simulation, crumpling test etc.
3. The sample should have stable performance during the entire process of varnish/ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the Purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

A. PERFORMANCE ON THE VARNISH/INK MANUFACTURING MACHINES

<u>General Operational Requirements</u>: - Offered Alkyd Resin shall

(i) Work smoothly and should not show any abnormal behavior while processing in the reactor at high temperature (up to 250°C) during processing of varnish.
(ii) Mix completely with the other raw material used in the varnish as per the varnish formulation requirement and processing parameters and as per the demand of the varnish.
(iii) The varnish thus manufactured shall work efficiently on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.
(iv) Have good compatibility with other components such as High boiling mineral distillates, other vehicles/ varnish, extenders, pigment, solvents, waxes etc. used in manufacturing of banknote printing inks.
(v) Be suitable for manufacturing varnish/inks to obtain appropriate rheology (Viscosity, Tack), solid content and acid value as required for satisfactory running in offset printing machines**.**
(vi) The inks manufactured from the offered alkyd resin shall be non-corrosive to printing plates.
(vii) **Shelf life:** The alkyd resin in new sealed barrels should have shelf life of minimum 12 months.

B. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

General Operational Requirements: - Offered alkyd resin should be such that

(i) Ink prepared by using varnish manufactured with the offered alkyd resin should not show any abnormal behavior while using in offset printing machines.
(ii) There should not be any set off in the printed sheets after keeping in the pile for drying.
(iii) Printed sheets should dry within the regular drying time.
(iv) Printed sheets should withstand the scuffing forces and should not be damaged during running on numbering machines and during the high speed automated paper cutting and counting machines.

C. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using the offset ink where the target alkyd resin has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability, physical and chemical resistance of inks.

PHYSICAL RESISTANCE:
Crumpling Resistance: -
Test Method: Resistance to crumpling is evaluated by means of the Crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

Rub Resistance: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered alkyd resin shall be such that this should not affect the light fastness of the manufactured ink.

CHEMICAL RESISTANCE: The offered alkyd resin shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.

Chemical Resistance Properties of Dried Print: -
Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below. The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,
5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).
Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The alkyd resin sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls etc. The sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc. The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered alkyd resin shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile or odour, which would be harmful to health of the employee while working on machines and the manufacturer shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

21. BENTONITE CLAY - RHEOLOGICAL ADDITIVE BASED ON ORGANIC DERIVATIVE

An easier-dispersing organoclay powder with precisely controlled particle size distribution is required for manufacturing of high security intaglio medium. This medium is used for manufacturing of high security intaglio inks to print banknotes. The banknote paper is made from 100% rag cotton substrate. Printing of banknote is carried out in high speed printing machines having a speed of 10000 sheets per hour. Under these conditions, intaglio printing has to be carried out without any major printing issues like – misting, filling, transfer issues, wipability of ink etc.

ORGANIC DERIVATIVE OF BENTONITE CLAY		
1	Type	Organic derivative of bentonite clay (with precisely controlled particle size distribution)
2	Appearance	Light Cream Powder
3	% Drying Loss	0.1 – 3.0
4	% Loss of Ignition	45 - 48
5	% Thru 200 Mesh Sieve	97 - 100
6	Moisture	≤ 3 %
7	Should have tendency to provide rapid rheology build and good sag resistance	Conforms
8	Disperses easily with less shear	Conforms

1. The supplier has to furnish a test certificate for conformity as per the above specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests. For example, manufacturing of medium & ink, quality control of medium and ink samples including curing/drying of ink, stability of ink during retention, press performance of ink, physical and chemical resistance tests especially for rub resistance, laundry test, circulation and simulation, crumpling test etc.
3. The sample should have stable performance in the entire process of ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the Purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

A. PERFORMANCE ON THE INK MANUFACTURING MACHINES

<u>General Operational Requirements</u>: - Offered Organoclay shall

(i) Work efficiently on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.

(ii) Have good compatibility with High boiling mineral distillates, varnish, extenders, metallic pigments, solvents, waxes etc. used in manufacturing of Banknote printing inks.

(iii) Be such that the inks manufactured from the offered Bentonite Clay are non-corrosive to printing plates.

(iv) **Shelf life:** The offered Bentonite Clay should have shelf life of 5 years preferably.

B. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

<u>General Operational Requirements</u>: - Offered Organoclay should be such that

(i) Ink prepared by using medium manufactured with offered material should not show any abnormal behavior while using in intaglio printing machines.
(ii) There should not be any set off in the printed sheets after keeping in the pile for drying.
(iii) Printed sheets should dry within the regular drying time.
(iv) Printed sheets should withstand the scuffing forces and should not be damaged during running on numbering machines and during the high speed automated paper cutting and counting machines.
(v) Ink should be stable during the retention period i.e. minimum 2 years.

C. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using the high security intaglio ink where this Organoclay has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability, physical and chemical resistance of inks.

PHYSICAL RESISTANCE:
Crumpling Resistance: -
Test Method: Resistance to crumpling is evaluated by means of the Crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable Rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

Rub Resistance: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered Organoclay shall be such that this should not affect the light fastness of the manufactured ink.

CHEMICAL RESISTANCE: The offered Organoclay shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.

Chemical Resistance Properties of Dried Print: -
Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below. The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,
5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).
Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The Organoclay sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls etc. The sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc. The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered Organoclay shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile or odour, which would be harmful to health of the employee while working on machines and the manufacturer shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

22. LANOLIN (PHARMACEUTICAL GRADE WATER-FREE WOOL WAX):

An ultra-pure, pharmaceutical –grade anhydrous lanolin is required for manufacturing of high security intaglio medium. The intaglio ink medium is used for manufacturing of high security intaglio ink to print banknotes. The banknote paper is made from 100% rag cotton substrate. Printing of banknote is carried out in high speed printing machines having a speed of 10000 sheets per hour. Under these conditions, intaglio printing has to be carried out without any major printing issues like – misting, filling, transfer issues, wipability of ink etc.

LANOLIN (PHARAMACEUTICAL GRADE WATER FREE WOOL WAX)		
1	Type	Anhydrous Lanolin (Water Free Wool Wax)
2	Odour	Mild, Characteristics
3	Appearance	Yellow clear, semi solid
3	Colour (Gardner)	≤ 10
4	Acid Value (mg KOH/gm)	≤ 1
5	Saponification Value (mg KOH/gm)	90-105
6	Drop Point °C	38-44
7	Peroxide Value (meq O2/Kg)	≤ 20
8	Water Absorption %	≥ 200
9	Loss on drying % ,1Hrs at 105 °C	≤ 0.5
10	Ash (sulphated) %	≤ 0.15
11	Paraffins %	≤ 1.0
12	Chlorides (ppm)	≤ 150
13	Water soluble alkalis	Conforms to EP
14	Water soluble oxidants	Conforms to EP
15	Product complies to European Pharmacopoeia	Conforms to EP

1. The Supplier has to furnish a test certificate for conformity as per the above specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests. For example, manufacturing of medium & ink, quality control of medium and ink samples including curing/drying of ink, stability of ink during retention, press performance of ink, physical and chemical resistance tests especially for rub resistance, laundry test, circulation and simulation, crumpling test etc.
3. The sample should have a stable performance during the entire process of ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the Purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

A. PERFORMANCE ON THE INK MANUFACTURING MACHINES

<u>General Operational Requirements</u>: - Offered Pharmaceutical grade water-free wool wax shall

(i) Work efficiently on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.
(ii) Have good compatibility with High boiling mineral distillates, varnish, extenders, metallic pigments, solvents, waxes etc. used in manufacturing of Banknote printing inks.

(iii) The inks manufactured by the offered material shall be non-corrosive to printing plates.
(iv) **Shelf life:** The offered wax should have shelf life of 2 years preferably.

B. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

<u>General Operational Requirements</u>: - Offered Pharmaceutical grade water-free wool wax should be such that

(i) Ink prepared by using medium manufactured with this wax should not show any abnormal behavior while running on intaglio printing machines.
(ii) There should not be any set off in the printed sheets after keeping in the pile for drying.
(iii) Printed sheets should dry within the regular drying time.
(iv) Printed sheets should withstand the scuffing forces and should not be damaged during running on numbering machines and during the high speed automated paper cutting and counting machines.

C. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using the high security intaglio ink where the target wax has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability, physical and chemical resistance of inks.

PHYSICAL RESISTANCE:
<u>Crumpling Resistance</u>: -
Test Method: Resistance to crumpling is evaluated by means of the Crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable Rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

<u>Rub Resistance</u>: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered wax shall be such that this should not affect the light fastness of the manufactured ink.

CHEMICAL RESISTANCE: The offered wax shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.

Chemical Resistance Properties of Dried Print: -

Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below. The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,
5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).
Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The wax sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls etc. The sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc. The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered wax shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile or odour, which would be harmful to health of the employee while working on machines and the manufacturer shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

23. TALC (HYDRATED MAGNESIUM SILICATE):

A high quality talc powder with precise controlled particle size distribution is required for manufacturing of high security intaglio medium. This medium is used for manufacturing of high security intaglio inks to print banknotes. The banknote paper is made from 100% rag cotton substrate. Printing of banknote is carried out in high speed printing machines having a speed of 10000 sheets per hour. Under these conditions, intaglio printing has to be carried out without any major printing issues like – misting, filling, transfer issues, wipability of ink etc.

TALC (HYDRATED MAGNESIUM SILICATE)		
1	Type	Hydrated Magnesium Silicate with precisely controlled particle size distribution
2	Appearance	White Powder
3	Talc (Mg-Silicate)	>96%
3	Top cut D98 (Sedigraph, ISO13317)	≤10 micron
4	Median Particle Size D50 (Sedigraph, ISO13317)	≤2.2 micron
5	Specific surface area (BET,ISO 4652)	≤9.5 m2/g
6	Oil Absorption (ISO 787/5)	≤ 48 g/100g
7	ISO brightness R457	> 84.5 %
8	Whiteness Ry (DIN53163)	>85%
9	Abrasion (Einlehner at 1000)	Approx. 5 mg
10	Hardness (Mohs)	Approx. 1

1. The supplier has to furnish a test certificate for conformity as per the above specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests. For example, manufacturing of medium & ink, quality control of medium and ink samples including curing/drying of ink, stability of ink during retention, press performance of ink, physical and chemical resistance tests especially for rub resistance, laundry test, circulation and simulation, crumpling test etc.
3. The sample supplied should have a stable performance during the entire process of ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the Purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

D. PERFORMANCE ON THE INK MANUFACTURING MACHINES

General Operational Requirements: - Offered Talc shall

(i) Work efficiently on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.
(ii) Have good compatibility with High boiling mineral distillates, varnish, extenders, metallic pigments, solvents, waxes etc. used in manufacturing of Banknote printing inks.
(iii) The inks manufactured by the offered material shall be non-corrosive to printing plates.
(iv) **Shelf life:** The offered wax should have shelf life of 5 years preferably.

E. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

General Operational Requirements: - Offered Talc should be such that

(i) Ink prepared by using medium manufactured with this material should not show any abnormal behavior while running on intaglio printing machines.
(ii) There should not be any set off in the printed sheets after keeping in the pile for drying.
(iii) Printed sheets should dry within the regular drying time.
(iv) Printed sheets should withstand the scuffing forces and should not be damaged during running on numbering machines and during the high speed automated paper cutting and counting machines.

F. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using the high security intaglio ink where this Talc has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability, physical and chemical resistance of inks.

PHYSICAL RESISTANCE:
Crumpling Resistance: -
Test Method: Resistance to crumpling is evaluated by means of the Crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable Rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

Rub Resistance: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered Talc shall be such that this should not affect the light fastness of the manufactured ink.

CHEMICAL RESISTANCE: The offered Talc shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.

Chemical Resistance Properties of Dried Print: -

Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below. The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,
5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).
Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The Talc sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls etc. The sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc. The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered Talc shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile or odour, which would be harmful to health of the employee while working on machines and the manufacturer shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

24. DRIER - [COBALT BIS (2-ETHYLHEXANOATE) AND ZIRCONIUM CARBOXYLATE MIXED DRIER]:

High quality mixed metal drier is required for manufacturing of high security Offset, Numbering, Intaglio inks used in printing of banknotes. The banknote paper is made from 100% rag cotton substrate. Printing of banknote is carried out in high speed printing machines having a speed ranging from 10000 to 12000 sheets per hour. Under these conditions, printing has to be carried out without any major printing issues like – misting, drying on duct roller, filling, transfer issues, wipability of ink etc.

METAL DRIER [COBALT BIS (2-ETHYLHEXANOATE) AND ZIRCONIUM CARBOXYLATE MIXED DRIER]:		
1	Type	Mixed Metal Salt Drier [Cobalt BIS (2-ethylhexanoate) and Zirconium carboxylate mixed drier]
3	Appearance	Liquid
3	Colour (Visual)	Blue – Violet
4	Initial Boiling Point °C	≥215 °C
5	% Metal (Co + Zr)	14.8 – 15.2
6	Viscosity (Brookfield @ 25°C , cPs)	90 Max.
7	Settling	There should not be any settling during storage

1. The supplier has to furnish a test certificate for conformity as per the above specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests. For example, manufacturing of medium & ink, quality control of medium and ink samples including curing/drying of ink, stability of ink during retention, press performance of ink, physical and chemical resistance tests especially for rub resistance, laundry test, circulation and simulation, crumpling test etc.
3. The sample should have stable performance during the entire process of ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the Purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

A. PERFORMANCE ON THE INK MANUFACTURING MACHINES

<u>General Operational Requirements</u>: - Offered Mixed Metal Drier shall

(i) Work efficiently on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.
(ii) Have good compatibility with High boiling mineral distillates, varnish, extenders, metallic pigments, solvents, waxes etc. used in manufacturing of Banknote printing inks.
(iii) The inks manufactured from the offered Mixer Metal Drier shall be non-corrosive to printing plates.
(iv) **Shelf life:** The offered Mixed Metal Drier should have shelf life of 2 years preferably.

B. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

<u>General Operational Requirements</u>: - Offered Mixed Metal Drier should be such that

(i) Ink prepared with this Metal Mixed Drier should not show any abnormal behavior while running on Offset, intaglio & Numbering printing machines.
(ii) Ink Should be fresh in duct of Offset, intaglio & Numbering printing machine.
(iii) There should not be any set off in the printed sheets after keeping in the pile for drying.
(iv) Printed sheets should dry within the regular drying time.
(v) Printed sheets should withstand the scuffing forces and should not be damaged during running on numbering machines and during the high speed automated paper cutting and counting machines.

C. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using the high security intaglio ink where the target wax has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability, physical and chemical resistance of inks.

PHYSICAL RESISTANCE:
Crumpling Resistance: -
Test Method: Resistance to crumpling is evaluated by means of the Crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable Rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

Rub Resistance: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered Mixed Metal Drier shall be such that this should not affect the light fastness of the manufactured ink.

CHEMICAL RESISTANCE: The offered Mixed Metal Drier shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.

Chemical Resistance Properties of Dried Print: -

Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below. The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,
5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).
Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The Mixed Metal Drier sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls etc. The sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc.The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered Mixed Metal Drier shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile or odour, which would be harmful to health of the employee while working on machines and the manufacturer shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

25. FOOD GRADE FUMARIC ACID:

The high quality fumaric acid is required for manufacturing of high security intaglio varnishes. The intaglio varnish is used for manufacturing of Intaglio inks to print banknotes. The banknote paper is made from 100% rag cotton substrate. Printing of banknote is carried out in high speed printing machines having a speed of 10000 sheets per hour. Under these conditions, the intaglio printing has to be carried out without any major printing issues like – misting, filling, transfer issues, wipability of ink etc.

FOOD GRADE FUMARIC ACID		
1	Type	Food Grade Fumaric Acid
2	Appearance	White Crystalline Fine Powder
3	Assay (as C4H4O4) on dry basis (wt. %)	99.5 % min
4	Loss on Drying @ 105°C (wt. %)	0.25% max
5	Maleic Acid (wt. %)	0.05% max
6	Residue on Ignition (Sulphated Ash) wt. %	0.05% max
7	Colour of 5% solution in Alcohol (APHA)	20 Max
8	Arsenic (PPM)	1 Max
9	LEAD (PPM)	2 Max
10	Solubility in Water at 30°C	0.7 gms /100 ml

1. The Supplier has to furnish a test certificate for conformity as per the above specifications (for each parameter) while making the supplies of material every time. However, purchaser reserves the right to carry the critical tests of any of the specified parameters on receipt of the material in BRBNMPL.
2. Apart from the conformity on the above parameters, the sample should pass all the functional requirements/tests. For example manufacturing of varnish, manufacturing of inks, quality control of varnish and ink samples including curing/drying of ink, stability of inks/varnish during retention, press performance of inks, physical and chemical resistance tests especially for rub resistance, laundry test, circulation and simulation, crumpling test etc.
3. The sample should have stable performance during the entire process of varnish/ink manufacturing, printing and all quality control requirements.
4. The decision of the evaluation by the Purchaser would be final and binding on the bidder and the bidder has to accept the result of such evaluation without any objection/reservation.

A. PERFORMANCE ON THE VARNISH/INK MANUFACTURING MACHINES

<u>General Operational Requirements</u>: - Offered Fumaric Acid shall

(i) Work smoothly and should not show any abnormal behavior while processing in the reactor at high temperature (up to 250°C) during processing of varnish.
(ii) React chemically with the other raw material used in the varnish as per the varnish formulation requirement and processing parameters and as per the demand of the varnish.
(iii) The varnish thus manufactured shall work efficiently on High Torque Mixers and Triple Roll Milling machines, under normal operating conditions.
(iv) Have good compatibility with other components such as rosin modified phenolic resin, alkyd resins, high boiling mineral distillates, other vehicles/ varnish, extenders, pigments, solvents, waxes, driers etc. used in manufacturing of banknote printing inks.
(v) Be suitable for manufacturing varnish/inks to obtain appropriate rheology (Viscosity, Tack), solid content and acid value as required for satisfactory running in intaglio printing machines**.**
(vi) The inks manufactured from the offered Fumaric Acid shall be non-corrosive to printing plates.
(vii) **Shelf life:** The Fumaric Acid in sealed barrel/drum should have shelf life of 2 years preferably.

B. PERFORMANCE ON THE PRINTING MACHINES & POST PRINTING

General Operational Requirements: - Offered Fumaric Acid should be such that

(i) Ink prepared by using varnish manufactured with this Fumaric Acid should not show any abnormal behaviour while running on intaglio printing machines.
(ii) There should not be any set off in the printed sheets after keeping in the pile for drying.

C. LABORATORY TEST FOR PHYSICAL AND CHEMICAL RESISTANCE PROPERTIES OF THE PRINTED SHEET/DRAWDOWN.

The printed sheet/drawdown by using the intaglio ink & colour shift intaglio ink where the target Fumaric Acid has been used shall conform to all the tests mentioned below. These tests are carried out to confirm the durability, physical and chemical resistance of inks.

PHYSICAL RESISTANCE:
Crumpling Resistance: -
Test Method: Resistance to crumpling is evaluated by means of the Crumpling Test Apparatus. 6x6 cm. cut of print is rolled up on itself, printed face inside, then introduced into the apparatus, and the lever is fully pressed. The print is then withdrawn, unfolded, and the operation is repeated three times, each time rotating the print by 90°. The procedure is then repeated analogously by rolling the printed face outside. Afterwards, the print is unrolled, flattened and compared with the standard scale. The print is examined by means of a magnifying glass for splitting of the ink film and for staining of blank areas.

Acceptable Rating should be within 1 to 3 on the scale of 1-4 evaluated on crumpling test apparatus, where 1 indicates 'Excellent' where no damage and transfer of ink, 2 indicates slight damage and transfer (15%), 3 indicate damage and transfer (30%) and 4 indicates 'Insufficient' considerable damage and transfer (more than 30%). The rating will be based on visual comparison of un-crumpled print taking into account (i) the damage to the colour of the print (ii) ink transfer on un-printed areas.

Rub Resistance: -

Test Method: A print is subjected to the rub resistance test by means of the Rub Test Apparatus. The print is rubbed against a sheet of the equivalent blank paper. Acceptable rating should be within 1-3 on the scale of 1-4 evaluated on Rub Tester, where 1 indicates 'Excellent' (no damage or transfer of ink), 2 indicates slight damage and transfer (15%), 3 indicates damage and transfer (30%) and 4 indicates 'Insufficient' i.e. considerable damage and transfer. The rating will be based on visual comparison of un-tested and tested print and transfer to the paper, used for rubbing against.

LIGHT FASTNESS: The offered Fumaric Acid shall be such that this should not affect the light fastness of the manufactured ink.

CHEMICAL RESISTANCE: The offered Fumaric Acid shall be such that the ink manufactured should be resistant to acid, alkali, solvents and other reagents like industrial laundry solutions etc. (given below) as required for security inks for banknotes. The chemical resistance should not be less than 4 in the scale of 1 to 5, where 1 indicates total colour disappearance (in addition fluorescent disappearance) in the case of fluorescent inks and 5 indicates no colour change to the print.

Chemical Resistance Properties of Dried Print: -

Test Method: The chemical resistance test will be conducted on the prints on cotton paper, dried naturally for seven days. The prints will be treated in various chemicals for time and temperature indicated below. The print is then withdrawn rinsed and placed under a filter paper between two glass plates under a weight of 1 Kg. until both print and filter paper are completely dry.

Class	Reagent	Concentration	Temperature° C	Exposing Time (minutes)	Result (Minimum)
Solvents	Ethyl Alcohol	95%	25	30	4
	Ethyl acetate	PURE	25	30	4
	Acetone	PURE	25	5	4
	Trichloro ethylene	PURE	25	30	4
	Perchloro ethylene	PURE	25	30	4
	Xylene	PURE	25	30	4
Acids	Acetic Acid	20%	25	30	4
	Sulphuric acid	2%	25	30	4
	Hydrochloric Acid	5%	25	30	4
Soap	Soap Solution	10%	85	30	4
Bleach	Sodium Hypochlorite (8.5 %)	20%	25	20	4

Ratings are based on visual comparison of the appearance of treated print with an untreated print taking into account (i) the ink transfer on filter paper kept in contact, while drying and (ii) bleed in the chemicals where,
5 indicates no visible damage to colour and glitter, no transfer, no bleeding of ink prints (less than 5%),
4 indicates slight change in the colour and glitter (5-25%),
3 indicates minor change in the colour and glitter (25-50%),
2 Indicates significant change in colour, glitter transfer bleeding (50-95%)
1 indicates colour disappearance (less than 5% remaining).
Note: Purchaser may perform either of the tests of the ink as per the point D.

E. Environmental Aspect: The Fumaric Acid sample should not contain any heavy metal like Lead, Chromium, Nickel, Cadmium in any form or organic agents such as polychlorinated biphenyls etc. The sample should be free from any toxic solvents, toxic organic chemicals, cyanides, chlorinated solvents, mono-glycol ethers etc. The bidder should provide the Material Safety Data Sheet pertaining to the product.

F. Quality Certificate: Each lot supplied should have Quality Control Certificate giving details of parameter tested. Purchaser reserves the right to verify the quality control parameters submitted by the bidder/s and to reject the supply in case of incomplete/wrong details in the certificates.

G. Tender Stipulations: Bidder firm should provide Material Safety Data Sheets (MSDS) of the offered product. Each lot supplied should have Quality Control Certificate giving details of parameters tested. Prospective bidders shall comply with the feature specifications and submit a "Specification Compliance Certificate" with their Technical Bid along with the test certificates.

H. Health and safety requirements: The ink manufactured with the offered Fumaric Acid shall meet the standards of health and safety regulations prescribed by the appropriate Indian/Global agencies and the bidder/s shall submit a certificate to this effect. The ink while in continuous use on machines either shall not pose any health hazards to the personnel to their eyes or skin or to any internal organs or to the functions of the body in any way and the bidder shall submit a certificate to this effect. The ink shall not emit any volatile organic compounds or odour, which would be harmful to health of the employee while working on machines and the manufacturer, shall submit a certificate to this effect. The bidder shall indicate the shelf life and storing conditions.

ANNEXURE – B

EOI 001/MYS/VARNIKA-11/2023-24 **Dated: 09.08.2023**

Details of documents:

The following documents and information shall be submitted together with the Expression of Interest:

- Brief description of the company/organization, including its structure and the number of employees.
    - Name of the firm and complete address including branches; if any:
    - Status of the firm: Proprietor / Partnership / Regd. Company / Co-op. Society
- Reference list of major clients and projects of similar nature executed in the last 5 years with relevant details like Supply order/LOI/satisfactory performance certificate.
- The vendor should give a declaration that they have not been blacklisted / debarred from dealing by Government of India/BRBNMPL in the past 5 years.
- The vendor is required to submit the undertaking that "the information given in the documents are correct and the Vendor is aware that any information provided is found to be false at a later stage, purchaser reserves the right to reject / disqualify the vendor at any stage of the tendering process without assigning any reason."
- The vendor should indicate that authorized signatory is competent and legally authorized to submit the tender and / or to enter into legally binding contract. The offer shall be legally binding on the vendor and are required to submit the authorization letter to that effect.
- A duly signed and stamped confidentiality statement as given below is to be furnished-"The information contained in the EOI document will not, in whole or in part be reproduced, transferred to other documents / electronic media or disclosed to others without written consent of BRBNMPL".
- Please enclose the details of last three years' ending 31st March 2022 financial standings data (P/L accounts, Balance sheets) are duly certified by Chartered Accountant (CA).
- The Vendor shall clearly indicate in the EOI if any patent or other proprietary rights are involved for the material and if so whether the Vendor has unlimited legal rights to deal with them/use them. The Vendor shall completely indemnify and hold harmless the Purchaser from and against any claims of infringement of any patent from any source. The abuse of patent rights resulting in cartel formation could lead to permanent disqualification of the Vendor. The Purchaser reserves the right to take such action as deemed fit over the same, without assigning any reason thereof.
- The Vendor should provide names of the Ink manufacturing companies to which they have supplied respective material in the past indicating the quantities supplied annually during the last five years. (Previous Purchase Order copies to be enclosed).

ANNEXURE – C

EOI 001/MYS/VARNIKA-11/2023-24 **Dated: 09.08.2023**

INFORMATION ABOUT THE COMPANY (TO BE FILLED-IN BY THE FIRMS)

Sl.No	Description	Details to be filled
1	Name of the company	
2	Year of Incorporation (copy of incorporation certificate may be enclosed)	
3	a) Address of the registered office.	
	b) Telephone no(s).	
	c) Fax no(s).	
	d) Web site, e-mail, if any.	
	e) Address of other regional/local office, if any.	
4	a) Name of the authorized representative of the company for coordination of this job	
	b) Telephone no(s).	
	c) Fax no(s).	
	d) E-mail address.	
5	a) Name of the associate JV company, if any	
	b) Address of the registered office of associate co.	
	c) Telephone no(s).	
	d) Fax no(s).	
	e) Website/email etc.,	
6	Current net worth (in INR or equivalent)	
7	Financial details (P/L, Balance sheet) for last three financial years (2019-20, 2020-21 2021-22)	
8	Any other information relevant to this tender	

Date:

Place: Signature of owner /Authorized representative of the company

Annexure-D

Salient features of 'Public Procurement Policy for Micro and Small Enterprises (MSEs) Order, 2012'

CONDITIONS FOR MICRO AND SMALL ENTERPRISES (MSEs)

1. MSEs must be registered with any of the following in order to avail the benefits / preference available under MSEs Order, 2012: -

- District Industries Centers (DIC)
- Khadi and Village Industries Commission (KVIC)
- Khadi and Village Industries Board
- Coir Board
- National Small Industries Corporation (NSIC)
- Directorate of Handicraft and Handloom
- Any other body specified by Ministry of MSME (MoMSME)
- Udyog Aadhaar Acknowledgment / Udyog Aadhaar Memorandum issued by MoMSME

2. MSEs participating in the tender must submit valid & authorised copy of certificate of registration with any one of the above agencies. In case of bidders submitting DIC registration certificate, they shall attach original notarised copy of the DIC certificate.
3. The registration certificate issued from any one of the above agencies must be valid as on Bid closing date of the tender. Bidder shall ensure validity of registration certificate in case bid closing date is extended.
4. The MSEs who have applied for registration or renewal of registration with any of the above agencies/bodies, but have not obtained the valid certificate as on closing date of the tender, are not eligible for exemption/preference. Where validity of such certificates such as NSIC certificate has lapsed, it shall be the responsibility of the bidder to seek renewal from the concerned Govt. agency before such expiry. However, documentary evidence seeking extension before the lapse of validity of such certificate and an authorization letter from the Govt. agency having received application for renewal submitted before the bid closing date shall be accepted.
5. Manufacturer for tendered items / Service provider of tendered services: The MSE bidder must be Manufacturer of tendered items for procurement / Service provider who is capable of rendering the tendered services by themselves to avail the benefits under MSEs Order, 2012. Traders/dealers/resellers/distributors/authorized agents will not be considered for availing benefits under MSEs Order, 2012 as per guidelines issued by MoMSME.
6. The MSEs registered with above mentioned agencies / bodies are exempted from payment of Earnest Money Deposit (EMD) & Tender fees.
7. Relaxation of Norms for Micro & Small Enterprises (MSEs): Pre-qualification criteria with respect to Prior Turnover and Prior experience may be relaxed for Micro & Small Enterprises as per GOI guidelines subject to meeting of quality and technical specifications.
8. Items which are reserved for exclusive purchase from MSEs shall be procured from Micro and Small Enterprises as per Public Procurement Policy.
9. Subject to meeting terms and conditions stated in the tender document, at least 25% of the total quantity of the tender is earmarked for MSEs registered with above mentioned agencies / bodies.
10. In case MSE bidder is L1, entire value of the tender is to be ordered on the L1 MSE bidder.
11. In tender, participating MSEs quoting price within price band of L1 + 15% shall also be allowed to supply a portion of requirement by bringing down their price to L1 price in a situation where L1 price is from someone other than a MSE and such MSE shall be allowed to supply at least 25% of the total tendered value (where the tender quantity can be split).
12. In case of more than one such MSEs are in the price band of L1 + 15% and matches the L1 price, the supply may be shared proportionately if the job can be split.

13. In case the tendered quantity cannot be split, MSE shall be allowed to supply total tendered quantity provided their quoted price is within a price band of L1 + 15% and they match the L1 price.
14. If the quantity cannot be split and there are more than one eligible MSE bidders (price band within L1+15%) then the opportunity to match the L1 rate of the tender shall be given first to MSE (who have quoted lowest rate among the MSEs within the price band of L1+15%) and the total quantity shall be awarded to him after matching the L1 price of the tender.
15. If the MSE who have quoted lowest rate among the MSEs in the price band of L1 + 15% do not agree to match the rate of L1 of the tender, then the next ranked MSE bidder who has quoted within the price band of L1 + 15% in order shall be given chance to match the rate of L1 for award of the quantity/order.
16. For more clarity in this regard, following table is furnished: -

Type of Tender	**Price quoted by MSE**	**Finalization of tender**
Can be Split	L1	Full order on MSE
	Not L1 but within L1+15%	At least 25% order on MSE subject to matching L1 price
Cannot be split	L1	Full Order on MSE
	Not L1 but within L1+15%	Full Order on MSE subject to matching L1 price

17. The purchase preference to MSEs is not applicable for works contracts where supply of goods not produced by MSEs is also involved.
18. Special provision for MSEs owned by SC & ST entrepreneurs: Out of the 25% target of annual procurement from MSEs, 4% shall be earmarked for procurement from MSEs owned by SC & ST entrepreneurs. In the event of failure of such MSEs to participate in the tender process or meet the tender requirements and L1 price, 4% sub-target so earmarked shall be met from other MSEs.
19. To qualify for entitlement as SC/ST owned MSE, the SC/ST certificate issued by District Authority in addition to certificate of registration with any one of the agencies mentioned in paragraph 1 above. Alternatively, the bidder shall be responsible to furnish necessary documentary evidence for enabling BRBNMPL to ascertain that the MSE is owned by SC/ST entrepreneurs. MSE owned by SC/ST is defined as:

- In case of Proprietary MSE, proprietor(s) shall be SC/ST
- In case of Partnership MSE, the SC/ST partners shall be holding at least 51% shares in the enterprise
- In case of Private Limited Companies, at least 51% share shall be held by SC/ST promoters

20. Special provision for MSEs owned by women entrepreneurs: Out of the 25% target of annual procurement from MSEs, 3% shall be earmarked for procurement from MSEs owned by women entrepreneurs in addition to 4% earmarked for MSEs owned by SC/ ST entrepreneurs. MSE owned by Women is defined as:

- In case of Proprietary MSE, proprietor(s) shall be Women
- In case of Partnership MSE, the Women partners shall be holding at least 51% shares in the enterprise
- In case of Private Limited Companies, at least 51% share shall be held by Women promoters

21. Micro & Small Scale Enterprises have to submit a declaration and undertaking along with their offer as per Declaration & Undertaking by Micro & Small Scale Enterprises / Start-up Companies / Entities seeking purchase preference under Make In India Policy / Women entrepreneurs / Registration with TReDS/GeM [as per Annexure-5].

Annexure - E

CONDITIONS FOR START-UP COMPANIES

1. Subject to meeting of Quality and Technical specifications, BRBNMPL may consider allowing the participation of "Start-up'' companies with capability to execute the supply/ services, as per technical specifications / perform the job as per scope of work specified in the tender and subject to meeting extant & relevant guidelines of Government of India. This should be confirmed and substantiated in the technical bid.
2. The bidder who intends to participate as "Start-up" company should enclose the Certificate of Recognition issued by Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce & Industry, Govt. of India during submission of Technical bid.
3. Start-ups registered with DPIIT are exempted from payment of Earnest Money Deposit (EMD) & Tender fees.
4. Prequalification Criteria with respect to Prior Turnover and Prior Experience may be relaxed for Start-ups as per the GOI guidelines.
5. Start-up Companies who are also registered as MSEs and wish to avail the benefits as applicable to MSE, shall submit relevant documents covered under Conditions for Micro and Small Enterprises elsewhere in this tender.
6. Start-up Companies have to submit a declaration and undertaking along with their offer as per Declaration & Undertaking by Micro & Small Scale Enterprises / Start-up Companies / Entities seeking purchase preference under Make In India Policy / Women entrepreneurs / Registration with TReDS/GeM [as per Annexure-5].

Annexure-F

Salient features of revised 'Public Procurement (Preference to Make in India) Order, 2017'

1. As per the revised Order, suppliers have been classified as 'Class-I local supplier', 'Class-II local supplier' and 'Non-local supplier' as defined below (para 2 of order): -

- 'Class-I local supplier' - supplier or service provider whose Goods, Services or Works has local content equal to or more than 50% - shall get purchase preference provided quoted price falling within margin of price preference i.e. within L1 + 20%
- 'Class-II local supplier' - supplier or service provider whose Goods, Services or Works has local content more than 20% but less than 50% - shall not get any purchase preference
- 'Non-local supplier' - supplier or service provider whose Goods, Services or Works has local content less than or equal to 20% - shall not get any purchase preference

2. Other important definitions (para 2 of order): -

- 'Local content'- means the amount of value added in India i.e. total value of the item (excluding local taxes) minus the value of import content in the item (including customs duty) as a proportion of the total value of the item, in percent
- 'Margin of purchase preference' – means the maximum extent to which the price quoted by a 'Class-I local supplier' can be above L1 price for the purpose of purchase preference. The margin of purchase preference shall be 20%

3. Procedure for purchase preference to 'Class-I local supplier' applicable for procurement scenario 2 in para 3 above is explained below in brief (para 3A (b) and (c) of order): -

I) Procurement of Goods and Works which are divisible in nature (e.g. consumables): -

- If L1 is 'Class-I local supplier' – 100% awarded to L1
- If L1 is not 'Class-I local supplier' – 50% awarded to L1

  - Remaining 50% awarded to lowest bidder among 'Class-I local supplier' falling within L1+20% subject to matching L1 price
  - If unable to match L1 price or accepts less than offered quantity, next lowest 'Class-I local supplier' bidder within L1+20% is invited to match L1 price for remaining quantity and so on and contract will be awarded accordingly.
  - If some quantity is left uncovered on 'Class-I local supplier', then such balance quantity can be ordered on the original L1 bidder

II) Procurement of Goods and Works which are not divisible in nature (e.g. Varnish Plant) and procurement of Services where bid is evaluated on price alone: -

- If L1 is 'Class-I local supplier' – 100% awarded to L1
- If L1 is not 'Class-I local supplier'

  - Lowest bidder among 'Class-I local supplier' falling within L1+20% is invited to match L1 price – contract awarded subject to matching L1 price
  - If unable to match L1 price, next lowest 'Class-I local supplier' bidder within L1+20% is invited to match L1 price and so on and contract will be awarded accordingly
  - If none of the 'Class-I local supplier' bidder within L1+20% is unable to match L1 price, contract awarded to original L1 bidder

4. Verification of local content: Verification of local content will be as per "para 9" (a) & (b) of DPIIT order No. P-45021/2/2017-B.E.-II dated 04.06.2020.

The Class-I local supplier/Class-II local supplier at the time of tender, bidding or solicitation shall be required to indicate percentage of local content and provide self-certification (as per format given below on the manufacturers company letter head) that the item required to indicate percentage of the local content

requirement for Class-I local supplier/Class-II local supplier as the case may be. They shall also give details of the location(s) at which the local addition is made.

"We _____ (Name of Manufacturer/Supplier) undertake that we meet the mandatory minimum Local Content (LC) requirement i.e. for claiming purchase preference linked with Local Contents under the Govt. policy against under tender no.."

In cases of procurement for a value in excess of Rs.10 crores, the Class-I local supplier/Class-II local supplier shall be required to provide a certificate from the statutory auditor or cost auditor of the company (in case of companies) or from a practicing cost accountant or practicing charted accountant (in respect of suppliers other than companies) giving the percentage of local content.

5. False declarations (para 9 (f) & (g) of DPIIT order),
   False declarations will be breach of the code of Integrity under Rule 175(1)(i)(h) of the General Financial Rules for which bidder or its successors can be debarred for up to two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permissible under law.
   A supplier who has been debarred by any procuring entity for violation of this Order shall not be eligible for preference under this Order for procurement by any other procuring entity for the duration of the debarment. The debarment for such other procuring entities shall take effect prospectively from the date on which it comes to the notice of other procurement entities.
6. Relaxations in Eligibility Criteria (para 10 (a) & (b) of DPIIT) order) No. P-45021/2/2017-B.E.-II dated 04.06.2020.
   Bidders under Make in India scheme are exempted to provide any proof of supply in other countries or proof of exports w.r.t. experience and past performance criteria, subject to meeting of quality and technical specifications mentioned in this Tender.
7. Besides above, the bidders have to submit a declaration and undertaking along with their offer as per Declaration & Undertaking by Micro & Small Scale Enterprises / Start-up Companies / Entities seeking purchase preference under Make In India Policy / Women entrepreneurs / Registration with TReDS/GeM [as per Annexure-5].

Annexure-G

PROCEDURE TO BE ADOPTED WHEN THE BIDDER QUALIFIES AS BOTH MSE AND CLASS-I LOCAL SUPPLIER

The option in case of bidders qualifying under both Policies, namely, Public Procurement Policy for MSEs Order, 2012 (MSEs-2012) and Public Procurement (Preference to Make in India) Order, 2017 (MII-2017) shall be exercised as under:

1. The bidder can avail only one out of the two applicable purchase preference policies, i.e., MSEs-2012 and MII-2017. Therefore, bidder will be required to furnish the option under which he desires to avail purchase preference. This option must be declared within the offer and in case bidder fails to do so although he is eligible under both the Policies, BRBNMPL shall evaluate his offer considering MSEs-2012 as the default chosen option.
2. In case a bidder opts for preference under MSEs-2012, he shall not be eligible to claim benefit under MII-2017 (irrespective of the fact whether he furnishes the details of local content in his offer and the same meets the stipulated local content criteria).
3. In case a bidder opts for purchase preference based on MII-2017, he shall not be entitled to claim benefit of purchase preference as applicable for MSE bidders under MSEs-2012. However, the exemptions from furnishing Bid security (EMD) shall continue to be available to such a bidder.
4. In view of the above,
    a. The bidder's quoted prices against various items of enquiry shall remain valid even in case of splitting of quantities of the items, except in case of items where the quantity cannot be split since these are to be awarded in a Lot or as a package or Group.
    b. While evaluating the bids, for price matching opportunities and distribution of quantities among bidders, the order of precedence shall be as under:
        - MSE bidder (MSEs-2012)
        - Class-I local supplier (MII-2017)
5. In case the bidder has not declared his status as to whether he is an MSE Bidder or Class-I local supplier during bid submission, then he will be considered as non MII-2017 compliant bidder and evaluated accordingly. No further correspondence will be made in this regard.

Examples of Purchase Preference:

a. Non divisible item

L1 bidder is neither MSE nor Class-I local supplier

L2 bidder is Class-I local supplier (within L1 + 20%)

L3 bidder is MSE bidder (within L1 + 15%)

L3 bidder i.e. MSE bidder shall be given preference to match the L1 price. If L3 bidder matches the L1 price, Order shall be placed on him, otherwise, option for matching the L1 price shall be given to L2 bidder (Class-I local supplier)

b. Divisible item

L1 bidder is neither MSE nor Class-I local supplier

L2 bidder is Class-I local supplier (within L1 + 20%)

L3 bidder is MSE bidder (within L1 + 15%)

MSE bidder shall be given preference to match the L1 price. If L3 bidder matches the L1 price, order shall be placed on him for at least 25% of the tendered quantity. For balance quantity (i.e. 50% of tendered quantity/value), option for matching the L1 price shall be given to L2 bidder (Class-I local supplier). Remaining quantity (25%) shall be awarded to natural lowest bidder. For further clarification, in case an item has quantity 4 nos. then 1 no. (25%) can be given to MSE bidder, 2 nos. (50%) to Class-I local supplier and left out 1 no. to natural L1 bidder.

Note:

The above two examples are not applicable to the Works Contracts since MSEs Order, 2012 is not applicable to works contracts.

- In case lowest bidder is a MSE bidder, the entire work shall be awarded to him without resorting to purchase preference to bidders complying under MII-2017.
- In case lowest bidder is a Class-I local supplier, purchase preference shall be resorted to MSE bidder as per provisions specified in the enquiry document w.r.t. MSEs-2012 only.

Annexure-H

F No 6/18/2019-PPD dated 23rd Jul 2020 and its subsequent amendment on restrictions of procurement from countries sharing land border with India

- Any bidder from a country which shares a land border India will be eligible to bid in any procurement whether of goods, services or works only if the bidder is registered with the competent authority.
- Bidder means any person or firm or company, including any member of a consortium or joint venture, every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency, branch or office controlled by such person, participating in a procurement process.
- Bidder from a country which shares a land border with India means,
- a) An entity incorporated, established or registered in such a country or
- b) A subsidiary of an entity incorporated, established or registered in such a country or
- c) An entity substantially controlled through entities incorporated, established or registered in such a country or
- d) An entity whose beneficial owner is situated in such a country or
- e) An Indian (or other) agent of such an entity or
- f) A natural person who is a citizen of such a country or
- g) A consortium or joint venture where any member of the consortium or joint venture falls under any of the above
- Office memorandum dated 8th Feb 2021 (clarification)
  a) A bidder is permitted to procure raw material, components, sub-assemblies etc. from the vendors from countries which share a land border with India. Such vendors will not be required to be registered with the competent authority, as it is not regarded as sub-contracting.
  b) However, in case a bidder has proposed to supply finished goods procured directly/indirectly from the vendors from the countries sharing land border with India such vendor will be required to be registered with the competent authority.

Annexure-I

Declaration & Undertaking by Micro & Small Scale Enterprises / Start-up Companies / Entities seeking purchase preference under Make In India Policy / Women entrepreneurs / Registration with TReDS/GeM

(To be filled in the Company letter head)

Date: ……

Sl. No	Particulars	Details
1	Is your organization Proprietary / Partnership / Private Limited Company / Public Limited Company?/ Others	……
2	Does your organization belong to Micro / Small Scale Industry / Start-up / Class-I local supplier / others (Please tick mark appropriate box. Bidders may tick more than one, if eligible)	• Micro • Small Scale • Start-up Company • Class-I local supplier • Others
3	In case you belong to Micro / Small Scale Enterprises, whether you are a Manufacturer for the tendered items (supply) / Service Provider for the tendered services (Please tick mark the appropriate box)	• Manufacturer for supply items • Service Provider for services • Trader/dealer/reseller/distributor/ authorized agent • Non MSE Bidder
4	In case you belong to Micro / Small Scale Enterprises, whether you are registered under SC / ST Category. *If yes, valid documentary evidence to be submitted* (Please tick mark the appropriate box)	• Yes • No If yes, whether • SC • ST
5	In case you belong to Micro / Small Scale Enterprises, whether your firm/ organization is owned by Women entrepreneurs? *If yes, valid documentary evidence to be submitted* (Please tick mark the appropriate box)	• Yes • No
6	Are your registered under TReDS (Trade Receivable Electronic Discounting System approved by RBI) Applicable for Micro, Small and Medium Enterprises (Please tick mark the appropriate box)	• No • Yes If yes, whether • RXIL A-Treds M1Xchange (Tick agency with whom you are registered along with Regn No.)
		Regn No. ……

7	Has your firm/organization registered your items/services in Government e-Marketplace (GeM)	• Yes • No
8	In case you are both a valid MSE bidder and Class-I local supplier (Make in India Policy), please give your preference. (Please tick any one)	• MSE • Class-I local supplier
9	In case you are claiming benefits under Make in India Policy, whether you are meeting the minimum local content as mentioned in the tender document/ concerned Ministry guidelines/Policy.	• Yes, Local Content_____% • Not applicable for this tender

Declaration: I/We hereby declare that the above data submitted are true and back-up documents are attached as proof of the same. In case any submitted data are found to be incorrect/false, my/our bid is liable to be rejected and I/we am/are liable for suitable actions as per relevant BRBNMPL Policy.

I/We also understand that in case I/we am/are not claiming benefits under Make in India Policy, or under MSEs Order as per tender requirements, then purchase preference shall apply to other bidders who have quoted accordingly as per policy.

A. Categorisation of MSE/SC-ST & Women Vendors

1. In case of Micro/Small scale Enterprises, kindly attach Registration Certificate issued by DIC/KVIC/KVIB/Coir Board/NSIC/Directorate of Handicrafts and Handlooms, or any other body specified by MSME for authentication such as Udyog Aadhaar Memorandum/ Acknowledgment.

2. SC/ST and Women entrepreneurs registered under MSEs need to submit valid documentary evidence.

B. Categorisation of Start-up Companies

Bidder who intends to participate as 'Start-up'' company should enclose the Certificate of Recognition issued by Department for Promotion of Industry and Internal Trade, Ministry of Commerce and Industry, Govt. of India and his eligibility shall be valid as on bid closing date.

C. Declaration in case of MSE Bidders / Start-up Companies

In terms of Tender Conditions applicable for Micro & Small Enterprises (MSEs) / Start-ups, we hereby declare as under: -

a. We are a Micro / Small Enterprise, as on bid closing date of this tender.

b. We are a Manufacturer of the quoted supply item(s)/service provider for quoted services and valid documentary evidence for same is submitted.

c. MSE certificate submitted by us is authentic & valid as on bid closing date of this tender.

d. We are a 'Start-up'' company and we are enclosing copy of certificate of recognition issued by Department for Promotion of Industry and Internal Trade, Ministry of Commerce and Industry, Govt. of India.

e. We are a Micro / Small Enterprise which is owned by SC-ST/women entrepreneurs and we are submitting valid documentary evidence for the same.

D. Declaration in case of entities seeking purchase preference under Make in India Policy

We have read carefully the terms and conditions for availing the benefits of purchase preference under Make in India Policy and we are meeting all the requirements of Local Content and duly certified documents for proving the stipulated local content along with details of the location(s) where local value addition is made as mentioned in this document are enclosed.

We declare the above details are true. In case any of the details are found to be false/untrue, our offer will be liable for rejection /cancellation of order/subjected to appropriate actions as per tender Terms & Conditions.

……

Authorized Signatory

(With Company Seal & Signature)