

OPEN TENDER CHECKLIST

Sl. No.	Document Name	Vendor Confirmation (Filled and Signed copy to be submitted along with Techno Commercial Offer)
01	Annexure A COVERING LETTER	Submitted ☐ Not Submitted ☐
02	Annexure B GENERAL TERMS & CONDITIONS (FOR GUIDANCE TO THE SUPPLIERS)	Submitted ☐ Not Submitted ☐
03	Annexure C, COMMERCIAL TERMS AND CONDITIONS	Submitted ☐ Not Submitted ☐
04	Annexure D PRICE OFFER FORMAT	Submitted ☐ Not Submitted ☐
05	Annexure E SPECIFICATION DEVIATION DISPOSITION REPORT	Submitted ☐ Not Submitted ☐
06	Annexure F CEBG	Submitted ☐ Not Submitted ☐
07	Annexure G Online SRF	Submitted ☐ Not Submitted ☐
08	TECHNICAL SPECIFICATION ROS:6175 REV 00 DATED 05.07.17	Submitted ☐ Not Submitted ☐
09	TECHNICAL SPECIFICATION ROS:9012 REV 03 DATED 09.07.16	Submitted ☐ Not Submitted ☐
10	TECHNICAL SPECIFICATION ROS:4177 REV 00 DATED 08.07.17	Submitted ☐ Not Submitted ☐
11	P&ID FOR DOSING SYSTEM 1-WT-030-01052 REV 00	Submitted ☐ Not Submitted ☐
12	BOQ FOR INSTRUMENTS ANNEXURE A	Submitted ☐ Not Submitted ☐
13	VENDOR LIST ANNEXURE – I	Submitted ☐ Not Submitted ☐
14	MANDATORY SPARES ANNEXURE II	Submitted ☐ Not Submitted ☐
15	SEAWORTHY PACKING SPEC. PE TS 888 100 A001 REV 00	Submitted ☐ Not Submitted ☐
16	PQR FOR DOSING SYSTEM	Submitted ☐ Not Submitted ☐



Bharat Heavy Electricals Limited

Boiler Auxiliaries Plant
RANIPET – 632 406, Tamil Nadu, India
Purchase Department - Desalination

ANNEXURE - A

Open Tender for Manufacturing & Supply of

**DOSING SYSTEM SKID ASSEMBLY (CONSIST OF MOTORISED PUMPS,
(MANUAL/AUTOMATIC), TANKS, MOTORISED MIXER, INTERCONNECTING CPVC PIPING,
VALVES, INSTRUMENTS) & ACCESSORIES
FOR KECL TANZANIA 371.2MW CCP PROJECT
(INTERNATIONAL ORDER)**

Enquiry No.: 77770674E Dated 21-JUL-17(NIT_33791)

Due on: Due on: 17-AUG-17

To All [Manufacturers only.](#)

Dear Sir,

Please submit your lowest quotation on FIRM PRICE, in duplicate subject to our terms & conditions in the various annexures attached and herein for the below listed materials so as to reach us on or before the due date by 2.00 p.m.

Requirement with Delivery date-FOR SUPPLY:

Enquiry Sl. No.	Description & material Code	Unit	Qty.	Delivery Date
001	RWT705300001 NAOCL DOSING SYSTEM (SKID) ASSEMBLY WITH ACCESSORIES (20 LPH) FOR PWTP, AS PER TECHNICAL SPECIFICATION NO. ROS:6175 REV 00 DATED 05.07.17, ROS:9012 REV 03 DATED 09.07.16, ROS:4177 REV 00 DATED 08.07.17 & P & ID DRAWING. NO. 1-WT- 030-01052 REV 00.	ST	1.00	15.02.2018
002	RWT705300002 HCL DOSING SYSTEM (SKID) ASSEMBLY WITH ACCESSORIES (50 LPH) FOR PWTP, AS PER TECHNICAL SPECIFICATION NO. ROS:6175 REV 00 DATED 05.07.17, ROS:9012 REV 03 DATED 09.07.16, ROS:4177 REV 00 DATED 08.07.17 & P & ID DRAWING. NO. 1-WT- 030-01052 REV 00.	ST	1.00	15.02.2018



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Enquiry Sl. No.	Description & material Code	Unit	Qty.	Delivery Date
003	RWT705300003 COAGULANT DOSING SYSTEM (SKID) ASSEMBLY WITH ACCESSORIES (50 LPH) FOR PWTP, AS PER TECHNICAL SPECIFICATION NO. ROS: 6175 REV 00 DATED 05.07.17, ROS:9012 REV 03 DATED 09.07.16, ROS:4177 REV 00 DATED 08.07.17 & P & ID DRAWING. NO. 1-WT- 030-01052 REV 00.	ST	1.00	15.02.2018
004	RWT705300004 COAGULANT AID DOSING SYSTEM (SKID) ASSEMBLY WITH ACCESSORIES (50 LPH) FOR PWTP, AS PER TECHNICAL SPECIFICATION NO. ROS: 6175 REV 00 DATED 05.07.17, ROS:9012 REV 03 DATED 09.07.16, ROS:4177 REV 00 DATED 08.07.17 & P & ID DRAWING. NO. 1-WT- 030-01052 REV 00.	ST	1.00	15.02.2018
005	RWT705300005 DE-CHLORINATION DOSING SYSTEM (SKID) ASSEMBLY WITH ACCESSORIES (10 LPH) FOR PWTP, AS PER TECHNICAL SPECIFICATION NO. ROS:6175 REV 00 DATED 05.07.17, ROS:9012 REV 03 DATED 09.07.16, ROS:4177 REV 00 DATED 08.07.17 & P & ID DRAWING. NO. 1-WT- 030-01052 REV 00.	ST	1.00	15.02.2018
006	RWT705300006 ANTISCALANT DOSING SYSTEM (SKID) ASSEMBLY WITH ACCESSORIES (10 LPH) FOR PWTP, AS PER TECHNICAL SPECIFICATION NO. ROS: 6175 REV 00 DATED 05.07.17, ROS:9012 REV 03 DATED 09.07.16, ROS:4177 REV 00 DATED 08.07.17 & P & ID DRAWING. NO. 1-WT- 030-01052 REV 00.	ST	1.00	15.02.2018



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Enquiry Sl. No.	Description & material Code	Unit	Qty.	Delivery Date
007	RWT705300007 NAOH DOSING SYSTEM (SKID) ASSEMBLY WITH ACCESSORIES (10 LPH) FOR PWTP, AS PER TECHNICAL SPECIFICATION NO. ROS: 6175 REV 00 DATED 05.07.17, ROS:9012 REV 03 DATED 09.07.16, ROS:4177 REV 00 DATED 08.07.17 & P & ID DRAWING. NO. 1-WT- 030-01052 REV 00.	ST	1.00	15.02.2018
008	RWT705300008 UF CIP CLEANING - CITRIC ACID DOSING SYSTEM (SKID) ASSEMBLY WITH ACCESSORIES (160 LPH) FOR PWTP-1 NO & STP-1 NO. AS PER TECHNICAL SPECIFICATION NO. ROS: 6175 REV 00 DATED 05.07.17, ROS:9012 REV 03 DATED 09.07.16, ROS:4177 REV 00 DATED 08.07.17 & P & ID DRAWING. NO. 1-WT- 030-01052 REV 00.	ST	2.00	15.02.2018
009	RWT705300009 UF CIP CLEANING- NAOCL DOSING SYSTEM (SKID) ASSEMBLY WITH ACCESSORIES. (160 LPH) FOR PWTP-1NO. & ETP-1 NO., AS PER TECHNICAL SPECIFICATION NO. ROS:6175 REV 00 DATED 05.07.17, ROS:9012 REV 03 DATED 09.07.16, ROS:4177 REV 00 DATED 08.07.17 & P & ID DRAWING. NO. 1-WT- 030-01052 REV 00.	ST	2.00	15.02.2018
010	RWT705300010 HCL DOSING SYSTEM (SKID) ASSEMBLY WITH ACCESSORIES (50 LPH) FOR ETP, AS PER TECHNICAL SPECIFICATION NO. ROS: 6175 REV 00 DATED 05.07.17, ROS:9012 REV 03 DATED 09.07.16, ROS:4177 REV 00 DATED 08.07.17 & P & ID DRAWING. NO. 1-WT- 030-01052 REV 00.	ST	1.00	15.02.2018



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Enquiry Sl. No.	Description & material Code	Unit	Qty.	Delivery Date
011	RWT705300011 COAGULANT DOSING SYSTEM (SKID) ASSEMBLY WITH ACCESSORIES (50 LPH) FOR ETP, AS PER TECHNICAL SPECIFICATION NO. ROS:6175 REV 00 DATED 05.07.17, ROS:9012 REV 03 DATED 09.07.16, ROS:4177 REV 00 DATED 08.07.17 & P & ID DRAWING. NO. 1-WT- 030-01052 REV 00.	ST	2.00	15.02.2018
012	RWT705300012 COAGULANT AID DOSING SYSTEM (SKID) ASSEMBLY WITH ACCESSORIES (50 LPH) FOR ETP, AS PER TECHNICAL SPECIFICATION NO. ROS:6175 REV 00 DATED 05.07.17, ROS:9012 REV 03 DATED 09.07.16, ROS:4177 REV 00 DATED 08.07.17 & P & ID DRAWING. NO. 1-WT- 030-01052 REV 00.	ST	2.00	15.02.2018
013	RWT705300013 DECHLORINATION DOSING SYSTEM (SKID) ASSEMBLY WITH ACCESSORIES (10 LPH) FOR ETP, AS PER TECHNICAL SPECIFICATION NO. ROS:6175 REV 00 DATED 05.07.17, ROS:9012 REV 03 DATED 09.07.16, ROS:4177 REV 00 DATED 08.07.17 & P & ID DRAWING. NO.1-WT- 030-01052 REV 00.	ST	1.00	15.02.2018
014	RWT705300014 ANTISCALANT DOSING SYSTEM (SKID) ASSEMBLY WITH ACCESSORIES (10 LPH)FOR ETP, AS PER TECHNICAL SPECIFICATION NO. ROS:6175 REV 00 DATED 05.07.17, ROS:9012 REV 03 DATED 09.07.16, ROS:4177 REV 00 DATED 08.07.17 & P & ID DRAWING. NO. 1-WT- 030-01052 REV 00.	ST	1.00	15.02.2018



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Enquiry Sl. No.	Description & material Code	Unit	Qty.	Delivery Date
015	RWT705300015 NAOH DOSING SYSTEM (SKID) ASSEMBLY WITH ACCESSORIES (15 LPH) FOR ETP, AS PER TECHNICAL SPECIFICATION NO. ROS: 6175 REV 00 DATED 05.07.17, ROS:9012 REV 03 DATED 09.07.16, ROS:4177 REV 00 DATED 08.07.17 & P & ID DRAWING. NO. 1-WT- 030-01052 REV 00.	ST	1.00	15.02.2018
016	RWT705300016 NAOCL DOSING SYSTEM (SKID) ASSEMBLY WITH ACCESSORIES, (15 LPH) FOR ETP, AS PER TECHNICAL SPECIFICATION NO. ROS: 6175 REV 00 DATED 05.07.17, ROS:9012 REV 03 DATED 09.07.16, ROS:4177 REV 00 DATED 08.07.17 & P & ID DRAWING. NO. 1-WT- 030-01052 REV 00.	ST	1.00	15.02.2018
017	RWT705300017 COMMISSIONING SPARES FOR DOSING SYSTEM, AS PER TECHNICAL SPECIFICATION NO. ROS:6175 REV 00 DATED 05.07.17, ROS:9012 REV 03 DATED 09.07.16 & ROS:4177 REV 00 DATED 08.07.17 <i>Commissioning spares shall be packed separately with detailed packing list (items should not be packed along with main supply items)</i>	ST	1.00	15.02.2018
018	RWT705300018 MANDATORY SPARES FOR DOSING SYSTEM, AS PER TECHNICAL SPECIFICATION NO. ROS:6175 REV 00 DATED 05.07.17, ROS:9012 REV 03 DATED 09.07.16 & ROS:4177 REV 00 DATED 08.07.17 <i>Mandatory spares shall be packed separately with detailed packing list (items should not be packed along with main supply items)</i>	ST	1.00	15.02.2018



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Enquiry Sl. No.	Description & material Code	Unit	Qty.	Delivery Date
OPTIONAL PRICE	RECOMMENDED SPARES FOR 2 YEARS O&M -LIST OF SPARES WITH PRICE BREAKUP TO BE FURNISHED NOTE: THIS ITEM WILL BE ORDERED IF REQUIRED ONLY AND THIS ITEM WILL NOT BE CONSIDERED FOR ARRIVING RANKING	SET	1.00	Ordered later if required

BIDDERS SHALL CAREFULLY READ THE FOLLOWING ANNEXURES / NOTES AND SHALL QUOTE THEIR BEST COMPETITIVE PRICE.

PLEASE REFER TO,

1. **ANNEXURE-B FOR STANDARD TERMS & CONDITIONS (FOR GUIDANCE TO THE SUPPLIERS)**
2. **ANNEXURE-C FOR COMMERCIAL TERMS AND CONDITIONS**
3. **ANNEXURE-D PRICE BID FORMAT FOR THE SUPPLY, SERVICES & OPTIONAL PRICES.**
4. **ANNEXURE-E SDDR FORMAT**
5. **ANNEXURE-F CEBG FORMAT**
6. **ANNEXURE-G ON LINE SUPPLIER REGISTRATION FORM**
7. **TECHNICAL ENCLOSURES AS PER FOLLOWINGS:**

01. TECHNICAL SPECIFICATION FOR DOSING SYSTEM & ACCESSORIES - ROS: 6175 REV 00 DATED 05.07.17,
02. GENERAL SPECIFICATION FOR DOSING SYSTEM & ACCESSORIES - ROS: 9012 REV 03 DATED 09.07.16,
03. TECHNICAL SPECIFICATION FOR ELECTRICAL CONTROL & INSTRUMENTATION FOR DOSING SYSTEM - ROS: 4177 REV 00 DATED 08.07.17
04. P & ID DRAWING. NO. 1-WT- 030-01052 REV 00,
05. BOQ FOR INSTRUMENTS ANNEXURE A
06. MANDATORY SPARES ANNEXURE I
07. SEAWORTHY PACKING SPEC. PE TS 888 100 A001 REV 00,
08. PQR FOR DOSING SYSTEM.

Important Instruction to Bidders:

1. All the items will be procured from a single vendor only & all the Items will be compared on SET Basis & Order will be placed on a Single vendor who is the lowest (L1) on set basis. Hence please quote for all the complete items including services. Incomplete offers will be rejected.
2. Vendors shall go through the “Qualification Requirement” & furnish Qualification Data sheet duly filled in along with Techno-Commercial offer. Offers received without this requirement will be summarily rejected & such offers will not be processed further.



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3. Price bid opening will be considered subject to techno commercial confirmation and acceptance by BHEL, Ranipet & also approval from our customer: M/s KECL TANZANIA 371.2MW.

➤ TENDER SHALL BE SUBMITTED IN TWO PARTS AS REFERRED IN ANNEXURE-B.

➤ ANY REVISED OFFER(S) SENT BY VENDORS ON THEIR OWN, AFTER THE TENDER OPENING, WILL BE TREATED AS "UNSOLICITED OFFER". SUCH OFFERS WILL NOT BE CONSIDERED AND NECESSARY ACTION AS DEEMED FIT WILL BE TAKEN BY BHEL ON THOSE VENDORS. HENCE COMPETITIVE OFFER TO BE GIVEN IN THE ORIGINAL QUOTE ITSELF.

IMPORTANT NOTE:

TENDERS ARE INVITED THROUGH ELECTRONIC MODE FROM ELIGIBLE SUPPLIERS IN CASE OF OPEN TENDERS AND FROM SUPPLIERS TO WHOM THE ENQUIRY IS ADDRESSED IN CASE OF LIMITED / SINGLE TENDER.

THE OFFERS SHALL BE POSTED INTO THE SYSTEM BEFORE THE DATE AND TIME SPECIFIED IN THE TENDER.

THE OFFER SHALL BE SENT ON ~~SINGLE PART~~ / TWO PART / ~~THREE PART~~ BASIS AS SPECIFIED IN THE MAIN TENDER DOCUMENT.

BIDS SHALL BE SUBMITTED THROUGH E-PROCUREMENT PORTAL, <https://bheleps.buyjunction.in> OF M/s mJUNCTION SERVICES LIMITED WHO ARE OUR SOLUTION PROVIDER.

01) OFFERERS ARE REQUESTED TO CAREFULLY READ THE FOLLOWING CONDITIONS AND GIVE THEIR SPECIFIC CONFIRMATION OF ACCEPTANCE IN TOTO.

2A) TIME IS THE ESSENCE OF CONTRACT.

2B) IN THE EVENT OF DELAY ON THE CONTRACT DELIVERY, LIQUIDATED DAMAGES (LD) WILL BE LEVIED.

2C) LD WILL BE LEVIED AT THE RATE OF 0.5 % PER WEEK OR PART THEREOF ON THE CONTRACT VALUE.

2D) THE LD CEILING WILL BE 10 %.

2E) LD WILL BE A MANDATORY CONDITION IN THE PURCHASE ORDER.

3) IF NO CONFIRMATION OR COMMENTS ARE INCLUDED IN THE INITIAL OFFER BY THE TENDERER, IN THE EVENT OF PLACEMENT OF ORDER, THE ORDER WILL BE RELEASED WITH THE STANDARD LD CONDITION GIVEN ABOVE.

4) THE CONDITION WILL BE INCLUDED IN THE ORDER WITHOUT ANY FURTHER REFERENCE TO THE OFFERER AND NO CHANGES WILL BE PERMISSIBLE, POST ORDER RELEASE.

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**ANNEXURE –B**  
**GENERAL TERMS & CONDITIONS**  
**(FOR GUIDANCE TO THE SUPPLIERS)**

**A] Submission of Offer**

**a) Invitation for bid**

Tenders are invited through electronic mode from eligible suppliers in case of open tenders and from suppliers to whom the enquiry is addressed in case of Limited / Single Tender.

The offers shall be posted into the system before the date and time specified in the tender.

The offer shall be sent on single part / two part / three part basis as specified in the main tender document.

Bids shall be submitted through e-Procurement portal, <https://bheleps.buyjunction.in>, of M/s mJunction Services Limited who are our solution provider.

**b) Hardware and Software requirements for participating in e-tender**

Requirement for participating in e-Procurement is as under:

- i) A Computer with internet connectivity (Internet Explorer Version 9 and above).
- ii) Digital Signature Certificate (Class 3- SHA2-2048 BIT- with both Signing and Encryption component separately).
- iii) JAVA (Version 1.8 Update 45).

**c) Instructions for Registered Suppliers**

For all types of tenders (Single / Limited / Open) an automated email alert regarding issue of the Tender will be sent by the e-procurement portal to all Suppliers registered with BHEL, Ranipet for the item/s for which the tender is issued.

In case of open tenders, Registered suppliers with registered DSC will have to login with their user id/password & DSC and search for the Open Tender. On clicking the “Interest” button, they will get attached to that particular Open Tender.

Registered suppliers without DSC will have to first register themselves in <https://bheleps.buyjunction.in> as new supplier by clicking the “New Supplier” button.

To know the procedure for obtaining Digital Signature Certificate (DSC), suppliers who are not having the DSC are advised to visit our website [www.bhel.com](http://www.bhel.com) → Tender Notifications → Sample Checklist.

**d) Instructions for new suppliers wishing to bid against open tenders**

New, unregistered suppliers wanting to bid against open tender/s will have to first register themselves in <https://bheleps.buyjunction.in> as new supplier by clicking the “New Supplier” button.

After entering the Income Tax Permanent Account Number (PAN) details and pressing “Enter”, they have to click the “Interested” button against the respective BHEL Unit for which they want to participate in the Open Tender and also fill up other relevant Company information as a one-time activity.

Then, a box for filling in a “preferred login id” will appear at the top of the page. After giving the “preferred login id” and then clicking the “Next” button, Supplier would have to map their DSC (which will be activated by M/s mJunction Services Limited), if available. Or else, by pressing “skip” button and selecting relevant procurement category from the list available in the next page and “agreeing” to the BHEL’s terms & conditions, user id and password will be generated/activated once in 2 hours and mailed to their registered

email id. Using this user id and password, Supplier has to login and map the Digital Signature Certificate they have purchased to their code. The DSC will then be activated by M/s mJunction Services Limited.

As required by the tender, the necessary documents have to be filled-in online, in the provided template. Additional documents required are to be scanned and uploaded as .pdf file. Suppliers are advised to take note that the maximum space that is provided for uploading the documents that are to be attached is 300 MB. However the size of an individual document cannot exceed 10 MB. For any clarification on submission of offer on line, attention of the Supplier/s is invited to our document “Supplier Manual” hosted in the home-page of the e-procurement portal. During normal business hours, helpline maintained by the service provider mJunction is available for clarifying any doubts of supplier/s. The helpline numbers are 09840704941 or 09500199108.

**Typical documents that would be required as part of tender submission would be**

- a) **Complete technical Offer** with details, catalogues, as applicable.
- b) **Un-priced bid** (i.e. Bid without the Price) as per given format, if any.
- c) **Filled-in BHEL’s Standard Terms & Conditions** as per Annexure enclosed with the Tender Document,
- d) **Deviation summary** submitted in two parts – giving the summary of technical deviations separately and the commercial deviations separately, if any and
- f) **Supporting documents** to substantiate equivalent material specifications / sections, where quoted for.
- g) Where asked for, **Client list** with their full address including detail of contact person with phone no., fax no. & e-mail ID (if any) to whom the same / similar items are supplied in the past two years. The date of supply may also be indicated, against each client.
- h) **Bidders who are not already registered with BHEL Ranipet** are requested to submit the Supplier Registration Form (SRF) online (<http://supplier.bhel.in/>) for evaluating and registering as an approved vendor. The Supplier Development Cell (SDC) of BHEL, Ranipet would process the SRF for evaluation / registering the Supplier.

Suppliers can also upload their credentials by way of submission of Performance certificate/s issued by their customer/s detailing the quantity supplied and specification along with the un-priced PO copies and proof of supply along with the offer.

**Technical acceptance of offer by BHEL shall be based on the evaluation of offer and the submitted documents.**

**Note**

- (i) The materials offered, shall conform to the specification and scope attached in the tender.
- (ii) In case the offered materials are not conforming to the Enquiry material Specification, such offers would not be considered for evaluation and would be rejected.

Where equivalent specifications are offered, considering such offers will be at the sole discretion of BHEL. Wherever alternative standards / specifications are offered by Bidder, the Bidder shall provide sufficient documentary evidence to ensure equivalence to the designated standards / specifications, failing which the offer would be considered as not technically acceptable and hence shall stand rejected.

- (iii) All taxes and duties payable as extra to the quoted price should be specifically stated in offers (as appearing in the online template).

Offer/s from within India shall be submitted along with CST & TIN No. / Tariff No. etc, failing which the purchaser will not be liable for payment of such taxes and duties. Our TIN No. 33024364741, CST No. 1141686/01.07.2014, BHEL ECC No. AAACB4146PXM008.

(iv) The un-priced bid shall be used to indicate relevant commercial terms such as scope of freight and insurance, applicability of duties and taxes etc. All Commercial terms are to be indicated clearly in the offer.

(vi) No changes shall be entertained once the bid is opened unless otherwise specifically agreed to in writing by BHEL.

(vii) Money values other than for those items appearing in the un-priced bid template shall not be indicated anywhere in the un-priced bid.

(viii) Time required for inspection (at Supplier's works), should be clearly given in terms of numbers of working days.

(x) **Offers sent by FAX / E-mail:** would not be entertained.

**Price Bid** in conformance with the specification and terms as given in the Un-Priced bid document.

**Caution:**

*The suppliers are severely cautioned to note that the price bid document accepts the price in figures only. It does not allow the supplier to write the value by words. Therefore all care shall be exercised by the supplier while filling in the figures. Once the price bid is opened no option is available for the supplier to retract the offer under any grounds. If a supplier, for any reason whatsoever approaches BHEL with a request for change in the price, it would be treated as going back on the offer submitted. In such cases, action would be initiated by BHEL for suspending further business dealings with such suppliers as per policy of BHEL which prevails at that point of time.*

**Foreign / Overseas suppliers are hereby informed that offers with differential currencies are not permitted for a given tender document.**

**Note**

(i) The price break-up should be in line with technical specification / scope of the tender. (Cost of material, packing charges, forwarding charges, freight and insurance charges shall be shown appropriately, as applicable).

(ii) Unless otherwise specified as a part of the tender condition, No Price Variation Clause will be entertained and No advance payment will be made by BHEL.

(iii) In case, there is a discrepancy in the term quoted in techno-commercial bid and price bid, the term as per the techno-commercial bid (Part I) shall hold good and the commercial term quoted in the Price Bid (Part II) shall not be considered.

(iv) In their own interest, all Tenderers are advised to double check their prices, applicable duties and taxes.

(v) The quotation should be valid at least for a period of 90 days from the tender opening date.

(vi) Indian bidders should submit the prices in Indian Rupees only.

(vii) Foreign bidders may submit their bid in foreign currency. The currency for quoting shall be selected from the drop-down menu provided.

(x) Indian Suppliers shall quote on FOR Destination basis only. Destination is BHEL, Ranipet Stores or BHEL Project Site as specified in the tender requirement. Foreign Suppliers shall quote on CFR Chennai Seaport Delivery and Insurance will be in BHEL's scope. No other delivery terms shall be acceptable. Shipment shall be arranged by the Seller on *Liner in / Liner out basis*. As per Government of India guidelines, BHEL Ranipet being a Government of India Undertaking the Bill of Lading shall be made with the Shipper as "Government of India". This shall be specifically confirmed by the Bidder.

(xi) Where the cargo is containerized, Container washing charges, stuffing charges and / or any other such charges would be to the account of the supplier, where the containers are to be stuffed at the works of the supplier.

## **B] Opening of Offers**

a) **Tenders can be submitted up to 1400 Hours on tender opening due date. Part I will be opened on the same day at 1430 Hours. Results of the tender opening will be available for viewing for upto 7 days from the date of opening.**

**b) Requests by Bidders for extension of due date will not be entertained by BHEL.**

c) Price Bid opening will be done through e-mode / Reverse Auction method ( English method) **which will be decided after techno-commercial bid evaluation is completed.** All tenderers would have to specifically give their acceptance for this in their bid/s.

## **Note**

(i) Bids including all enclosures and supporting documents like catalogues, pamphlets, etc., shall be provided in ENGLISH language only.

(ii) In exceptional circumstances, at its option, BHEL may consider extending the due date/s for the tender openings for reasons such as (but not limited to) paucity of offers etc. However, sufficient notice would be given by BHEL for such extension.

(iii) Deviations shall be summarized and provided in a "Deviation Statement", listing the points and the deviation against each point.

(iv) BHEL reserves the right to increase or decrease the tendered quantity and to order on more than one vendor at the lowest acceptable price to BHEL. In ordering on more than one source, the ratio of quantity split will be as specified in the tender terms.

If not explicitly specified, BHEL reserves the right to split the quantity of the enquiry as follows: 70% quantity being ordered on the original lowest bidder (L1) and balance 30% on the next higher bidder/s excluding H1, who accepts the L1 price. However, the final decision to split the order rests with BHEL only.

In the event that the other than L1 suppliers do not accept the L1 price, then the balance will be reverted to the original L1 and the original L1 shall be bound to accept the balance of the enquiry quantity kept reserved for order splitting. This decision would be given by BHEL within 60 days of the price bid opening.

Notwithstanding the quantum of split that may be indicated in the main body of the enquiry, bidders are advised to note that the splitting of the orders will be decided by BHEL after the evaluation of the techno-commercial and price bids.

(v) Offers for part quantities on item level basis are not acceptable to BHEL. While tenderers can quote for some or all the tendered items, no supplier shall quote for partial quantity of any given enquiry item. Such

partial offer would not be considered in the enquiry for that item. Suppliers are to note that the evaluation unless otherwise specified will be on item level and not for the tendered items as a whole.

### **C] Evaluation of Offers**

- a) The price bids including the impact price (if any) of the technically acceptable offers alone shall be opened.
- b) Offers with pre-conditions (like conditional discounts) for price are liable to be not considered / rejected. For evaluation such conditions would be removed and only the base offer would be considered for evaluation and comparison.
- d) In the event of any change in scope / quantity arising out of the discussions, offerers would be given a chance to submit their revised offer / Impact bids. The option for the revised offer / impact offer will be triggered by BHEL. The Supplier then will have the facility to feed-in the revised price / impact price as per the provision given by BHEL. The impact price can be positive or negative (or nil). The impact price option shall contain only the price addition / deletion for such change in the scope / quantities, over and above the original scope and price quoted. The original price quoted would remain unchanged. The total price would then be computed by the arithmetic addition of the original price and the impact price. Where BHEL gives the option of submitting the revised offer, the impact would be computed as the arithmetic difference of the revised price and the original price.
- e) For evaluating the overseas offers, CFR Chennai Sea Port price quoted will be taken into account. The cost to BHEL will be arrived at by loading the applicable customs duty project wise, insurance charges, inland transportation charges to BHEL stores and LC charges etc.,
- f) For suppliers within Tamil Nadu state, as per prevailing VAT Act, VAT input credit is currently 5%.
- g) BHEL reserves the right to reject without assigning any reasons / load any offer with factors other than already specified for such offers having deviations to BHEL Specifications, Standard Terms & Conditions at its discretion. The decision of BHEL in this regard shall be final.
- h) BHEL reserves the right to reject an offer due to unsatisfactory past performance during tender finalisation / execution of a contract at any of BHEL projects / units or if unsatisfactory performance report is received from the party/s referenced by the supplier at any time during tender finalisation.
- i) BHEL reserves the right to operate Purchase / Price preference to Government of India Undertakings, which shall be given as per the guidelines of Government of India given from time to time and / or relax the Terms and Conditions of the tender.
- j) For the purpose of comparing prices, tender prices shall be converted to Indian rupees and the conversion shall be made by using the TT Selling rate of State Bank of India (SBI) prevailing on the date of opening of Techno-Commercial / Unpriced bids. If the relevant day happens to be a bank holiday, then the forex rate as on the previous bank (SBI) working day shall be taken. This exchange rate will be followed till placement of order. Tenderers may please note that even if an impact price is taken as in (d) for purpose of price evaluation and arriving at the rank; the exchange rate will be taken as explained above.
- k) Unless otherwise specified, evaluation will be on individual line item basis only and ordering will be on respective L1 vendors.

l) BHEL reserves the right to conduct negotiations on the “Price” and “Other Commercial Terms and Conditions” with the lowest ranked offerer at any time after the bid opening but before the release of the Purchase Order and If so required by BHEL, Supplier may have to share their costing sheet with BHEL.

m) Bidders are required to confirm in writing in their techno-commercial document that other than themselves (the bidder) none of its group companies, concerns or affiliates etc., are participating in the tender either directly or indirectly or through any other agency under the same proprietor / common partner(s)/ common Directors. If during the evaluation of the bids it is found that the bidder has submitted the offer in violation of this condition then all the offers received from the group companies would stand rejected. If such relationship is found at a later date where the Purchase Order has been issued, then BHEL would cancel the Purchase Order and initiate suitable action/s under the contract/s including but not limited to invoking the Risk Purchase clause of the order and other applicable legal provisions / guidelines of BHEL including guidelines on suspension of business dealings. (Please see clause L sub-clause c).

#### **D] Execution of the Order**

a) BHEL will have the option to pre-inspect the materials at Supplier's works by BHEL's own inspector or by third party agency appointed by BHEL or BHEL's end customer/s. The mere act of the pre-dispatch inspection (PDI) does not absolve the Supplier from giving the specifications as agreed upon in the Purchase Order. In the case of inspection being carried out by a third party inspector (TPI) as per the extant practice, the TPI would forward the Inspection Report (IR) along with Test Certificates and other related documents to the Quality Assurance (QA) Department of BHEL. The QA department after scrutinising the report/s submitted by the TPI would issue the Material Dispatch Clearance Certificate (MDCC). Suppliers are hereby informed that materials should be dispatched only after getting the MDCC, failing which the materials may be rejected on receipt at BHEL Stores.

b) In the case of overseas suppliers Inspection call for carrying out the inspection shall be given 30 days before the scheduled contract delivery date. The Inspection date/s given by the Supplier shall be on firm basis. For local Suppliers the Notice period of Inspection shall be 10 working days.

c) Deviations, if any pointed out by the visiting Inspection team of BHEL shall be corrected and the items as per specification shall be dispatched on or before the contract delivery date after getting the MDCC.

d) The final inspection for acceptance will, however be carried out at BHEL's works at Ranipet.

**e) The contract delivery date is the date of receipt at BHEL Stores for suppliers in India, applicable in the case of FOR Destination Contracts.**

**For ex-works contracts or FOR dispatching station indigenous contracts, the date of the Lorry way bill issued by the authorised transport carriers of BHEL / Railway Receipt / Courier Way bill / Airway bill or any such dispatch documents of carriage approved by BHEL would be considered as the Contract Delivery Date. In the case of CFR contracts with overseas suppliers, the B/L date shall be taken as the Contract Delivery Date**

f) Travel & other local stay cost for the Inspectors sent by BHEL will be to BHEL account, but other Inspection Charges, if any shall be to the account of the Seller only.

g) The supplier shall arrange for packing suitably in all respects for normal transport by sea / rail / road and Materials shall be suitably protected against effect of tropical salt laden atmosphere in the event of shipment being delayed at ports / store yards and as per BHEL TDC.

h) Foreign suppliers shall dispatch on CFR agreed Sea-Port basis, according to the contract conditions. Indian suppliers shall dispatch on free delivery (door-delivery) at BHEL stores basis only. Unloading the materials at BHEL Stores would be to the account of BHEL only.

i) In the event of any short supply, it shall be the responsibility of the supplier to deliver such short supplied/ missing items on Free-of-Cost basis at BHEL stores, including customs clearances at Indian Ports in the case of foreign suppliers.

k) Terms of payment:

k.1) For Indigenous Suppliers: Unless otherwise agreed to by BHEL, the standard payment terms of BHEL shall be: For non-MSE suppliers 100% payment made directly through EFT within 90 days from the date of receipt and acceptance of materials at BHEL Stores, Ranipet or 90 days from the date of acknowledgement of receipt of materials at destination specified. If any supplier asks for payment terms other than the above specified, then suitable loading on cost will be considered. **Loading of any deviation in the payment terms w.r.t tender terms will be “Base rate of State Bank of India (SBI) (as applicable on the date of bid opening: Techno-commercial bid opening in case of two part bids) + 6%, will be considered for loading for the periods of relaxation sought by bidders.**

k.2) For MSE vendors (under Micro & Small category alone) 100% payment will be made within 45 days from the date of receipt and acceptance of materials at BHEL Stores, Ranipet or 45 days from the date of acknowledgement of receipt of materials at destination specified.

l) NOTE:

Where the destination specified is other than BHEL Stores Ranipet, for claiming payment, Supplier has to submit proof of receipt of the materials at the destination by furnishing a copy of the acknowledged despatch document (LR/RR/Courier receipt etc.) .

If the Bidder is bidding for the first time and wants to be considered as an MSE then, the Bidder shall submit document evidencing that they are an MSE along with a certificate from a Chartered Accountant certifying the status of their Unit / Works clearly specifying the address of the works which is to be considered as MSE and send the same to BHEL, Ranipet either before the tender opening date or upload it as a part of the tender document in the e-procurement portal. Where the document is submitted electronically a hard copy shall invariably be sent within a reasonable period (not exceeding 30 days) from the bid opening date for the purpose of BHEL's records. If the hard copy is not received within this specified time, then the supplier would be treated as a non-MSE. BHEL will not be responsible for any postal / courier / delivery delays.

For approved vendors the status as on the date of the bid opening as available with BHEL Ranipet's records shall be used for reckoning the status of the Bidder as an MSE or otherwise.

Offer/s received without these documents will be treated as non-MSE and order finalization will be done based on this premise. Documents submitted after Bid-opening will not be considered in this tender. This provision for MSE will apply subject to the condition that the participating MSE meets the tender requirements.

For approved suppliers, in case of any change in the MSE status, it shall be the responsibility of the Bidder to notify the change as a part of the Bid document. If at a later date it comes to the knowledge of BHEL, Ranipet that the change in the status has not been intimated by the Bidder and the order is obtained under the premise of an MSE then BHEL would cancel the pending order against this tender and take necessary steps



for suspension of the business dealing with the Bidder as per the procurement policy of BHEL. Similarly if a supplier claims MSE status after the Part I bid opening, then the same would not be considered in the tender.

In case after the bid opening it is seen that no MSE has become L1, then depending on the nature of the item, if it is not possible to split the tendered items / quantities on account of reasons like customer contract requirements of supplying one make for a given project or technical reasons like the tendered item being a system etc. then BHEL would not counter offer the L1 prices even though there may be MSE bidders within the +15% band of L1.

Other concessions for MSEs / Reserved sectors

In addition to the concessions specified above, MSE suppliers will be eligible for such other concessions as per the MSME Act 2006 and any other benefits / concessions that may be announced by the Government of India from time to time.. However, such concessions as applicable at the time of tender opening alone will be applicable. Any concessions advised after tender opening will not be considered for the current tender.

Items that are reserved for MSE and for any other items for which reservations for Indian manufacturers are notified by the Govt. Of India, such concessions as prevailing on the date of tender opening shall apply as a part of this tender conditions.

ii) Foreign Suppliers “100% thru’ irrevocable & unconfirmed LC at sight within 3 weeks from the PO date through any one of our Bankers listed elsewhere in the tender conditions for 100% value (less Agency Commission, if any ) valid up to the PO delivery period and 15 days thereafter for negotiation. All bank charges in India to BHEL's account and all other charges outside India to Supplier's account. **BHEL would load the price of foreign suppliers in order to bring them on common platform as per Indigenous Suppliers on the account of differential payment terms to Indigenous Suppliers. Loading of payment terms will be “Base rate of State Bank of India (SBI) (as applicable on the date of bid opening: Techno-commercial bid opening in case of two part bids) + 6%, will be considered for loading for the periods of relaxation compared to indigenous suppliers i.e. 90 days.**

m) Any incidence of tax like Income tax, Goods & Services Tax (GST) and Withholding any other similar tax / duties /levies imposed by the Government of India, or the State Government, where the BHEL Unit is located, deductible at Source, during the tenure of the Order shall be deducted by BHEL and necessary certification of the deduction (Tax deduction at Source) would be given. This is subject to the supplier fulfilling the necessary documentation as specified by the Government of India. (e.g. Tax Residency Certificate, PAN Number etc.)

n) The Guarantee period shall start from the “Date of receipt and acceptance of the materials at BHEL Stores.”

***o) Where any bidder gives extended credit period over and above that offered by BHEL, then all other Non-MSE bidders and foreign bidders would have to match the extended period of payment terms. This information would be given to such bidders after opening of the techno-commercial bids; but before opening the price bids. However bidders would not be allowed to change their price bid for purpose of confirming the extended credit period. In the event such bidder/s do not accept the extended credit period for payment, then their offer would be loaded to the extent of the differential between their offered payment terms and the revised payment terms offered by BHEL as explained above.***

**E] Liquidated Damages Clause:**



BHEL will levy penalty as Liquidated Damages (LD), for delay in delivery. The damages shall be at the rate of ½% per week or part thereof subject to a maximum of 10% PLUS applicable Goods & Services Tax (GST). The contract delivery date for purpose of L.D is the date of receipt at BHEL Stores for suppliers in India for F.O.R. Destination Contract and the date of dispatch clearance given by BHEL for overseas suppliers. For ex-works or F.O.R dispatching station contracts, the date of the dispatch document will be reckoned as the date of delivery for computing the LD. Supplier shall deduct the applicable LD from the first payment when raising the claim for the same. The applicable LD if any would be communicated by BHEL along with the dispatch clearance. It is taken by BHEL that Foreign Suppliers have confirmed their acceptance to BHEL for opening the LC for value which is the value of the order reduced by the applicable LD. The LD would apply on the undelivered portion only. In case of reasons attributable to BHEL for the delay in delivery (for e.g. delay in arranging the pre-inspection) then the delivery time would be reset to the extent of the time delay attributable to BHEL, with waiver of the LD. Delivery being the essence of BHEL's contract requirements, Unless otherwise specified the LD would apply on the undelivered portion of the contracted items. **In the event that a Supplier does not accept the LD condition above, the offer would be loaded to the extent of the shortfall with respect to upper limit specified above.**

#### **F) Miscellaneous**

##### **i) Role of Principals and Agents:**

BHEL will deal directly with indigenous manufacturers only.

BHEL strongly discourages the engagement of Agents in India by foreign principals, to deal with BHEL, in BHEL's tenders.

BHEL will not enter into any correspondence with an Indian Agent.

The Indian Agent will not be extended the privilege given to the principals, such as that of attending the tender openings, attending technical discussions, commercial discussions or price negotiations and such like.

In case, in spite of the above, a foreign principal insists on engaging an Indian Agent, It is made clear by BHEL that:

It is the sole responsibility of the foreign principal to ensure the Agent does not represent any other foreign principal in a given tender.

An undertaking to this effect shall be given by the foreign principal that his / her Agent does not represent any other foreign principal in the tender. This document shall form a part of the techno-commercial offer.

A Principal shall authorise only one Agent to quote against each BHEL's tender. In the event a Principal authorises more than one agent to quote against a BHEL's tender, then all such offers will be rejected by BHEL in that tender. Principals are also advised to include BHEL's tender Number / Reference in their authorisation issued to the Agent.

If at any stage of the tender, BHEL finds that an Indian Agent has represented more than one foreign principal, all such offers of and all the foreign principals would be disqualified summarily in the tender inquiry.

BHEL will only give an intimation of notice of the disqualification. No correspondence would be entertained by BHEL, on their decision. Such decision of BHEL shall be irrevocable, firm and final and shall be binding on the tenderer.

BHEL, due to business reasons would ban, would have banned Indian agents from dealing with BHEL.

Any foreign principal who engages such a banned agent, or an employee of the banned agency, or any other person connected with the banned agency, at any time during the tender proceedings, would be disqualified from the tender proceedings. The decision of BHEL in this regard shall be final and be binding on the OEM.

Hence in their own interests, prospective tenderers may check with BHEL, the status of their proposed agent vis-à-vis BHEL.

In view of the requirement of BHEL, it is strongly suggested that in their own interest, foreign principals may desist from engaging any Indian agent and deal with BHEL directly and it is stressed that any Main producer proposing to deal with BHEL by engaging and through an Indian Agent does so at their own risk.

BHEL shall in no way be responsible for any consequences that may arise to the foreign principal on account of the antecedents / actions of their Indian Agent.

**In the event of the foreign principal engaging an Indian Agent:**

**a) The Supplier shall furnish an authenticated copy of the Agency Agreement with his agent detailing the precise relationship between them and their mutual interest in the business along with techno-commercial bid.**

b) The Supplier shall furnish original authorization letter for the Indian Agent. The letter shall contain name, contact person, complete postal address including phone, fax and e-mail ID. It shall also spell out the type of services to be rendered by Indian Agent.

c) Indian Agent & Agency commission: An Indian Agent can represent only one Foreign Manufacturer against a particular Tender. The CFR price quoted by the foreign bidder shall include the agency commission. However, the agency commission component payable to their Indian Agents shall be shown separately in the Offer, either as a lump-sum or as a percentage of the quoted price. This will be paid by BHEL in Indian Rupees, on satisfactory receipt & acceptance of the materials. For calculation of Rupee equivalent of Agency Commission, exchange rate as prevailing on the date of Purchase Order will be taken and

d) For all discussions, technical clarification and negotiations etc. only the principal would be authorized for interaction with BHEL. The Agent shall not be a party to the discussions / negotiations and would not be normally allowed to participate.

**ii) Terms & Conditions of Letter of Credit (L/C) for overseas suppliers (indicated for acceptance).**

a) Unconfirmed irrevocable Letter of Credit at Sight only will be opened by BHEL. Confirmation of L/C is not preferred by BHEL. Also L.C will be opened in Lots in line with the staggered delivery.

b) All Bank charges out side India are to the Supplier's account and within India to BHEL's account.

c) In case of L/C extension caused by delays attributable to the Supplier, the L/C extension / commitment charges are to be borne by the Supplier.

**iii) Other terms & conditions for letter of credit: - Documents for negotiation**

a) Signed Commercial invoice in quadruplicate, for a value not exceeding the draft amount, quoting the import Licence No and certifying goods evidencing shipment of the merchandise are as per Applicant's Purchase Order. The amount of invoice after deducting Indian Agent's commission, if any, should not exceed the Credit amount. (The Indian agent's commission, if any, is payable in India in Indian rupees only.)

- b) Certificate of Country of Origin, from the country of manufacture, issued by the Chamber of Commerce.
- c) One set of Original and two sets of Non-negotiable copies of 'signed', 'unmarked', 'clean on board' Ocean Bill of Lading, showing Shipper as "Government of India" Account M/s. Bharat Heavy Electrical Ltd, Unit: BHEL, Ranipet as consignee (The opening bank should not be notified as consignee), marked freight payable / prepaid at destination.
- d) Packing list in 4 copies in English, indicating Size wise Number of bundles / pieces shipped and weight.
- e) Certified copy of the fax / e-mail sent by the beneficiary to the applicant giving the following particulars of shipment, as the insurance is to be arranged by the Applicant in India: (a) Purchase Order Number & date; (b) Bill of Lading Number & date (c) Name of vessel; (d) Port of Loading; (e) Number of bundles / pieces and weight; (f) Invoice Number, date and value (g) Purchase Order item number's despatched. The cable / fax is to be sent within 2 working days of shipment.
- f) Beneficiary's certificate showing the relevant airmail / courier reference no. and date that the following clauses have been complied with:
  - 1] Beneficiary to forward by Registered Airmail / Courier one complete set of original documents and one set of non-negotiable documents within 3 working days of obtaining shipping documents to Regional Manager (ROD), Bharat Heavy Electricals Ltd, 6th Floor, EVR Periyar Bldg. No 690 (Old 474), Anna Salai, Nandanam, Chennai-600035. India. (Phone: +91-24330931, 24330253; e-mail: pbpwar@bhel.in)
  - 2] Beneficiary to courier at his cost 3 copies of complete set of non-negotiable documents to the Officer who released the Purchase Order.
  - 3] Declaration by the Supplier certifying that the contents in each case are not less than those entered in the invoices / packing list and that the invoicing for the supplies effected is strictly in accordance with agreed rates as stipulated in the Purchase Order.
  - 4] Declaration to the effect that all other documents as per purchase order has been couriered to the Purchase order releasing authority
  - 5) The carrying steamer should be seaworthy, less than 25 years of age and approved by Lloyds / Classification Societies / General Insurance Corporation of India from time to time and
  - 6) Copy of Dispatch Clearance / Instruction issued by BHEL.

**iv) Documents to be sent directly to the Purchaser prior to shipment**

- a) Manufacturer's Original Internal Inspection / Test certificate in triplicate.
- b) Manufacturer's Original Guarantee certificate as per Purchase Order. The material shall be guaranteed for a period of 12 months from the date of acceptance of the materials at BHEL stores or 18 months from the date of dispatch whichever is earlier. The acceptance would be evidenced by the Stores Receipt Voucher (SRV) which will be raised by BHEL.
- c) Inspection / Test Certificate issued by BHEL / Inspection agency specified in the Purchase Order. In the event that Inspection prior to dispatch is not carried out by the Engineers of BHEL, the Inspection certificate of the third party so authorized by BHEL and
- d) Any other documentation as specified in the Purchase Order.

**v) Conditions for transportation:**

- a) All shipping documents shall show the Purchase Order Number & Date, Import Licence Number & Date, and Letter of Credit Number & Date.
- b) Transshipment is to be avoided.
- c) Loading on deck is not permitted. The transport document must not contain a provision that goods may be carried on deck.
- d) A transport document which is produced or appearing to have been produced by reprographic, automated or computerized systems or as carbon copy will be accepted as an original document provided that it is marked as original and is ink-signed.
- e) The transport document must contain all the conditions of carriage on the original document.
- f) The transport document must not indicate the place of destination as being different from the port of discharge.
- g) The transport document must not contain the indication 'intended' or similar qualification in relation to the vessel or other means of transport or port of loading or port of discharge.
- h) The transport document must be issued by the carrier or his agent and not by any freight forwarder.
- i) Transport documents bearing reference by stamp or otherwise, to costs additional to the freight charges are not acceptable.
- j) The Bills of Exchange must be dated and presentation of documents for negotiation must not be later than 15 days after the date of shipment and in any case not later than the expiry date of the Credit.
- l) Indian suppliers shall dispatch the materials on freight prepaid and on door-delivery basis (FOR Destination – Destination: BHEL Stores) and
- m) In the event there is a delay by the Supplier in negotiating / submitting the document, any demurrage / wharfage arising out of the same shall be to the account of the Supplier and shall be deducted from the final payment. Also, in such cases, the Supplier shall authorize the Steamer / Shipping agent / transporter to freely release the consignment to BHEL by providing a “Surrender Bill of Lading”. Over-seas Suppliers have to give a No-Objection Certificate to BHEL, authorizing BHEL to get the Delivery Order from the Steamer Agent without producing the Original Bill of Lading. This is required to ensure avoidance of incidence of demurrage at Chennai Sea-port that may arise in case of delayed presentation of documents by the Seller.

**G) Reverse auction (RA) / on-line bidding on internet:**

*1. “BHEL reserves the right to go for Reverse Auction (RA) (Guidelines as available on [www.bhel.com](http://www.bhel.com)) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. Bidders shall give their acceptance with their offer for participation in RA. Non-acceptance to participate in RA may result in non-consideration of the bids, in case BHEL decides to go for RA.”*

*2. Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit ‘Process compliance form’ (to the designated service provider) as well as ‘Online sealed bid’ in the Reverse Auction. Non-submission of ‘Process compliance form’ or ‘Online sealed bid’ by the agreed bidder(s) will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines for “Suspension of Business Dealings with Suppliers/ Contractors (as available on [www.bhel.com](http://www.bhel.com)).”*

3. The philosophy followed for reverse auction shall be English Reverse (No ties).
4. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
5. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on internet.
6. In case of reverse auction, BHEL will inform the bidders the details of Service Provider to enable them to contact & get trained.
7. Business rules like event date, time, bid decrement, extension etc. also will be communicated through service provider for compliance.
8. Bidders have to fax the Compliance form (annexure IV) before start of Reverse auction. Without this, the bidder will not be eligible to participate in the event.
9. Reverse auction will be conducted on scheduled date & time.

**Note: Decision to go for RA or not will be on case to case basis.**

10. At the end of Reverse Auction event, the lowest bidder value will be known on auction portal.
11. The lowest bidder has to fax/e-mail the duly signed and filled-in prescribed format for price breakup including that of line items, to the Service provider within two working days of Auction without fail.
12. Bidders are be required to read the “Terms and Conditions” section of the auctions site of Service provider, using the Login IDs and passwords given to them by the service provider before reverse auction event. Bidders should acquaint themselves of the „Business Rules of Reverse Auction“, which will be communicated before the Reverse Auction.
13. If the Bidder or any of his representatives are found to be involved in Price manipulation/ cartel formation of any kind, directly or indirectly by communicating with other bidders, action as per extant BHEL guidelines, shall be initiated by BHEL and the results of the RA scrapped/ aborted.
14. The Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party.
15. The bidders have to necessarily submit online sealed bid less than or equal to their envelope sealed price bid already submitted to BHEL along with their offer. The envelope sealed price bid of successful L1 bidder in RA, if conducted, would also be opened after the RA and the order will be placed on lower of the two bids (RA closing price & envelope sealed price) thus obtained. It is considered that the bidder having submitted their offer specifically agrees to this condition and undertakes to execute the contract on thus awarded rate/s.
16. If it is found that L1 bidder has quoted higher in the online sealed bid in comparison to the envelope sealed bid for any item(s), the bidder will be issued a warning letter to this effect. However, if the same bidder again defaults on this count in any subsequent tender, it will be considered as fraud and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on [www.bhel.com](http://www.bhel.com)).”
17. The calculation sheet e.g. excel sheet (which will help to arrive at ‘Total Cost to BHEL’) will be communicated to respective bidders of RA by BHEL. In line with the NIT terms, BHEL will provide the calculation sheet (e.g., EXCEL sheet) which will help to arrive at “Total Cost to BHEL” like Packing & forwarding charges, Taxes and Duties, Freight charges, Insurance, Goods & Services Tax (GST) and loading

factors (for non-compliance to BHEL standard Commercial terms & conditions) for each of the bidder to enable them to fill-in the price and keep it ready for keying in during the Auction.]

18. This calculation sheet will be finalized based on the evaluation criteria specified in the NIT.

19. Suppliers are required to submit their best price bid in a separate sealed cover along with techno-commercial bid. After evaluation of Techno-Commercial Bids:

a) In case BHEL decides not to conduct RA, the envelope sealed price bids of all techno-commercially qualified bidders, along with price impact, if any, would be opened and processed as per extant the internal Purchase/ Works Policy as applicable to BHEL.

b) In case BHEL decides to conduct RA, business rules of RA will be sent to service provider.(See Annexure for Model General Business Rules of RA.)

20. Generally the start price for the RA would be the lowest of

a) Lowest online sealed bid and

b) Internal Estimate of BHEL

Note: Wherever more than one lowest online sealed bids are identical and lower than the estimate, the start price, would be that price arrived by reducing the lowest online sealed bid by maximum of one decrement.

21. Reverse auction process would deemed to have started upon receipt of 'Online Sealed Bids' from the bidders within the prescribed time frame as per Business Rules.

22. After receipt of 'online sealed bids', the start price & bid decrement will be decided by BHEL and the same would be communicated to the service provider, to start the bidding process.

23. Only those bidders who have submitted the 'online sealed bid' within the scheduled time would be eligible to participate further in RA process. However, the H1 bidder (whose quote is highest in online sealed bid) will not be allowed to participate in further RA process provided minimum three bidders are left after removal of H1 bidder. In case of tie for H1 bid (identical online sealed bids), 15 minutes additional time would be provided and all the participating bidders would be informed by mail/ message on bidding screen to enable bidders submit revised online sealed bids so as to break the tie.

24. If the lowest online sealed bid is the starting price, then the lowest bidder in online sealed bid shall be shown as current L1 automatically by the system. System would have the provision to indicate this bid as current L1 for further bidding.

25. If the start price is lower than the lowest online sealed bid, on acceptance of such start price by any bidder, this bid would be indicated as current L1 for further bidding.

26. In case of no further bidding, RA will be deemed to have been successful with current L1 bidder.

27. All bidders who had given online sealed bid would be able to see their rank and L1 price and their ranking L1, L2 etc. would be based on their last quoted price irrespective of quote received in RA or online sealed bid.

28. RA shall be treated as failed in the following scenarios:

a) In cases where the start price is (a) estimate or (b) one decrement (maximum) lower than the lowest of the online sealed bids and no bidder accepts the start price.

- b) In cases where the number of online sealed bids are less than four before removal of highest bidder.
- c) In cases of tie among H1 bidders, even after extension of submission of online sealed bids once by 15 minutes.
- d) Wherever, the evaluation is done for individual line items, RA shall be treated as failed only for those line item(s) for which any of the above a), b) or c) satisfies.
29. In cases of failure of RA, sealed envelope price bids (of item(s) for which RA has failed) of all the techno-commercially qualified bidders would be opened and the tender would be processed accordingly. However, the envelope sealed bid(s) of techno-commercially acceptable bidder(s) who had agreed to participate in the RA and had failed to submit the online sealed bid would not be opened.
30. After declaring L1 upon completion of RA, the envelope sealed price bid of L1 bidder would also be opened for placement of order on lower of the two bids (RA closing price & envelope sealed price) and the offers would be processed as per extant their internal Purchase/ Works policy provisions of BHEL. Action as per NIT terms would be taken if online sealed bid is higher than the envelope sealed bid.
31. Relative position of bidders (for usage in cases of predefined splitting the quantities) would also include bidders who have given 'online sealed bids' but have not given further bids in auction. In case of splitting requirement, H1 bidder may be considered for counter offer if the pre-stated (NIT) numbers of suppliers do not accept the counter offer. However, principle of splitting to N-1 bidder would be maintained.
32. In case H1 bidder happen to be MSE and was removed from further bidding but is within L1 + 15% band, then this bid would be considered and to be processed in line with 'Public Procurement Policy for Micro & Small Enterprises (MSEs) order, 2012'.
33. For providing preference to domestically manufactured Electronic Products, in accordance with Department of Electronics and Information Technology (DeitY) Gazette Notification No. 33(3)/2013-IPHW dated 23.12.2013 and its related notifications issued from time to time, H1 bidder removed from further bidding would be considered for counter-offer to meet domestic bidder requirement for the item(s) under procurement.
34. In case BHEL decides not to go for Reverse Auction for the tender enquiry, the Price bids and price impacts, if any, already submitted and available with BHEL would be opened as per BHEL's standard practice.
35. In case of enquiry through e-Procurement, the sealed electronic price bid (e-bid) would be treated as sealed envelope price bid.

**Note: In order to bring more transparency and to address any queries of Bidders on Reverse Auction, an abridged version of BHEL's "Common Guidelines for conducting Reverse Auction (RA)" has been hosted in BHEL's web site [www.bhel.com](http://www.bhel.com) under the links "Supplier Registration Page" and "Tender Notification". All Bidders are requested to visit the link and familiarize themselves with BHEL's RA procedures and guidelines before submission of their bid/s. Submission of Bid shall mean that the Bidder has read and understood BHEL's RA procedures and the bid is in agreement with the same.**

## **H] Force Majeure**

If at any time during the currency of this contract, the performance in whole or in part, by either party of any obligations under this contract shall be prevented or delayed by reason, of any war, hostilities, acts of the public enemy, civil commotion, sabotage, fires, explosions, epidemics, quarantine, restrictions or acts of GOD (hereinafter referred to as events), then provided notice of happening of any such events is given by either party to other within ten days from the date of occurrence thereof, neither party shall reason of such events be entitled to terminate this contract nor shall either party have any such non performance and delay is resumed as soon as practicable after such events has come to an end or ceased to exist. If the performance in whole or part of any obligation under this contract is prevented or delayed by reason or any such event claims for extension of time shall be granted for period considered reasonable by the purchaser subject to prompt notification by the seller to the purchaser of the particulars of the events and supply to the purchaser if required of any supporting evidence. Any waiver of time in respect of partial installment shall not be deemed to be a waiver of time in respect of remaining deliveries.

## **I] Cancellation of Order:**

In the event of non-performance of the contract by the Supplier, BHEL reserves the right to cancel the order with issue of a written notice. BHEL would provide a curing period of 30 days, for the Supplier to rectify the situation. If the Supplier fails to rectify the reason/s that led to the issue of cancellation notice by BHEL, then the cancellation order would be issued automatically by BHEL, without further recourse to the Seller. BHEL will not pay any cancellation charges or any other charges / damages to the Supplier, arising out such cancellation. In the event of the non-performance of the supply contract, by the Supplier, the rights of BHEL include, in addition to cancelling the order, to take alternate purchase action at the cost and risk of the supplier. The additional expenditure to be incurred by BHEL in such alternate purchase would be to the account of the supplier. (Risk Purchase). This remedy would be in addition to the invoking of the CEBG on grounds of failure of the Supplier in executing the Contract and any other legal remedies." BHEL reserves the right to initiate the alternate purchase action at the cost and risk of the erring supplier by issue of a simple notice of intention for the alternate purchase action duly sent by any electronic means and / or by a letter. The cancellation of the order would not be a pre-condition for initiation of the alternate purchase action.

## **J] Contract Execution Bank Guarantee:**

To demonstrate the fidelity of the successful bidder, in executing the Contract, on receipt of the Letter of Intent / Purchase Order, the Supplier shall arrange to provide a contract execution bank guarantee (CEBG). The format of the CEBG is a part of this enquiry. The format may be downloaded and necessary stamping may be obtained from the Banker towards submission of the CEBG. The indigenous suppliers have to provide the CEBG from any one of the Nationalized Banks, listed in the annexure to these terms. Overseas suppliers can submit the CEBG from any of the reputed International / National Bankers. However the CEBG is to be confirmed by any of the Bankers listed by us. In the event of failure by the Supplier to execute the contract either fully or partially, BHEL would encash the entire CEBG. The CEBG shall be valid for the period covering the agreed delivery date of the order with a further claim period of 3 months on the last specified delivery date. In the event of the failure of delivery BHEL would proceed with encashing the CEBG without reference to the Supplier. In the event of BHEL granting extension of the delivery dates, then the CEBG validity shall also be got extended by the Supplier to the extent of the extended delivery times together with the claim period as specified elsewhere. **The CEBG shall be for a value of 2% of the Purchase order.**



**Suppliers who are all already registered with BHEL and having a vendor performance rating of A or A+ grade would be exempted from submission of CEBG.**

#### **Performance Bank Guarantee**

Where ever so required, the Supplier shall arrange to provide a Performance bank guarantee (PBG). The indigenous suppliers have to provide the PBG from any one of the Nationalized Banks, listed in the tender terms. Overseas suppliers can submit the PBG from any of the reputed International / National Bankers. However the PBG shall be confirmed by any of the Bankers listed by us. The PBG shall guarantee the performance of the equipment / materials / items supplied and shall cover the guarantee period. The PBG shall have a claim period of 3 months in addition to the guarantee period. In the event of failure of the supplies made within the guarantee period, BHEL would encash the entire PBG. **The PBG shall be for a value of 10% of the Purchase order.**

**The supplier/s have to get the PBG format (pre-printed) from BHEL and get the same stamped by the Banker. Change of PBG terms either by the supplier's Banker or by the supplier, after servicing of the order is not acceptable. Similarly PBG prepared by the supplier (typed by them) will also not be acceptable to BHEL. The pre-printed form issued by BHEL shall be used for making the PBG.**

#### **K] Post-order submission of documents for approval**

In the event of the release of Letter of Intent (LoI) / Purchase order/s (PO) against this tender, Bidders have to submit the applicable documents as called for in the tender / LoI / PO/s, such as drawings, data sheets, design calculations etc. These documents for approval have to be submitted within the agreed timelines between BHEL and Bidder. Normally the time period for submission for approval is 15 days from the date of receipt of the LoI / PO by the supplier. The actual time period within which the documents have to be submitted for approval would be specified in the LoI / PO.

Such documents would be subjected to evaluation and approval by BHEL and / or by BHEL's customer / Consultant / Customer's Consultant. Bidders have to give their specific acceptance for this.

After approval of such documents and after getting clearance from BHEL, only the items ordered can be taken up for manufacture.

Any changes required by BHEL / Customer etc. in the documents submitted for approval shall be incorporated by the Bidder and no extra cost would be payable by BHEL for such changes.

In the event that the Bidder does not carry out the required corrections, then the LoI / PO would be liable for cancellation by BHEL and BHEL would resort to alternate purchase action at the risk and cost of the Bidder under the Risk Purchase Condition of the Purchase Order.

*Note: After receiving the LoI / PO, supplier shall also forward the acknowledgement / acceptance of the LoI / PO by signing and returning the second copy of the LoI / PO as the token of acceptance.*

#### **L] Others**

a) In case of any contradiction in the terms and conditions given here and elsewhere in the other documents of the tender, it shall be the responsibility of the tenderer to get it clarified from BHEL. The officer authorized to provide such clarifications is the tender issuing officer.

b) Alterations to the conditions of the Tender can be done only by the authorized officer, at any time before the date and time of tender opening and would be duly communicated through a corrigendum.

c) **Suspension of Business dealings with Suppliers:**



(i) Before submitting offer, prospective bidders are advised to visit our web-site [www.bhel.com](http://www.bhel.com) / supplier registration to familiarize themselves with BHEL's policy and procedures of Suspension of Business Dealings with Suppliers.

Submission of offer shall be deemed to be evidence of the Bidder to have read and understood the above said policy.

**ii) Treatment of Banned / Under-performing Vendors:**

Any supplier who has been put on "Hold" or "Banned" from having business dealings with BHEL, Ranipet or any other unit of BHEL shall not submit their offer against this tender. If any such offers are received they would be summarily rejected and sent back. During the processing of tender, if any unit of BHEL puts a supplier on "Ban" then further processing of the offer will not be taken up and in case an order is placed, BHEL, Ranipet may resort at their discretion to cancel the PO either fully or partially.

If any of the supplier who is supplying similar material to BHEL, Ranipet has a Vendor Performance Rating (VPR) score of 'C' or below, then offer given by such parties will not be considered for ordering in this tender.

If any of the Bidders have unexecuted order/s with BHEL and if in such orders, the deliveries have been delayed beyond a reasonable period (say 30 days of agreed delivery period), the offer of such Bidders will also be liable for rejection.

Offers of such of those bidders against whom action for suspension of business dealings has been initiated by BHEL, Ranipet or any other Units/Division of BHEL will also not be considered in this tender.

**d) Fraud Prevention Policy:**

The Bidder along with its associate/ collaborators/ sub-contractors/ sub-vendors/ consultants/ service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website <http://www.bhel.com> and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to their notice.

**e) Applicability of Integrity Pact:-**

IP is a tool to ensure that activities and transactions between the Company and its Bidders/ Contractors are handled in a fair, transparent and corruption free manner. A panel of Independent External Monitors (IEMs) have been appointed to oversee implementation of IP in BHEL.

The IP as enclosed with the tender is to be submitted (duly signed by authorized signatory who signs in the offer) along with techno-commercial bid. Only those bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this Pact would be a preliminary qualification.

Details of IEM for this tender is furnished below:

Name \_\_\_\_\_  
Address \_\_\_\_\_  
Email \_\_\_\_\_

Please refer Section-8 of IP for Role and Responsibilities of IEMs. In case of any complaint arising out of the tendering process, the matter may be referred to the IEM mentioned in the tender.

Note:

*No routine correspondence shall be addressed to the IEM (phone/ post/ email) regarding the clarifications, time extensions or any other administrative queries, etc on the tender issued. All such clarification/ issues shall be addressed directly to the tender issuing (procurement) department*

*For all clarifications/ issues related to the tender, please contact:*

Name: (1) ..... (2) .....  
Dep't: .....  
Address: .....  
.....  
Phone:(Landline/Mobile) (1) ..... (2) .....  
Email:  
Fax:

Integrity Pact are applicable for all the BHEL enquiries whose estimated value is equal to or more than Rupees 05 Crores.

Copy of Integrity Pact with applicable nominated IEM is attached along with the tender documents for ready reference of Suppliers.

f) If any Supplier attempts to bribe, or pay commission, gift or any advantage or bring in undue influence either by himself or on his behalf any one including a stranger to the tender, in addition to instituting legal proceedings as per the extant laws prevailing, will disqualify the supplier from this tender and all future tenders of BHEL. Decision of the Purchaser would be final in this matter.

g) The laws governing this transaction shall be the laws in India.

h) Wherever not specified, Inco terms 2010 shall be used to interpret the Commercial terms and conditions and

i) In the event of an order, Supplier shall agree to settlement of disputes or differences, if any, by way of arbitration, in accordance with the “Rule of Arbitration” of the Indian Council of Arbitration.

*The language in the tender documents downloaded by the Bidders shall at no point of time be changed, altered or modified in any manner by the Tenderer. If such changes are made by any tenderer, it shall be considered as tampering with BHEL's terms and the offer shall be summarily rejected, whenever it is noticed by BHEL. Such Bidders would be disqualified from the Bidding Process and their offers would be forfeited / Bank Guarantees invoked. They would also not be allowed to participate in future tenders of BHEL.*

#### **M. Conditions for rejection of offers:**

**Following is the list of situations which would lead to rejection of offer/s.**

**This list is not exhaustive but only indicative.**

BHEL reserve the right to reject one or all offers without assigning any reason. The decision of BHEL will be final in this regard.

- 1. If the offer fails to meet the technical requirements/specifications of the tendered item/s.*
- 2. If the offer does not meet the commercial terms & conditions, such as but not limited to delivery period specified in the tender, Delivery terms, payment terms, Liquidated damages, Risk Purchase, cancellation clause etc., including the load factors specified in the tender.*
- 3. If the bidder fails to respond to clarification sought, within a reasonable period. In case of doubts / lack of clarity on the technical and commercial offer of the bidder, BHEL will seek clarifications. Bidders are required to respond completely to such BHEL's queries within 3 working days unless otherwise agreed to in writing by BHEL for period beyond 3 days. If supplier fails to respond within*



*3 working days or maximum 2 working days on a reminder thereon, the offer of such bidders will be automatically dis-qualified in the tender without further recourse to informing the bidder.*

*4. If any of the conditions listed below are applicable to the bidder, the offer is liable to be rejected:*

If any

- Debt recovery / Winding up Proceedings are initiated against the Company in Courts / Debt Recovery Tribunals (DRTs),
- Proceedings are there against the Company in National Company Law Tribunal (NCLT) with respect to Insolvency and Bankruptcy Code (IBC) or otherwise,
- Any proceedings are there against the Company under the “Securitization and Reconstruction of Financial Assets and Enforcement of Security Interest (SARFAESI) Act,
- Any restructuring proceedings are underway for the Company under Corporate Debt Restructuring (CDR), Strategic Debt Restructuring (SDR) or otherwise,
- Divestment / demerger proceedings are underway for the Company under the Companies Act.

The above list is not exhaustive but is indicative only.

**N. Special Note:**

BHEL is a Government of India Undertaking. Its procurement practices are governed by the (Internal) Purchase Policy issued by the management of the company and as per Annexure B applicable at the time of finalising the order against this tender.

**-O-**

**Record of Revisions:**

| Revision No. | Revision Date | Modification                                                                                                                                                   |
|--------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 01           | 17.08.2016    | Payment terms for Foreign suppliers modified wrt loading- Clause k.ii                                                                                          |
| 02           | 29.08.2016    | Treatment of banned vendors – Para 3 added - Clause L.ii                                                                                                       |
| 03           | 14.09.2016    | Opening of offers – clause B – sub clause ‘b’ included and existing clause ‘b’ renamed as ‘c’.                                                                 |
| 04           | 14.09.2016    | Opening of offers – Note – sub clause (ii) modified                                                                                                            |
| 05           | 12.10.2016    | Clause N. Special Note added                                                                                                                                   |
| 06           | 22.10.2016    | Clause G Reverse Auction modified.<br>Annexure on General Business Rules for Reverse Auction appended<br>Role of Principals added under ‘Miscellaneous’        |
| 07           | 20.01.2017    | Clause L (e) is modified.<br>Clause L (f ,g ,h) renumbered.                                                                                                    |
| 08           | 24.02.2017    | Clause F(c) modified.                                                                                                                                          |
| 09           | 08.07.2017    | Clause M, Point 4 is added – regarding the financial health of the Bidder - as a criterion for disqualification.                                               |
| 10           | 20.07.2017    | Duties and Taxes replaced with GST; Applicability of GST for LD inserted in Clause E; Treatment of poor performing current vendors inserted in clause L.c.(ii) |

## ANNEXURE

### Model General Business Rules for Reverse Auction

This has reference to tender no {tender number....date...}. BHEL shall finalise the Rates for the supply of {item name} through Reverse Auction mode. BHEL has made arrangement with M/s. {Service provider}, who shall be BHEL's authorized service provider for the same. Bidders should go through the instructions given below and submit acceptance of the same. The technical & commercial terms are as per (a) BHEL Tender Enq. No. {...} dated {...}, (b) Bidders' technical & commercial bid (in case of two part bid) and (c) subsequent correspondences between BHEL and the bidders, if any.

#### 1. Procedure of Reverse Auctioning

- i. Online Sealed Bid: This duration of online sealed bid will be {...} minutes. All bidders to submit their online sealed bids during this period.
- ii. Online Reverse Auction: The 'opening price' i.e. start price for RA and 'bid decrement' will be decided by BHEL.
- iii. If BHEL decides the lowest online sealed bid as the starting price, then the lowest bidder in online sealed bid shall be shown as current L1 automatically by the system and no acceptance of that price is required. System shall have the provision to indicate this bid as current L1.
- iv. Bidders by offering a minimum bid decrement or the multiples thereof can displace a standing lowest bid and become "L1" and this continues as an iterative process.
- v. After the completion of the online reverse auction, the Closing Price (CP) shall be available for further processing.

**2. Schedule for Reverse Auction:** The Reverse Auction is tentatively scheduled on {date}: and the duration of online sealed bid will be {...} minutes. All bidders to submit their online sealed bids during this period.

#### - Online Sealed Bid:-

- {Start Time:
- Close Time: }

#### - Online Reverse Auction:-

- {Start Time:
- Close Time: }

#### 3. Auction extension time:

If a bidder places a bid in the last {...} minutes of closing of the Reverse Auction and if that bid gets accepted, then the auction's duration shall get extended automatically for another {...} minutes, for the entire auction (i.e. for all the items in the auction), from the time that bid comes in. Please note that the auto-extension will take place only if a bid comes in those last {...} minutes and if that bid gets accepted as the lowest bid. If the bid does not get accepted as the lowest bid, the auto-extension will not take place even if that bid might have come in the last {...} minutes. In case, there is no bid in the last {...} minutes of closing of Reverse Auction, the auction shall get closed automatically without any extension. However, bidders are advised not to wait till the last

minute or last few seconds to enter their bid during the auto-extension period to avoid complications related with internet connectivity, network problems, system crash down, power failure, etc.

The above process will continue till completion of Reverse Auction.

Complaints/ Grievances, if any, regarding denial of service or any related issue should be given in writing thru e-mail/ fax to M/s. {Service provider} with a copy to BHEL within 15 minutes prior to initial closing time of Online Reverse Auction.

**4. Bid price:** The Bidder has to quote the {.....} Price inclusive of Packing & Forwarding charges, all the routine & type tests as per tender scope, ED + cess, CST against C-form, Freight (bidder to provide original Freight paid receipt), insurance charges, etc. including loading (if indicated by BHEL due to deviations in technical/ commercial terms) for the Items specified. Details are as shown in Excel Sheet for calculation of total cost to BHEL (To be specified by Unit as per NIT conditions).

**5. Bidding currency and unit of measurement:**

Bidding will be conducted in *Indian Rupees per Unit* of the material as per the specifications {...}

In case of foreign currency bids, exchange rate (TT selling rate of State Bank of India) as on scheduled date of tender opening (Part-I bid) shall be considered for conversion in Indian Rupees. If the relevant day happens to be a Bank holiday, then the forex rate as on the previous bank (SBI) working day shall be taken.

**6. Validity of bids:** Price shall be valid for {... days} from the date of reverse auction. These shall not be subjected to any change whatsoever.

**7. Lowest bid of a bidder:** In case the bidder submits more than one bid, the lowest bid at the end of Online Reverse Auction will be considered as the bidder's final offer to execute the work.

**8.** Bidders shall be assigned a **Unique User Name & Password** by M/s. {Service provider}. Bidders are advised to change the Password and edit the information in the Registration Page after the receipt of initial Password from M/s. {Service provider} to ensure confidentiality. All bids made from the Login ID given to the bidders will be deemed to have been made by the bidders/ bidders' company.

**9.** Post auction procedure: BHEL will proceed with the Lowest Bid in the Reverse Auction for further processing.

**10.** Any commercial/ technical loading shall be intimated to bidders prior to RA. The excel sheet provided in this regard shall cover all these aspects. Commercial/ technical loading if any, shall be added by the respective bidder in its price during online sealed bid & Online Reverse Auction. Modalities of loading & de-loading shall be separately intimated to the bidders. The responsibility for correctness of total cost to BHEL shall lie with the bidders.

**11.** Computerized reverse auction shall be conducted by BHEL (through M/s. {Service Provider}), on pre-specified date, while the bidders shall be quoting from their own offices/ place of their choice. Internet connectivity shall have to be ensured by bidders themselves.

During the RA process if a bidder is not able to bid and requests for extension of time by FAX/ email/ phone then time extension of additional 15 minutes will be given by the service provider provided such requests come before 5 minutes of auction closing time. However, only one such request per bidder can be entertained. Despite this extension if bidder fails to upload his prices due to extreme case of failure of Internet connectivity, (due to any reason whatsoever may be) it is the bidders'

responsibility/ decision to send fax communication immediately to M/s. {Service provider}, furnishing the price the bidder wants to bid online with a request to the service provider to upload the faxed price online so that the service provider will upload that price online on behalf of the Bidder. It shall be noted clearly that the concerned bidder communicating this price to service provider has to solely ensure that the fax message is received by the service provider in a readable/ legible form and also the Bidder should simultaneously check up with service provider about the clear receipt of the price faxed. It shall also be clearly understood that the bidder shall be at liberty to send such fax communications of prices to be uploaded by the service provider only within the closure of Bid time and under no circumstance it shall be allowed beyond the closure of Bid time /reverse auction. It shall also be noted that the service provider should be given a reasonable required time by the bidders, to upload such prices online and if such required time is not available at the disposal of the Service provider at the time of receipt of the fax message from the bidders, the service provider will not be uploading the prices and either BHEL or the service provider are not responsible for this unforeseen circumstances. In order to ward-off such contingent situation bidders are requested to make all the necessary arrangements/ alternatives whatever required so that they are able to circumvent such situation and still be able to participate in the reverse auction successfully. Failure of power or loss of connectivity at the premises of bidders during the Reverse auction cannot be the cause for not

participating in the reverse auction. On account of this, the time for the auction cannot be extended and neither BHEL nor M/s. {Service provider} is responsible for such eventualities.

**12. Proxy bids:** Proxy bidding feature is a pro-bidder feature to safeguard the bidder's interest of any internet failure or to avoid last minute rush. The proxy feature allows bidders to place an automated bid in the system directly in an auction and bid without having to enter a new amount each time a competing bidder submits a new offer. The bid amount that a bidder enters is the minimum that the bidder is willing to offer. Here the software bids on behalf of the bidder. This obviates the need for the bidder participating in the bidding process until the proxy bid amount is decrementally reached by other bidders. When proxy bid amount is reached, the bidder (who has submitted the proxy bid) has an option to start participating in the bidding process.

The proxy amount is the minimum amount that the bidder is willing to offer. During the course of bidding, the bidder cannot delete or change the amount of a proxy bid. Bids are submitted in decrements (decreasing bid amounts). The application automates proxy bidding by processing proxy bids automatically, according to the decrement that the auction originator originally established when creating the auction, submitting offers to the next bid decrement each time a competing bidder bids, regardless of the fact whether the competing bids are submitted as proxy or standard bids. However, it may please be noted that if a manual bid and proxy bid are submitted at the same instant manual bid will be recognized as the L1 at that instant. In case of more than one proxy bid, the system shall bid till it crosses the threshold value of 'each lowest proxy bid' and thereafter allow the competition to decide the final L1 price. Proxy bids are fed into the system directly by the respective bidders. As such this information is privy only to the respective bidder(s).

**13.** Bidders are advised to get fully trained and clear all their doubts such as refreshing of screen, quantity being auctioned, tender value being auctioned etc. from M/s. {Service provider}.

**14.** M/s. {Service provider}, shall arrange to demonstrate/ train the bidder or bidder's nominated person(s), without any cost to bidders. M/s. {Service provider}, shall also explain the bidders, all the business rules related to the Reverse Auction. Bidders are required to submit their acceptance to the terms/ conditions/modalities before participating in the Reverse Auction in the process compliance form as enclosed. Without this, the bidder will not be eligible to participate in the event.

**15.** Successful bidder shall be required to submit the final prices (L1) in prescribed format (Annexure-VI) for price breakup including that of line items, if required, quoted during the Online Reverse Auction, duly signed and stamped as token of acceptance without any new condition (other than those already agreed to before start of auction), after the completion of auction to M/s. {Service provider} besides BHEL within two working days of Auction without fail.

**16.** Any variation between the final bid value and that in the confirmatory signed price breakup Document will be considered as tampering the tender process and will invite action by BHEL as per extant guidelines for suspension of business dealings (as available on [www.bhel.com](http://www.bhel.com)).

**17.** Bidders' bid will be taken as an offer to execute the work/ supplies of the item as per enquiry No. {...} dt. {...}. Bids once made by the bidder, cannot be cancelled/ withdrawn and bidder shall be bound to execute the work as mentioned above at bidder's final bid price. Should bidder back out and not execute the contract as per the rates quoted, BHEL shall take action as per extant guidelines for suspension of business dealings (as available on [www.bhel.com](http://www.bhel.com)).

**18.** Bidders shall be able to view the following on their screen along with the necessary fields during Online Reverse Auction:

- a. Leading (Running Lowest) Bid in the Auction (only total price of package).
- b. Bid Placed by the bidder.
- c. Start Price.
- d. Decrement value.
- e. Rank of their own bid during bidding as well as at the close of auction

**19.** BHEL's decision on award of contract shall be final and binding on all the Bidders.





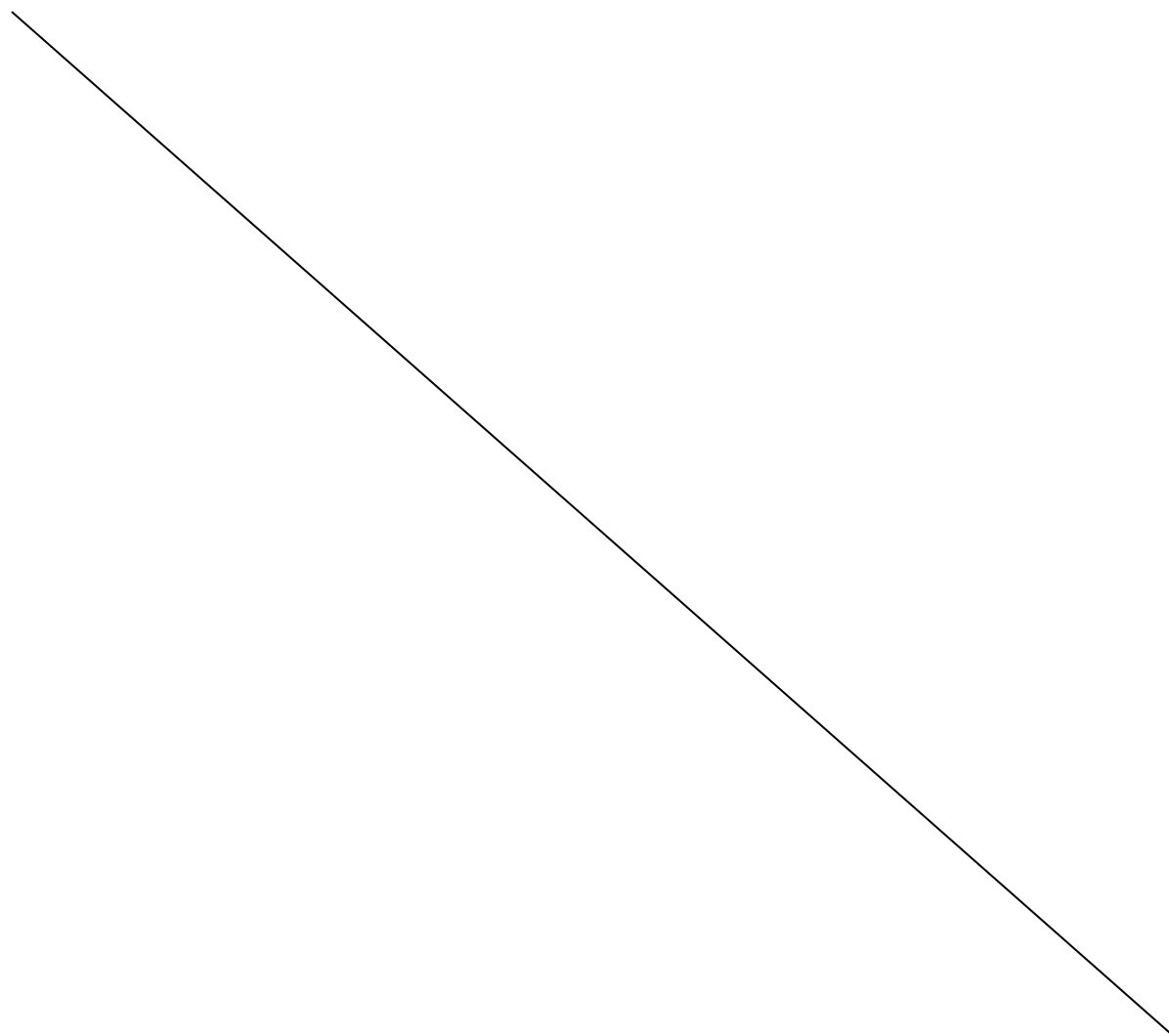
20. BHEL reserves the right to extend, reschedule or cancel the Reverse Auction process at any time, before ordering, without assigning any reason, with intimation to bidders.

21. BHEL shall not have any liability to bidders for any interruption or delay in access to the site irrespective of the cause. In such cases, the decision of BHEL shall be binding on the bidders.

22. Other terms and conditions shall be as per bidder's techno-commercial offers and other correspondences, if any, till date.

23. If there is any clash between this business document and the FAQ available, if any, in the website of M/s. {Service provider}, the terms & conditions given in this business document will supersede the information contained in the FAQs. Any changes made by BHEL/ service provider (due to unforeseen contingencies) after the first posting shall be deemed to have been accepted if the bidder continues to access the portal after that time..

24. Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party. If the Bidder or any of his representatives are found to be involved in Price manipulation/ cartel formation of any kind, directly or indirectly by communicating with other bidders, action as per extant BHEL guidelines for suspension of business dealings (as available on [www.bhel.com](http://www.bhel.com)), shall be initiated by BHEL.





**RA price confirmation and breakup**  
(To be submitted by L1 bidder after completion of RA)

To  
- M/s. Service provider  
- Postal address

CC: M/s BHEL

BOILER AUXILIARIES PLANT  
INDIRA GANDHI INDUSTRIAL COMPLEX  
RANIPET – 632406  
TAMILNADU  
INDIA.

Sub: Final price quoted during Reverse Auction and price breakup

Dear Sir,

We confirm that we have quoted.

**Rs.{ \_\_\_\_\_ in value & in words \_\_\_\_\_ } for item(s) covered under tender enquiry**  
**No. {...} dt.{...}**

Total price of the items covered under above cited enquiries is inclusive of {Packing & forwarding, E.D. , C.S.T. , freight and insurance charges up to {.....}  
District, {.....} State and Type Test Charges etc., [exclusive of Goods & Services tax (GST)],  
other as  
per NIT}

as our final landed prices as quoted during the Reverse Auction conducted today {date} which will  
be valid for a period of { \_\_\_\_ in nos. & in words \_\_\_\_ } days.

The price break-up including that of line items is as given below.

Total

=====

- Rs.in value & in words

=====

Thanking you and looking forward to the valuable order from BHEL.

Yours sincerely,

For \_\_\_\_\_

Name:

Company:

Date:

Seal:

| <p style="text-align: center;"> <b>BHEL : BAP : RANIPET</b><br/> <b>PURCHASE - DESALINATION</b><br/> <b>ANNEXURE - C</b><br/> <b>Commercial Terms and Conditions</b><br/> <b>MANUFACTURING AND SUPPLY OF DOSING SYSTEM &amp; ACCESSORIES</b><br/> <b>FOR KECL TANZANIA 371.2MW CCP PROJECT</b><br/> <b>(INTERNATIONAL ORDER)</b><br/> <b>Enquiry No.7770674E Dated 21-JUL-17 Due on: 17-AUG-17 (NIT_33791)</b> </p> |                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Sl. No.                                                                                                                                                                                                                                                                                                                                                                                                             | DESCRIPTION                                                      | BHEL (PURCHASER) REQUIREMENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | VENDOR (SELLER) CONFIRMATION |
| I                                                                                                                                                                                                                                                                                                                                                                                                                   | <u>Technical</u>                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                              |
| 01                                                                                                                                                                                                                                                                                                                                                                                                                  | SCOPE OF SUPPLY                                                  | <p>Please confirm the Scope of Supply of "DOSING SYSTEM SKID ASSEMBLY (CONSIST OF MOTORISED PUMPS, (MANUAL/AUTOMATIC), TANKS, MOTORISED MIXER, INTERCONNECTING CPVC PIPING, VALVES, INSTRUMENTS) &amp; ACCESSORIES" as per Specification No.</p> <p>01. TECHNICAL SPECIFICATION FOR DOSING SYSTEM &amp; ACCESSORIES - ROS: 6175 REV 00 DATED 05.07.17,<br/> 02. GENERAL SPECIFICATION FOR DOSING SYSTEM &amp; ACCESSORIES - ROS: 9012 REV 03 DATED 09.07.16,<br/> 03. TECHNICAL SPECIFICATION FOR ELECTRICAL CONTROL &amp; INSTRUMENTATION FOR DOSING SYSTEM - ROS: 4177 REV 00 DATED 08.07.17<br/> 04. P &amp; ID DRAWING. NO. 1-WT- 030-01052 REV 00,<br/> 05. BOQ FOR INSTRUMENTS ANNEXURE A<br/> 06. MANDATORY SPARES ANNEXURE II<br/> 07. SEAWORTHY PACKING SPEC. PE TS 888 100 A001 REV 00,<br/> 08. QUALIFICATION REQUIREMENT FOR DOSING SYSTEM &amp; ACCESSORIES - QUALIFICATION DATA SHEET FOR DMF - ANNEXURE - III</p> <p>submit the same after necessary Filling,signing &amp; returning a copy of the same.</p> |                              |
| 02                                                                                                                                                                                                                                                                                                                                                                                                                  | SPECIFICATION                                                    | Please confirm Clause wise / Point wise "IN TOTO" for all specifications and submit along with offer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                              |
| 03                                                                                                                                                                                                                                                                                                                                                                                                                  | DATA SHEETS / DRAWINGS                                           | Filled Data Sheets and Drawings are to be submitted along with offer. ( if applicable )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                              |
| 04                                                                                                                                                                                                                                                                                                                                                                                                                  | QUALITY ASSURANCE PLAN (QAP)                                     | To confirm applicable QAP will be followed. (OR) Supplier's Quality Plan to be submitted for our review and approval within 30 days from the date of Letter of Award (LOA).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                              |
| 05                                                                                                                                                                                                                                                                                                                                                                                                                  | SPECIFICATION DEVIATION DISPOSITION REPORT (SDDR)                | Attached SDDR to be filled & submit along with offer. (Even, If NO deviation is taken, NIL report to be submitted).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                              |
| 06                                                                                                                                                                                                                                                                                                                                                                                                                  | COMMISSIONING SPARES                                             | <p>Please confirm that the "COMMISSIONING SPARES WILL BE SUPPLIED ALONG WITH MAIN SUPPLY FOR TROUBLE FREE COMMISSIONING.Commissioning spares shall be packed separately with detailed packing list (items should not be packed along with main supply items)</p> <p>The commissioning spares List and the individual price should be indicated and included in the main supply.</p> <p>Any other spare(s) required during commissioning but not indicated in the list, should also be supplied at your cost &amp; BHEL will not entertain any claim towards supply of such spares used/supplied during commissioning.</p>                                                                                                                                                                                                                                                                                                                                                                                                   |                              |
| 07                                                                                                                                                                                                                                                                                                                                                                                                                  | MANDATORY SPARES                                                 | <p>The Mandatory spares List and the individual price should be indicated.</p> <p>Commissioning spares shall be packed separately with detailed packing list (items should not be packed along with main supply items)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                              |
| II                                                                                                                                                                                                                                                                                                                                                                                                                  | <u>Commercial Terms &amp; Conditions</u>                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                              |
| 01                                                                                                                                                                                                                                                                                                                                                                                                                  | PRICE                                                            | Please confirm 'Firm Price' till completion of order                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                              |
| 02                                                                                                                                                                                                                                                                                                                                                                                                                  | UNPRICED BID (PART-1)                                            | <p>Please confirm submission of 'Unpriced bid' in the price bid format attached duly signed.</p> <p>SCANNED COPY of FILLED &amp; SIGNED COPY OF 'Price Bid' format attached by filling all informations by writing 'Quoted' as the case may be in the 'Rate' and 'Value' columns to be submitted through E-Procurement System.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                              |
| 03                                                                                                                                                                                                                                                                                                                                                                                                                  | PRICED BID (PART-2)                                              | <p>Please confirm submission of 'Priced bid' in the price bid format attached duly signed.</p> <p>SCANNED COPY of FILLED &amp; SIGNED COPY OF 'Price Bid' format attached by filling all informations by writing the value as the case may be in the 'Rate' and 'Value' columns in a separate attachment to be submitted through E-Procurement System.</p> <p><b>Price bid opening will be considered after the Techno-Commercial evaluation &amp; further final approval from the customer: M/s. KECL TANZANIA 371.2MW CPP PROJECT</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                              |
| 04                                                                                                                                                                                                                                                                                                                                                                                                                  | DELIVERY TERMS & PRICE BASIS                                     | <p>Please confirm for FOR - Destination (BHEL - RANIPET STORES) basis.</p> <p>Unloading the Material at site is vendor Scope.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                              |
| 05                                                                                                                                                                                                                                                                                                                                                                                                                  | CONSIGNEE ADDRESS<br>(Detailed TIN No etc., will be given later) | <p>Please confirm supply to the following consignee address in the event of Order.</p> <p><b>THE SDGM / STORES/M/S.<br/> BHEL- BAP, RANIPET,<br/> VELLORE DISTRICT- 632 406<br/> TAMILNADU.</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                              |

| <p align="center"><b>BHEL : BAP : RANIPET</b><br/> <b>PURCHASE - DESALINATION</b><br/> <b>ANNEXURE - C</b><br/> <b>Commercial Terms and Conditions</b><br/> <b>MANUFACTURING AND SUPPLY OF DOSING SYSTEM &amp; ACCESSORIES</b><br/> <b>FOR KECL TANZANIA 371.2MW CCP PROJECT</b><br/> <b>(INTERNATIONAL ORDER)</b><br/> <b>Enquiry No.7770674E Dated 21-JUL-17 Due on: 17-AUG-17 (NIT_33791)</b></p> |                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Sl. No.                                                                                                                                                                                                                                                                                                                                                                                              | DESCRIPTION                                     | BHEL (PURCHASER) REQUIREMENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | VENDOR (SELLER) CONFIRMATION |
| 06                                                                                                                                                                                                                                                                                                                                                                                                   | ORIGIN OF DESPATCH OF VARIOUS CONSIGNMENT       | Please indicate clearly the origin of despatch of various consignments duly indicating whether interstate or intrastate based on the consignee address above. Origin of despatch should not be subjected to change during execution of contract.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                              |
| 07                                                                                                                                                                                                                                                                                                                                                                                                   | PACKING & FORWARDING                            | Please confirm inclusion of Packing & Forwarding Charges in the Basic quoted price.<br><br>If it is extra payable by BHEL, Please clearly indicate the applicable Packing & Forwarding charges in Lumpsum or % value.<br><br>Packing should be as per " <b>SEAWORTHY PACKING SPEC. PE TS 888 100 A001 REV 00</b> " - Please confirm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                              |
| 08                                                                                                                                                                                                                                                                                                                                                                                                   | FREIGHT & INSURANCE                             | Please confirm inclusion of Freight & Insurance Charges towards this in the Basic quoted price.<br><br>If it is extra payable by BHEL, Please clearly indicate the applicable Freight & Insurance charges in Lumpsum or % value.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                              |
| 09                                                                                                                                                                                                                                                                                                                                                                                                   | GOODS AND SERVICES TAX (GST) FOR SUPPLY PORTION | Please indicate the exact percentage applicable as on the date of submission of offer and also indicate whether the same is payable extra by BHEL or not.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                              |
| 10                                                                                                                                                                                                                                                                                                                                                                                                   | PAYMENT TERM FOR SUPPLY .                       | 1. Ninety percent (90%) of basic price of materials supplied, along with 100% taxes and duties (as applicable), shall be paid against receipt of material at site & submission of Bank Guarantee towards Performance (As called for in Sl. No. 19).<br><br>BG - 10% of Order/ Contract value (excluding taxes, duties & freight) before first submission of documents for payment to cover the due performance of Order/ Contract and to fulfill the guarantee conditions stipulated in the Order/ Contract.<br><br><b>Validity of the Bank Guarantee shall be for the entire Guarantee period. Initially, it should be at least 18 months plus 3 months claim period, later extended to cover the entire guarantee period, two months before its expiry.</b><br><br>2. Balance Ten percent (10%) of basic price of materials supplied will be released after commissioning of DOSING SYSTEM & ACCESSORIES. |                              |
| 11                                                                                                                                                                                                                                                                                                                                                                                                   | CONFIRM THE PAYMENT TERM FOR SUPPLY.            | Differential Payments applicable for Supply - Within 45 days for MSME vendor & 90 days for Non MSME vendors<br><br>Please confirm your status in case of MSME with relevant proof.<br><br><b>For MSME Registration, you have to submit the Notarized copy of MSME certificate with Original CA certificate</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                              |
| 12                                                                                                                                                                                                                                                                                                                                                                                                   | DELIVERY PERIOD FOR THE SUPPLY                  | Please confirm the supply completion on or before <b>15.02.2018 or 5 Months</b> from the date of Manufacturing clearance, whichever is Later.<br><br>Vendor to submit all drawings/documents within 2 weeks from the date of purchase order and resubmit the drawings/documents within 1 week incorporating all the comments.<br><br>In case there are delays of submission of drawings/documents beyond 2 weeks of order or 1 week of comments, that much days of delay would be reduced from delivery period.<br><br>Vendor can also quote improved delivery date if any or otherwise, please clearly indicate the delivery period in weeks / months from the date of Manufacturing clearance.<br><br>NOTE: Delivery period shall be reckoned till receipt of materials at site. For LD Purpose, Date of site receipt of material will only be considered.                                                |                              |
| 13                                                                                                                                                                                                                                                                                                                                                                                                   | LIQUIDATED DAMAGES (LD) - Supply Portion        | Please confirm LD for delayed delivery of Equipment (as per IMPORTANT NOTE) @ 0.5% per week for the undelivered portion of the order value and maximum of 10% of the total contract value.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                              |
| 14                                                                                                                                                                                                                                                                                                                                                                                                   | OFFER VALIDITY                                  | Please confirm Offer Validity for a minimum period of 60 days from the date of price bid opening.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                              |
| 15                                                                                                                                                                                                                                                                                                                                                                                                   | INSPECTION                                      | Please confirm for 'Inspection' of all the Items by BHEL Engineers / BHEL Authorized Engineer and Customer / Consultant Engineer either jointly or individually before the dispatch of the item at vendor works as per approved QAP. Please note that no payment will be made by BHEL towards inspection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                              |
| 16                                                                                                                                                                                                                                                                                                                                                                                                   | TEST CERTIFICATE (TC)                           | Please confirm that required TC will be provided at 'No Extra Cost'.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                              |
| 17                                                                                                                                                                                                                                                                                                                                                                                                   | GUARANTEE CERTIFICATE (GC) - Supply Portion.    | Please confirm furnishing of Guarantee certificate in BHEL format for 12 months from the date of commissioning or 18 months from the date of last despatch whichever is earlier.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                              |

| <p align="center"><b>BHEL : BAP : RANIPET</b><br/> <b>PURCHASE - DESALINATION</b><br/> <b>ANNEXURE - C</b><br/> <b>Commercial Terms and Conditions</b><br/> <b>MANUFACTURING AND SUPPLY OF DOSING SYSTEM &amp; ACCESSORIES</b><br/> <b>FOR KECL TANZANIA 371.2MW CCP PROJECT</b><br/> <b>(INTERNATIONAL ORDER)</b><br/> <b>Enquiry No.7770674E Dated 21-JUL-17 Due on: 17-AUG-17 (NIT_33791)</b></p> |                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Sl. No.                                                                                                                                                                                                                                                                                                                                                                                              | DESCRIPTION                                                                                                                                                                                                               | BHEL (PURCHASER) REQUIREMENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | VENDOR (SELLER) CONFIRMATION |
| 18                                                                                                                                                                                                                                                                                                                                                                                                   | Contract Execution Bank Guarantee (CEBG).<br>Ple Ref ANNEXURE –A GENERAL TERMS & CONDITIONS (FOR GUIDANCE TO THE SUPPLIERS)Under Clause -JJ<br>Contract Execution Bank Guarantee:                                         | To demonstrate the fidelity of the successful bidder, in executing the Contract, on receipt of the Letter of Intent / Purchase Order, the Supplier shall arrange to provide a contract execution bank guarantee (CEBG).                                                                                                                                                                                                                                                                              |                              |
| 19                                                                                                                                                                                                                                                                                                                                                                                                   | BANK GUARANTEE (BG) TOWARDS Supply Portion (10% OF ORDER VALUE)                                                                                                                                                           | BG to be submitted in the format issued by BHEL.<br>BG for 10% of the Total PO Value. Validity of the Bank Guarantee shall be for the entire Guarantee period. Initially, it should be at least 18 months, later extended to cover the entire guarantee period, three months before its expiry.                                                                                                                                                                                                      |                              |
| 20                                                                                                                                                                                                                                                                                                                                                                                                   | ERECTION MANUAL (INSTALLATION INSTRUCTIONS)                                                                                                                                                                               | Please confirm for providing of 'comprehensive Erection Manual covering the entire supply which include bought-outs' 6 sets in Hard copy & one CD form.                                                                                                                                                                                                                                                                                                                                              |                              |
| 21                                                                                                                                                                                                                                                                                                                                                                                                   | O & M MANUAL                                                                                                                                                                                                              | Please confirm for providing of 'comprehensive O&M Manual covering the entire System' 6 sets in Hard copy & one CD form.                                                                                                                                                                                                                                                                                                                                                                             |                              |
| 22                                                                                                                                                                                                                                                                                                                                                                                                   | REVERSE AUCTION                                                                                                                                                                                                           | <p>Please see the Clause in the main enquiry regarding Reverse Auction (RA). RA will be conducted through our Service Provider. Vendor to confirm acceptance.</p> <p>Please note that in case BHEL decides not to conduct RA, the sealed price bids along with the impact price bids arising out of techno-commercial discussions already available with BHEL only will be opened. Please note that no impact price due to non-conductance of RA will be accepted. Vendor to confirm acceptance.</p> |                              |
| 23                                                                                                                                                                                                                                                                                                                                                                                                   | RISK PURCHASE CLAUSE (CLAUSE No. 6 of General Terms and Conditions for Indigenous offer)                                                                                                                                  | BHEL's Standard Risk Purchase clause will be applicable. Please confirm.                                                                                                                                                                                                                                                                                                                                                                                                                             |                              |
| 24                                                                                                                                                                                                                                                                                                                                                                                                   | ZERO DATE (CONTRACT EFFECTIVE DATE)                                                                                                                                                                                       | Contract Effective date starts from Manufacturing Clearance subject to Documents submission clause.<br>Please confirm for 'Date of Manufacturing Clearance'.                                                                                                                                                                                                                                                                                                                                         |                              |
| 25                                                                                                                                                                                                                                                                                                                                                                                                   | Loading Criteria                                                                                                                                                                                                          | <p>Please note that no Commercial deviation is acceptable to BHEL. In case any deviation is taken in any of the commercial terms such as PAYMENT TERMS, LD, PBG, etc., where in we have specified the days, percentages etc., then loading will be done to the extent of the short fall with respect to the upper Limit specified for evaluation.</p> <p>In respect of LD offers which do not accept for LD Clause would be sumerly rejected - Please Confirm.</p>                                   |                              |
| 26                                                                                                                                                                                                                                                                                                                                                                                                   | NEGOTIATION                                                                                                                                                                                                               | In the event of negotiation if any, please confirm participation only by supplier's representative and not by their Agent which include indian Agent in the case of Foreign Offer.                                                                                                                                                                                                                                                                                                                   |                              |
| 27                                                                                                                                                                                                                                                                                                                                                                                                   | OTHER DOCUMENTS FOR APPROVAL (BBU)                                                                                                                                                                                        | In the event of order vendor should confirm the submission of BBU for the complete system supply with break up for each line item as well as quantities with value.                                                                                                                                                                                                                                                                                                                                  |                              |
| 28                                                                                                                                                                                                                                                                                                                                                                                                   | PLEASE PROVIDE THE STATUTORY DETAILS (Submit a copy of PAN, if not submitted already)                                                                                                                                     | GST Regn. Number<br>Application Reference Number (ARN)<br>TIN :<br>PAN No. :                                                                                                                                                                                                                                                                                                                                                                                                                         |                              |
| 29                                                                                                                                                                                                                                                                                                                                                                                                   | CONTACT PERSON'S ON TECHNICAL DETAILS FOR CORRESPONDENCE                                                                                                                                                                  | Name:<br>Designation:<br>Phone No.:<br>Mobile No.:<br>Fax No.:<br>E-mail ID:                                                                                                                                                                                                                                                                                                                                                                                                                         |                              |
| 30                                                                                                                                                                                                                                                                                                                                                                                                   | CONTACT PERSON'S ON COMMERCIAL DETAILS FOR CORRESPONDENCE                                                                                                                                                                 | Name:<br>Designation:<br>Phone No.:<br>Mobile No.:<br>Fax No.:<br>E-mail ID:                                                                                                                                                                                                                                                                                                                                                                                                                         |                              |
| 31                                                                                                                                                                                                                                                                                                                                                                                                   | <p><b>BHEL will not take cognizance of commercial terms mentioned by the bidder any where else.</b></p> <p><b>Commercial terms and conditions indicated in this Annexure - A will only be applicable and binding.</b></p> | Acceptance Required                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                              |

Signature, Seal & Date of offerer on all the pages.

**ANNEXURE - D**  
**BHEL : BAP : RANIPET**  
**PURCHASE - DESALINATION**  
**PRICE OFFER FORMAT**  
**MANUFACTURING AND SUPPLY OF DOSING SYSTEM & ACCESSORIES**  
**FOR KECL TANZANIA 371.2MW CCP PROJECT**  
**(INTERNATIONAL ORDER)**  
**Enquiry No.7770674E Dated 21-JUL-17 Due on: 17-AUG-17 (NIT\_33791)**

**PRICE OFFER - SUPPLY**

| <b>Enquiry<br/>Sl.<br/>No.</b> | <b>Description</b>                                                                                                                                                                                                                                                                                      | <b>Unit</b> | <b>Qty.</b> | <b>Rate / Unit<br/>in Rs.</b> | <b>Amount in<br/>Rs.</b> |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------------------------|--------------------------|
| 001                            | RWT705300001<br>NAOCL DOSING SYSTEM (SKID)<br>ASSEMBLY WITH ACCESSORIES<br>(20 LPH) FOR PWTP,<br>AS PER TECHNICAL SPECIFICATION NO.<br>ROS:6175 REV 00 DATED 05.07.17,<br>ROS:9012 REV 03 DATED 09.07.16,<br>ROS:4177 REV 00 DATED 08.07.17 &<br>P & ID DRAWING. NO.<br>1-WT- 030-01052 REV 00.         | ST          | 1.00        |                               |                          |
| 002                            | RWT705300002<br>HCL DOSING SYSTEM (SKID)<br>ASSEMBLY WITH ACCESSORIES<br>(50 LPH) FOR PWTP,<br>AS PER TECHNICAL SPECIFICATION NO.<br>ROS:6175 REV 00 DATED 05.07.17,<br>ROS:9012 REV 03 DATED 09.07.16,<br>ROS:4177 REV 00 DATED 08.07.17 &<br>P & ID DRAWING. NO.<br>1-WT- 030-01052 REV 00.           | ST          | 1.00        |                               |                          |
| 003                            | RWT705300003<br>COAGULANT DOSING SYSTEM (SKID) ASSEMBLY<br>WITH ACCESSORIES<br>(50 LPH) FOR PWTP,<br>AS PER TECHNICAL SPECIFICATION NO.<br>ROS:6175 REV 00 DATED 05.07.17,<br>ROS:9012 REV 03 DATED 09.07.16,<br>ROS:4177 REV 00 DATED 08.07.17 &<br>P & ID DRAWING. NO.<br>1-WT- 030-01052 REV 00.     | ST          | 1.00        |                               |                          |
| 004                            | RWT705300004<br>COAGULANT AID DOSING SYSTEM (SKID)<br>ASSEMBLY WITH ACCESSORIES<br>(50 LPH) FOR PWTP,<br>AS PER TECHNICAL SPECIFICATION NO.<br>ROS:6175 REV 00 DATED 05.07.17,<br>ROS:9012 REV 03 DATED 09.07.16,<br>ROS:4177 REV 00 DATED 08.07.17 &<br>P & ID DRAWING. NO.<br>1-WT- 030-01052 REV 00. | ST          | 1.00        |                               |                          |

**ANNEXURE - D**  
**BHEL : BAP : RANIPET**  
**PURCHASE - DESALINATION**  
**PRICE OFFER FORMAT**  
**MANUFACTURING AND SUPPLY OF DOSING SYSTEM & ACCESSORIES**  
**FOR KECL TANZANIA 371.2MW CCP PROJECT**  
**(INTERNATIONAL ORDER)**  
**Enquiry No.7770674E Dated 21-JUL-17 Due on: 17-AUG-17 (NIT\_33791)**

**PRICE OFFER - SUPPLY**

| <b>Enquiry<br/>Sl.<br/>No.</b> | <b>Description</b>                                                                                                                                                                                                                                                                                                                          | <b>Unit</b> | <b>Qty.</b> | <b>Rate / Unit<br/>in Rs.</b> | <b>Amount in<br/>Rs.</b> |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------------------------|--------------------------|
| 005                            | RWT705300005<br>DE-CHLORINATION DOSING SYSTEM (SKID)<br>ASSEMBLY WITH ACCESSORIES<br>(10 LPH) FOR PWTP,<br>AS PER TECHNICAL SPECIFICATION NO.<br>ROS:6175 REV 00 DATED 05.07.17,<br>ROS:9012 REV 03 DATED 09.07.16,<br>ROS:4177 REV 00 DATED 08.07.17 &<br>P & ID DRAWING. NO.<br>1-WT- 030-01052 REV 00.                                   | ST          | 1.00        |                               |                          |
| 006                            | RWT705300006<br>ANTISCALANT DOSING SYSTEM (SKID)<br>ASSEMBLY WITH ACCESSORIES<br>(10 LPH) FOR PWTP,<br>AS PER TECHNICAL SPECIFICATION NO.<br>ROS:6175 REV 00 DATED 05.07.17,<br>ROS:9012 REV 03 DATED 09.07.16,<br>ROS:4177 REV 00 DATED 08.07.17 &<br>P & ID DRAWING. NO.<br>1-WT- 030-01052 REV 00.                                       | ST          | 1.00        |                               |                          |
| 007                            | RWT705300007<br>NAOH DOSING SYSTEM (SKID)<br>ASSEMBLY WITH ACCESSORIES<br>(10 LPH)FOR PWTP,<br>AS PER TECHNICAL SPECIFICATION NO.<br>ROS:6175 REV 00 DATED 05.07.17,<br>ROS:9012 REV 03 DATED 09.07.16,<br>ROS:4177 REV 00 DATED 08.07.17 &<br>P & ID DRAWING. NO.<br>1-WT- 030-01052 REV 00.                                               | ST          | 1.00        |                               |                          |
| 008                            | RWT705300008<br>UF CIP CLEANING - CITRIC ACID DOSING<br>SYSTEM (SKID)<br>ASSEMBLY WITH ACCESSORIES<br>(160 LPH) FOR PWTP-1 NO & STP-1 NO.<br>AS PER TECHNICAL SPECIFICATION NO.<br>ROS:6175 REV 00 DATED 05.07.17,<br>ROS:9012 REV 03 DATED 09.07.16,<br>ROS:4177 REV 00 DATED 08.07.17 &<br>P & ID DRAWING. NO.<br>1-WT- 030-01052 REV 00. | ST          | 2.00        |                               |                          |

**ANNEXURE - D**  
**BHEL : BAP : RANIPET**  
**PURCHASE - DESALINATION**  
**PRICE OFFER FORMAT**  
**MANUFACTURING AND SUPPLY OF DOSING SYSTEM & ACCESSORIES**  
**FOR KECL TANZANIA 371.2MW CCP PROJECT**  
**(INTERNATIONAL ORDER)**  
**Enquiry No.7770674E Dated 21-JUL-17 Due on: 17-AUG-17 (NIT\_33791)**

**PRICE OFFER - SUPPLY**

| <b>Enquiry<br/>Sl.<br/>No.</b> | <b>Description</b>                                                                                                                                                                                                                                                                                                                      | <b>Unit</b> | <b>Qty.</b> | <b>Rate / Unit<br/>in Rs.</b> | <b>Amount in<br/>Rs.</b> |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------------------------|--------------------------|
| 009                            | RWT705300009<br>UF CIP CLEANING- NAOCL DOSING SYSTEM<br>(SKID)<br>ASSEMBLY WITH ACCESSORIES .<br>(160 LPH) FOR PWTP-1NO. & ETP-1 NO.,<br>AS PER TECHNICAL SPECIFICATION NO.<br>ROS:6175 REV 00 DATED 05.07.17,<br>ROS:9012 REV 03 DATED 09.07.16,<br>ROS:4177 REV 00 DATED 08.07.17 &<br>P & ID DRAWING. NO.<br>1-WT- 030-01052 REV 00. | ST          | 2.00        |                               |                          |
| 010                            | RWT705300010<br>HCL DOSING SYSTEM (SKID)<br>ASSEMBLY WITH ACCESSORIES<br>(50 LPH) FOR ETP,<br>AS PER TECHNICAL SPECIFICATION NO.<br>ROS:6175 REV 00 DATED 05.07.17,<br>ROS:9012 REV 03 DATED 09.07.16,<br>ROS:4177 REV 00 DATED 08.07.17 &<br>P & ID DRAWING. NO.<br>1-WT- 030-01052 REV 00.                                            | ST          | 1.00        |                               |                          |
| 011                            | RWT705300011<br>COAGULANT DOSING SYSTEM (SKID) ASSEMBLY<br>WITH ACCESSORIES<br>(50 LPH) FOR ETP,<br>AS PER TECHNICAL SPECIFICATION NO.<br>ROS:6175 REV 00 DATED 05.07.17,<br>ROS:9012 REV 03 DATED 09.07.16,<br>ROS:4177 REV 00 DATED 08.07.17 &<br>P & ID DRAWING. NO.<br>1-WT- 030-01052 REV 00.                                      | ST          | 2.00        |                               |                          |
| 012                            | RWT705300012<br>COAGULANT AID DOSING SYSTEM (SKID)<br>ASSEMBLY WITH ACCESSORIES<br>(50 LPH) FOR ETP,<br>AS PER TECHNICAL SPECIFICATION NO.<br>ROS:6175 REV 00 DATED 05.07.17,<br>ROS:9012 REV 03 DATED 09.07.16,<br>ROS:4177 REV 00 DATED 08.07.17 &<br>P & ID DRAWING. NO.<br>1-WT- 030-01052 REV 00.                                  | ST          | 2.00        |                               |                          |



**ANNEXURE - D**  
**BHEL : BAP : RANIPET**  
**PURCHASE - DESALINATION**  
**PRICE OFFER FORMAT**  
**MANUFACTURING AND SUPPLY OF DOSING SYSTEM & ACCESSORIES**  
**FOR KECL TANZANIA 371.2MW CCP PROJECT**  
**(INTERNATIONAL ORDER)**  
**Enquiry No.7770674E Dated 21-JUL-17 Due on: 17-AUG-17 (NIT\_33791)**

**PRICE OFFER - SUPPLY**

| <b>Enquiry<br/>Sl.<br/>No.</b> | <b>Description</b>                                                                                                                                                                                                                                                                                      | <b>Unit</b> | <b>Qty.</b> | <b>Rate / Unit<br/>in Rs.</b> | <b>Amount in<br/>Rs.</b> |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------------------------|--------------------------|
| 013                            | RWT705300013<br>DECHLORINATION DOSING SYSTEM (SKID)<br>ASSEMBLY WITH ACCESSORIES<br>(10 LPH) FOR ETP,<br>AS PER TECHNICAL SPECIFICATION NO.<br>ROS:6175 REV 00 DATED 05.07.17,<br>ROS:9012 REV 03 DATED 09.07.16,<br>ROS:4177 REV 00 DATED 08.07.17 &<br>P & ID DRAWING. NO.<br>1-WT- 030-01052 REV 00. | ST          | 1.00        |                               |                          |
| 014                            | RWT705300014<br>ANTISCALANT DOSING SYSTEM (SKID)<br>ASSEMBLY WITH ACCESSORIES<br>(10 LPH)FOR ETP,<br>AS PER TECHNICAL SPECIFICATION NO.<br>ROS:6175 REV 00 DATED 05.07.17,<br>ROS:9012 REV 03 DATED 09.07.16,<br>ROS:4177 REV 00 DATED 08.07.17 &<br>P & ID DRAWING. NO.<br>1-WT- 030-01052 REV 00.     | ST          | 1.00        |                               |                          |
| 015                            | RWT705300015<br>NAOH DOSING SYSTEM (SKID)<br>ASSEMBLY WITH ACCESSORIES<br>(15 LPH) FOR ETP,<br>AS PER TECHNICAL SPECIFICATION NO.<br>ROS:6175 REV 00 DATED 05.07.17,<br>ROS:9012 REV 03 DATED 09.07.16,<br>ROS:4177 REV 00 DATED 08.07.17 &<br>P & ID DRAWING. NO.<br>1-WT- 030-01052 REV 00.           | ST          | 1.00        |                               |                          |
| 016                            | RWT705300016<br>NAOCL DOSING SYSTEM (SKID)<br>ASSEMBLY WITH ACCESSORIES,<br>(15 LPH) FOR ETP,<br>AS PER TECHNICAL SPECIFICATION NO.<br>ROS:6175 REV 00 DATED 05.07.17,<br>ROS:9012 REV 03 DATED 09.07.16,<br>ROS:4177 REV 00 DATED 08.07.17 &<br>P & ID DRAWING. NO.<br>1-WT- 030-01052 REV 00.         | ST          | 1.00        |                               |                          |

**ANNEXURE - D**  
**BHEL : BAP : RANIPET**  
**PURCHASE - DESALINATION**  
**PRICE OFFER FORMAT**  
**MANUFACTURING AND SUPPLY OF DOSING SYSTEM & ACCESSORIES**  
**FOR KECL TANZANIA 371.2MW CCP PROJECT**  
**(INTERNATIONAL ORDER)**  
**Enquiry No.7770674E Dated 21-JUL-17 Due on: 17-AUG-17 (NIT\_33791)**

**PRICE OFFER - SUPPLY**

| Enquiry<br>Sl.<br>No.       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Unit | Qty. | Rate / Unit<br>in Rs. | Amount in<br>Rs. |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|-----------------------|------------------|
| 017                         | <div>RWT705300017<br/>COMMISSIONING SPARES<br/>FOR DOSING SYSTEM,<br/>AS PER TECHNICAL SPECIFICATION NO.<br/>ROS:6175 REV 00 DATED 05.07.17,<br/>ROS:9012 REV 03 DATED 09.07.16 &amp;<br/>ROS:4177 REV 00 DATED 08.07.17.</div> <div>Commissioning spares shall be packed separately with<br/>detailed packing list<br/>(items should not be packed along with main supply<br/>items)</div>                                                                                                                                                                                                                                                                                                                                                             | ST   | 1.00 |                       |                  |
| 018                         | <div>RWT705300018<br/>MANDATORY SPARES<br/>FOR DOSING SYSTEM,<br/>AS PER TECHNICAL SPECIFICATION NO.<br/>ROS:6175 REV 00 DATED 05.07.17,<br/>ROS:9012 REV 03 DATED 09.07.16 &amp;<br/>ROS:4177 REV 00 DATED 08.07.17</div> <div>Mandatory spares shall be packed separately with<br/>detailed packing list (items<br/>should not be packed along with main supply items)</div>                                                                                                                                                                                                                                                                                                                                                                          | ST   | 1.00 |                       |                  |
|                             | Total Price (Total of Sl. No. 001 -018)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |      |                       |                  |
| OPTIONAL<br>PRICE           | <div>RECOMMENDED SPARES FOR 2 YEARS O&amp;M -<br/>LIST OF SPARES WITH PRICE BREAKUP TO BE<br/>FURNISHED</div> <div>NOTE: THIS ITEM WILL BE ORDERED IF<br/>REQUIRED ONLY AND THIS ITEM WILL NOT BE<br/>CONSIDERED FOR ARRIVING RANKING</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | SET  | 1.00 |                       |                  |
| IMPORTANT NOTES             | <div>1) All the Items are to be inspected by BHEL Engineers / BHEL Authorized Engineer and Customer / Consultant Engineer either jointly or individually before the despatch of the item at vendor works as per approved QAP.</div> <div>2) All Items will be compared on SET Basis &amp; Order will be placed on a Single vendor who is the lowest (L1) on set basis.</div> <div>3) Please confirm the supply completion with in 15.02.2018 or 5 Months from the date of Manufacturing clearance, which ever is Later.</div> <div>4) Vendor can also quote improved delivery date if any from the date of Manufacturing Clearance,</div> <div>5) Commissioning Spares &amp; Mandatory spares List and the individual price should be indicated..</div> |      |      |                       |                  |
| Signature & Seal of Offerer |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |      |                       |                  |

| ANNEXURE - E<br>SPECIFICATION DEVIATION DISPOSITION REPORT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |                                                                                                                              |                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------------------------------------------------------------------------------------------------------------------------------|---------------------|
| Enquiry No.7770674E Dated 21-JUL-17 Due on:<br>17-AUG-17 (NIT_33791)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        | MANUFACTURING AND SUPPLY OF DOSING SYSTEM &<br>ACCESSORIES<br>FOR KECL TANZANIA 371.2MW CCP PROJECT<br>(INTERNATIONAL ORDER) | Vendor Name         |
| 01. TECHNICAL SPECIFICATION FOR DOSING SYSTEM & ACCESSORIES - ROS:<br>6175 REV 00 DATED 05.07.17,<br>02. GENERAL SPECIFICATION FOR DOSING SYSTEM & ACCESSORIES - ROS: 9012<br>REV 03 DATED 09.07.16,<br>03. TECHNICAL SPECIFICATION FOR ELECTRICAL CONTROL &<br>INSTRUMENTATION FOR DOSING SYSTEM - ROS: 4177 REV 00 DATED 08.07.17<br>04. P & ID DRAWING. NO. 1-WT- 030-01052 REV 00,<br>05. BOQ FOR INSTRUMENTS ANNEXURE A<br>06. MANDATORY SPARES ANNEXURE II<br>07. SEAWORTHY PACKING SPEC. PE TS 888 100 A001 REV 00,<br>08. QUALIFICATION REQUIREMENT FOR DOSING SYSTEM & ACCESSORIES -<br>QUALIFICATION DATA SHEET FOR DMF - ANNEXURE - III |        |                                                                                                                              |                     |
| Page                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Clause | Details Of Deviation With Reason                                                                                             | Disposition By BHEL |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |        |                                                                                                                              |                     |
| Signature Of Vendor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        |                                                                                                                              | Reviewed By         |
| “ AGREED DEVIATION “<br>if any to be incorporated in the PO in the event of order.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |                                                                                                                              | APPROVED BY         |

Date :

VENDOR's SIGNATURE WITH SEAL

*(TO BE STAMPED IN ACCORDANCE WITH STAMP ACT AND THE EXPIRY DATE OF BG MUST BE AFTER 3 MONTHS FROM THE DATE OF COMPLETION OF SUPPLIES)*

### **CONTRACT EXECUTION BANK GUARANTEE**

In accordance of M/s. Bharat Heavy Electricals Limited (A Government of India undertaking, a company incorporated under the Companies Act 1956 having its Registered Office at "BHEL House", SIRI Fort, New Delhi 110 049) through its Boiler Auxiliaries Plant located at Ranipet – 632 406, (hereinafter called 'the Company') having entered into a contract with M/s.....  
..... hereinafter called 'the said contractor' which term includes 'suppliers' for the purpose of this Bond and under the terms and conditions of the Contract No.....Dt.....between BHEL, Ranipet and as per the Contract, the Contractor / Supplier is to furnish a Contract Execution Bank Guarantee for Rs.....in words.....  
.....for the due performance of the contract and for the fulfillment of all the terms and conditions of the contract.

Sign and seal of issuing bank  
Please affix Non Judicial Stamp  
here, as per Stamp Act

Bank Guarantee No.....Date.....Banker Name.....  
Bank Guarantee Value Rs.....

1. We.....  
.....  
.....(Bank's name, Branch, Place – address to be mentioned [herein after referred to as the Bank) at the request of.....  
.....(Contractor(s)] do hereby undertake to pay the company an amount not exceeding Rs.....in words  
.....  
.....  
.....against any loss or damage caused to or suffered or would be caused to or suffered by the company by reason of any breach by the said Contractor(s) of any of the terms and conditions contained in the said agreement.

2. We.....  
.....  
.....(name of the bank with full address), do hereby undertake to pay the amounts due and payable under this guarantee without any demur, merely on a demand from the Company stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the Company by reason of breach by the said Contractor(s) of any of the terms and conditions contained in the said Agreement or by the reason of the Contractor(s) 'failure to perform' the said agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs.....in words.....  
.....

Sign and seal of issuing bank

Bank Guarantee No.....Date.....Banker Name.....  
Bank Guarantee Value Rs.....

3. We undertake to pay conditionally to the Company any money so demanded notwithstanding any dispute(s) raised by the Contractor in any suit, or proceedings pending before any Court or Tribunal or Arbitration or before any other authority relating thereto our liability under this present being absolute and unequivocal. The payment under this guarantee would not wait till the disputes have been decided by any Court or Tribunal or in the arbitration proceedings or by any other authority. The payment so made by us under this Bond shall be a valid discharge of liability for payment thereunder and the Contractor(s) shall have no claim against us for making such payment.

4. We.....(name of Bank), further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and that it shall continue to be enforceable till all the dues of the Company under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till Purchase Department of the Company certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said Contractor(s) and accordingly discharges this guarantee.

5. (i) Unless a demand or claim under this guarantee is made on us in writing on or before .....(date) (After 3 months from the date of completion of supplies) we shall be discharged from all the liability under this guarantee thereafter. But where such claim or demand has been preferred by the Company with the Bank before the expiry of the said date, the claim shall be enforceable notwithstanding the fact that the said enforcement is effected after the said date. (ii) For the purpose of this clause, any letter making demand on the Bank by M/s. BHEL dispatched by Registered Post with Ack. Due or by Telegram or by any Electronic media addressed to the above mentioned address of the Bank shall be deemed to be the claim / demand in writing referred to above irrespective of the fact as to whether and when the said letter reaches the Bank, as also any letter containing the said demand or claim is lodged with the Bank personally.

Sign and seal of issuing bank

Bank Guarantee No.....Date.....Banker Name.....  
Bank Guarantee Value Rs.....

6. We.....(name of the Bank), further agree with the company that the Company shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said agreement or to extend time of performance by the said Contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Company against the said Contractor(s) and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by any reason of any such variation or extension being granted to the said Contractor(s) or for any forbearance, act or omission on the part of the company or any indulgence by the company to the said Contractor(s) or by any such matter or thing whatsoever which under the law relating would, but for this provision, have effect of not so relieving us.

7. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s).

8. The guarantee herein contained shall not be determined or affected by the liquidation or winding up or insolvency of or change in the constitution of the Contractor, but shall in all respects and for all purpose be binding and operative until all payments of all moneys due or that may hereafter become due to the said company or settled irrespective of any liability or obligation of the Contractor under the said Contract.

9. It shall not be necessary for the company to proceed against the Contractor before proceeding against the guarantor-bank and the guarantee herein contained shall be enforceable against them notwithstanding any security, which the company may have obtained from the Contractor shall, at the time when proceedings are taken against the Guarantor hereunder be outstanding or unrealized.

10. Any claim or dispute arising under the terms of this document shall only be enforced or settled in the Courts at Ranipet, Tamilnadu Jurisdiction.

11. The Bank declares that it has powers to issue this Guarantee under the Bank's Memorandum and Articles of Association and the undersigned has full powers to do so on its behalf under the power granted to him by the proper authorities of the Bank.

12. We .....(name of Bank) lastly undertake not to revoke this guarantee during its currency except with the previous consent of the company in writing.

In witness whereof we.....  
(name of Bank) have hereunto setout Bank Seal the.....  
day of.....month 20\_\_.

Sign and seal of issuing bank.



## **Online SRF Submission Procedure**

Following are the formalities to be completed by your company for registration purpose.

**NOTE: BEFORE PROCEEDING FOR ONLINE REGISTRATION " PLS READ STEPS FOR FILLING UP ONLINE REGISTRATION FORM - HELP MENU" - DETAILS ATTACHED WITH THIS MAIL**

With effect from 01.04.2015 onwards, we have migrated to online Supplier Registration Form (SRF) as per our Corporate guidelines. **Supplier Registration Form (SRF)** is to be fed in our BHEL website portal – **ie., PDF documents of SRF and its annexure as called for shall be signed by authorized signatory & uploaded in portal.**

We request to visit our Web Site : [www.bhel.com](http://www.bhel.com) and click under heading "Supplier Registration" and fill up the **"Supplier Registration Form"** which is available in the Online Supplier Registration Portal.

Or else, copy the following URL Link and paste in the web link address: [http://www.bhel.com/vender\\_registration/vender.php](http://www.bhel.com/vender_registration/vender.php) and proceed with.

Or else, type directly as <http://203.129.195.108>

**Click the button "search material"** on the home page of supplier registration portal and search thoroughly your required material / product

*After completing the material search then proceed for User Id & Password for filling up the details of registration requirements. **Note: If you are an already registered supplier with any of our BHEL Unit - pls select "existing permanent supplier" or else select "New Registration" and then proceed accordingly.***

**Please note that for a foreign suppliers' there is a separate format to be filled in, which may be taken care suitably.**

After successful submission of SRF along with all annexures as called for thro' online i.e., authorized signatory signed pdf documents of SRF and its annexures are to be uploaded thro' online portal and confirm the same in **"form dispatch"** area ie., registration part-4 – wherein supplier has to confirm that all the documents were submitted "online" and click the button **"confirm"**. After clicking confirmation button, the same will be appearing against BHEL Ranipet for registration.

Looking for a long successful & sustaining business association with BHEL.



**GENERAL SPECIFICATION FOR  
DOSING SYSTEM**

SPEC. No.: ROS 9012

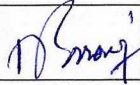
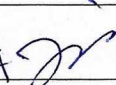
REV: 03

BHARAT HEAVY ELECTRICALS LIMITED,  
RANIPET- 632 406.

**GENERAL SPECIFICATION**

for

**DOSING SYSTEM & ACCESSORIES**

|         |          |                                                                                        |                                                                                         |                                                                                         |                                  |
|---------|----------|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|----------------------------------|
|         |          |                                                                                        |                                                                                         |                                                                                         |                                  |
|         |          |                                                                                        |                                                                                         |                                                                                         |                                  |
|         |          |                                                                                        |                                                                                         |                                                                                         |                                  |
| 03      | 09.07.16 | AJ  | DBN  | MN  | EC&I portion revised             |
| 02      | 17.09.12 | DBN sd/-                                                                               | PP sd/-                                                                                 | SK sd/-                                                                                 | General painting procedure added |
| 01      | 28.03.12 | ABH sd/-                                                                               | IMRL sd/-                                                                               | SK sd/-                                                                                 | Spec. revised                    |
| 00      | 20.05.10 | RR sd/-                                                                                | MN sd/-                                                                                 | KSK sd/-                                                                                | Fresh issue                      |
| Rev. No | Date     | Prepared                                                                               | Checked                                                                                 | Approved                                                                                | Remarks                          |

|                                                                                   |                                                    |                     |
|-----------------------------------------------------------------------------------|----------------------------------------------------|---------------------|
|  | <b>GENERAL SPECIFICATION FOR<br/>DOSING SYSTEM</b> | SPEC. No.: ROS 9012 |
|                                                                                   |                                                    | REV: 03             |

## 1.0 EQUIPMENT SPECIFICATIONS

This specification covers the design, skid manufacturing, assembly of pumps with motors, interconnecting piping, valves, instruments, tanks, accessories etc. in the skid, shop testing including hydro testing, supply of the dosing system ~~and erection supervision & commissioning the dosing system at site.~~ (Erection & commissioning is not in vendor scope)

### 1.1 CHEMICAL DOSING SYSTEM

- a. Application : To dose applicable chemical solution through electrical motor operated diaphragm pump.
- b. Surrounding : Dusty, humid atmosphere in thermal power plant.
- c. Installation : Indoor / Under shade
- d. Ambient Temperature : 45 °C Maximum & 5°C Minimum
- e. Operation : Continuous / Intermittent
- f. Dosing system : Each system normally consists of electro-mechanical diaphragm pumps, Day tank, Preparation tank (if required), Mixer (if required) for the applicable tank with necessary piping, valves & accessories which are mounted on the skid. For additional information refer enclosed detailed technical specification.

## 2.0 TECHNICAL REQUIREMENT:

Please refer separate Technical Specification for dosing system and accessories.

## 3.0 GENERAL DESIGN REQUIREMENTS

### 3.1 Pump & Accessories:

- a. Positive displacement, mechanically actuated diaphragm pump with provision for auto / manual stroke adjustment as specified in the technical specification.
- b. The pumps with auto operation shall be supplied with suitable components to adjust the stroke length or rate based on the 4-20 mA signal provided by Purchaser These pumps shall also have provision for manual over ride facility.
- c. Manual operated pumps shall have provision for adjusting the stroke length.
- d. Steady state accuracy :  $\pm 1.5\%$  of maximum flow

|                                                                                   |                                                    |                     |
|-----------------------------------------------------------------------------------|----------------------------------------------------|---------------------|
|  | <b>GENERAL SPECIFICATION FOR<br/>DOSING SYSTEM</b> | SPEC. No.: ROS 9012 |
|                                                                                   |                                                    | REV: 03             |

- e. Repeatability at fixed pressure and stroke setting. :  $\pm 3\%$
- f. Flow accuracy at various discharge pressures and } :  $\pm 6\%$   
specific stroke setting to the entire operating range }
- g. Turn down ratio : 10 : 1
- h. Stroke adjustment : 10 to 100%(Minimum)
- i. Diaphragm : Teflon coated EPDM or better
- j. All Wetted parts shall be compatible to chemical being handled and are subjected to BHEL approval.
- k. Accessories :

Each dosing pump should consist of one injection head, (to suit process line) one suction strainer, one air release valve, one low level switch for each tank with minimum 5 m length cable(if applicable), one tubular level gauge for each tank. Necessary tube connectors for suction, discharge ports, provision for mounting calibration column at pump suction, pressure gauge (4" dial- with chemical seal diaphragm), pump mounting fasteners (bolt, nut with 2 washers) , flow indicator etc. as per typical scheme of dosing system drawing.

- l. Power supply for pump motor :

230 V, AC, single phase 50 Hz, 3 core x 2.5 sq.mm PVCA cable or 415 V, AC, 3phase, 50Hz suitable to terminate 3 core x 2.5 sq.mm PVCA cable. Terminal Block shall be in vendor scope.

- m. Mounting arrangement :

The respective dosing pumps for each dosing system must be assembled in a common skid to have positive suction with suction isolation valve. The delivery of each pump shall be connected to a common discharge CPVC header with dedicated discharge isolation valve. This CPVC common header of each system to be connected to the injection head (fitted in process pipe line) through a common CPVC rigid piping system.

**Note:**

- Electronic solenoid operated diaphragm pumps are not acceptable unless otherwise stated elsewhere.
- Bidder shall quote nearest higher flow capacity pump if the specified capacity is not in their manufacturing range which is subjected to BHEL's acceptance.

|                                                                                   |                                                    |                     |
|-----------------------------------------------------------------------------------|----------------------------------------------------|---------------------|
|  | <b>GENERAL SPECIFICATION FOR<br/>DOSING SYSTEM</b> | SPEC. No.: ROS 9012 |
|                                                                                   |                                                    | REV: 03             |

3. The operating pressure of the offered pump should meet the pressure requirements stated in technical specification.

### 3.2 ELECTRICAL MOTORS – A.C

Motors shall be Squirrel cage Induction type. Motors shall be suitable to operate for 415V  $\pm 10\%$ , 3 Phase, 50 Hz  $\pm 5\%$ , combined voltage & frequency 10% (absolute sum), continuously rated (S1), Direct On-Line (DOL) starting, Starting Current shall be limited to IS-12615 tolerance, Degree of Protection – IP-55 and IP-54 for outdoor & indoor respectively and terminal boxes shall be provided with at least IP-55. Class F insulation with temperature limited to Class B, TEFC enclosure, canopy for outdoor motors & two earthing bolts are to be provided one on either side of the motors and another earthing bolt inside the Terminal box. The applicable standard shall be IS325 & IS 12615. The motor make shall be as per customer approved vendors as indicated in this specification. All Motors shall be energy efficient type (IE2).

Single phase 230 Volts  $\pm 10\%$ , 50 Hz  $\pm 5\%$  motors are also acceptable for dosing pump drives.

### 3.3 DAY TANK & PREPARATION TANK

FRP Tanks design considerations:

Tanks shall be vertical, cylindrical, (tapered bottom wherever needed) with level indication. The top cover shall be flanged with suitable reinforcing and bracing. The top cover (One segment) shall have opening for chemical loading and this part shall be hinged type for preparation tank and where ever required. A perforated basket for chemical dissolution shall be provided, in the FRP tank, below this opening for chemical loading.

The support pads shall be provided along the outer circumference, at the mid height of the tank with suitable reinforcing and bracing, so that the tank is rigidly held on the support legs in the skid wherever the tank is mounted on the skid. Otherwise the support pads at the bottom of the tank for necessary grouting during erection.

Each tank shall have four support pads with bolt hole & PCD not more than 150 mm beyond the tank diameter. Tank support pad with bolt hole shall be suitable for mounting the tank on the necessary support legs / channel provided in the skid or support floor.

Nozzles on top, sideways and bottom heads shall have a flanged faces perpendicular to the vertical centerline of the tank and nozzles on sidewalls shall have flanges faces perpendicular to radial centerlines. Tolerance on angle of

|                                                                                   |                                                    |                     |
|-----------------------------------------------------------------------------------|----------------------------------------------------|---------------------|
|  | <b>GENERAL SPECIFICATION FOR<br/>DOSING SYSTEM</b> | SPEC. No.: ROS 9012 |
|                                                                                   |                                                    | REV: 03             |

flange face with respect to tank centerline is  $\frac{1}{2}$  degree. All the nozzles with flange shall be molded integrally with tanks. Flanges shall be off CRS.

The tank shall be continuous filament wound type and there shall be no long seam joint in the cylindrical shell. The entire thickness of the cylindrical shell shall be built up prior to removal of the shell from the mandrel. Necessary baffle plate @ 120 deg apart shall be provided for each tank.

Filament wound reinforced tanks shall be considered. The minimum total laminate thickness of the filament wound tank shall not be less than 6 mm all around and minimum 10 mm for tank flange, flanged top cover, tank bottom corners and all nozzle flanges without exception.

Each tank shall have inlet, outlet, drain, overflow, service water inlet, level indication nozzles etc. Drain & overflow lines shall be minimum one size higher than the pump discharge line size. ALL FLANGE DRILLING SHALL CONFIRM TO ANSI B-16.5, CLASS 150.

Each day tank should be provided with a suitable low level switch with 1NO+1NC contact type for interlock through DCS for remote low level trip of respective pumps. The MOC of the wetted parts of the level switch must be compatible for the respective chemical used. This is not applicable for preparation tank.

Each tank shall be provided with a removable type basket (for dissolving chemical) attached to the inner periphery of the tank. This shall be rigidly fixed with the tank. 6 to 10 mm - holes shall be made on the basket

Each tank shall be equipped with a flanged level indicator / gauge. The gauge shall include two CPVC isolation ball valve, 20 mm dia glass tube and indicator board calibrated in cm.

Resin used for the tanks shall be a commercial-grade corrosion-resistant thermosetting, fully tested and accepted for the severe conditions. All internal surfaces, exposed to chemical, shall be resin rich and the thickness of this inner layer shall be minimum of 2 mm by vinyl ester resin. Isothalic resin shall be used for rest of the thickness lamination. The glass content of inner layer shall be 25 to 30 % by weight. The glass content of filament wound structural layer shall be 55 to 70 % by weight.

Applicable Dosing System name & tank capacity shall be indicated / painted in the respective tanks with black letters (25mm height minimum) on yellow background.

Suitable opening shall also be provided in these tanks to house slow speed mixer as the case may be. The above guide lines shall be followed for day and

|                                                                                   |                                                    |                     |
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preparation tank. The top cover in these tanks shall be sufficiently rigid enough for mounting the mixers.

### 3.4 SKID FRAME.

A skid shall be fabricated with MS channel and angles as per the approved drawing with good engineering practice. The MS skid shall be suitable to assemble the day & preparation tanks with mixer, dosing pumps with motor, piping system, overflow & drain arrangements etc. The pump mounting elevation and space between pumps shall be suitably designed to facilitate easy operation for flow adjustment, valve operation, maintenance and chemical loading etc.

Preparation tanks shall be located at suitable elevation in the skid near the respective day tank. Necessary interconnecting piping and valves to connect this tank with day tank shall be provided. Necessary supports & clamps for tank, piping etc. Lifting hook arrangement shall also be provided. Painting shall be followed as given in the technical specification elsewhere.

## 3.0 Painting

### 3.5.1 GENERAL

- a) All the Equipment and steel structures shall be protected against external and internal (if any) corrosion by providing suitable painting as described below unless otherwise specified elsewhere. However, the surfaces of stainless steel, Galvanised steel, Gunmetal, brass, bronze, UPVC pipes, HDPE pipes and non-metallic components shall not be applied with any painting.
- (b) All painting shall be carried out in conformity with the paint manufacturer's recommendation.

### 3.5.2 CLEANING AND SURFACE PREPARATION

All the external and internal surfaces to be painted shall be thoroughly cleaned before erection by wire brushing, shot blasting and air blowing. The steel surface to be applied with painting shall be thoroughly cleaned before applying paint by brushing, shot blasting etc as per the agreed procedure.

After all machining, forming and welding has been completed, all steelwork surfaces shall be thoroughly cleaned of rust, scale, welding slag or spatter and other contamination prior to painting.

Surfaces shall be cleaned to requisite surface preparation by one of the methods given below as per technical specification and all dust remaining after cleaning shall be removed.

|                                                                                   |                                                    |                     |
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Grease or oil contamination shall be removed by either wiping or scrubbing the surface with rags or brushes wetted with white spirit and then wiping down with clean dry cloths. Alternatively emulsifying agents may be used for this purpose.

#### **(a) Manual or hand tool cleaning**

The sequence of operation for manual / hand tool cleaning is as follows:

- 1) Solvent cleaning (if required) will be done to remove oil and grease soluble welding influx residues and salts.
- 2) Surface will be manually cleaned by hand hammering or hand chipping to remove stratified rust (rust Scale).
- 3) Brushing/hand scraping will be done to remove all loose mill scale and no adherent rust.

#### **(b) Blast Cleaning**

The surface of the metal will be blast cleaned to a finish confirming to SA 2 1/2 as per Swedish standard SIS-05-5900 using any of the following methods after removal of grease, oil and contaminants:

- 1) Dry sand blasting
- 2) Shot/grit blasting

### **3.5.3 PROTECTIVE COATING**

As soon as the painting items have been cleaned, within four hours of the subsequent drying, they will be coated with suitable anti-corrosion protection. Immediately after the protective coating all vessels and pipes will be suitably sealed off by discs or caps or approved alternatives to prevent ingress from the surrounds.

No painting or filler shall be applied until all repairs, hydrostatic test and final shop inspection are completed.

All painting works (including surface preparation) on piping or equipment at site shall be commenced only after the required tests have been completed.

Prior to painting, proper care shall be taken to protect nameplates, lettering, gauges, sight glasses, light fittings and similar such items, to ensure that these are in no way defaced or damaged during the work

All primers shall be well marked into the, particularly in areas where pitting is evident, and the first priming coat shall be applied as soon as possible after cleaning. The paint shall be applied as per manufacturer's recommendations.



|                                                                                   |                                                    |                     |
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All paints, when applied in a normal full coat, shall be free from runs, sags, wrinkles, patchiness, brush marks.

**Dry Film Thickness(DFT):** Each coat of paints will be allowed to harden before the next is applied as per manufacturer's recommendation. The requirements for DFT of the paint and materials to be used for different items will be as per the "schedules of finishes indicated below.

### 3.6. PIPING SYSTEM.

All the valves, strainer, interconnecting pipes, pump suction and discharge piping shall be of CPVC industrial grade, PN 16 rating, DIN standard or schedule 80 pipe shall be considered.

Prepared solution transfer pipe line from preparation tank to day tank shall be of 1"(DN 25) size minimum. Isolation valves shall also be 1"(DN 25) size.

The distance of discharge piping from the skid to the process line (dosing point) will vary from 10 to 40 meters based on the site layout. The dosing system design should take care of this. The erection of pipe from skid to dosing point will be carried out by others.

ALL FLANGE DRILLING SHALL CONFIRM TO ANSI B-16.5, CLASS 150.

Applicable bill of quantity, for this requirement, to cover all the system shall be separately offered by the bidder as called in the enquiry. Bidder shall also offer unit rates for pipe, fittings & valves etc., to order for any change in requirement based on detailed engineering. The expected quantity variation will be within + or (–) 20% for each item and will be finalized before order. However any minor variation in requirements shall be taken care by the vendor without any commercial implications after ordering.

A "TEE" connection with isolation valve at pump suction shall be provided by the bidder for fixing calibration column / cylinder for calibration of pumps.

### 3.7 MIXER / AGITATOR

- |                  |                                                                    |
|------------------|--------------------------------------------------------------------|
| i) Type          | : Electrical Operated with mounting flange & SS316 fasteners       |
| ii) Power supply | : 415 volts, 3ph, 50Hz.                                            |
| iii) Speed       | : Bidder to provide low speed mixers, preferably less than 300 rpm |

|                                                                                   |                                                    |                     |
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### 3.8 OTHER REQUIREMENTS

- a. All the interconnecting piping shall be CPVC, industrial grade Schedule 80.
- b. The pipe size shall be minimum of dia 1" (DN 25) for Tank Overflow , Drain, Transfer from Preparation tank to day tank , service water inlet
- c. The drain outlet , common pump discharge outlet , terminal points shall be terminated with mating flanges.
- d. The valves of union type socket end and the O rings shall be of either EPDM or VITON.
- e. All mounting fasteners : SS 316  
(Flanges, tank, pump etc.)
- f. Foundation Bolts : SS 316

Items though not mentioned but needed to make the system complete in all respects as stipulated under these specifications are also to be supplied unless otherwise specifically excluded.

### 3.9 JUNCTION BOX (IF applicable)

Junction Box for termination of contacts of field instruments .Enclosure material shall be of 2 mm Cold rolled sheet steel. Material of Removable gland plate shall be of 3mm Hot rolled sheet steel. Enclosure protection shall be of IP 55 as per IS 13947.

### 3.10 MEASURING INSTRUMENTS.

#### Pressure Gauge:

- Diaphragm seal type
- Dial size shall be of 100 mm.
- End connection shall be 1/2 inch NPT (M).
- Accuracy shall be  $\pm 2\%$  of span or better.

#### Level Gauge

- Transparent tubular type with accuracy of  $\pm 2\%$  of span or better.
- Range shall cover 125% of maximum of scale.
- Length of gauge glass shall not be more than 1400 mm.

#### Rotameter

- In-line rotameter with isolation & bypass valve arrangement.

|                                                                                   |                                                    |                     |
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**Level switches:**

- Magnetic Float type level switch.
- MOC of wetted parts shall be PP (chemical compatible).
- 150% of max design pressure.
- Enclosure shall be weather and dust proof as per IP-55.

**3.11 SPECIFICATION OF INSTRUMENT CABLE: (IF applicable)**

Cables shall be of type FRLS HRPVC SCREENED CONTROL CABLES .  
Cross section area of the conductor shall not be less than 0.5 sqmm. Construction shall be of multistrand and number of strands shall be 7. IS: 1554(Part-I Generally) & IS: 694 (Latest editions and its amendments) shall be applicable.

**4.0 DOCUMENTATION :**

The documentation during bid and post order stage shall meet the following requirements.

1. All documents and drawing shall be submitted in English.
2. Hard copies of all documents and drawings, in English, during bid stage to be submitted in duplicate.
3. Hard copies of all drawing and documents for approval shall be submitted in triplicate.
4. Hard copies of all final documents, drawings, erection manual, O&M manual etc., shall be submitted in bound folder in six.
5. Soft copies of all final documents in MS word / MS in the form of CD – 1 set
6. Soft copies of all final calculations in MS word / MS in the form of CD – 1 set
7. Soft copies of all final drawings in Auto Cad, latest version in the form of CD – 1 set

**5.0 DOCUMENTS / DETAILS ALONG WITH BID**

The following documents/ details shall be submitted along with the bid for scrutiny.

- a. Duly filled up data sheet for each dosing system, in Annexure-1 & 2 enclosed.
- b. Catalogues & typical drawings indicating system arrangement, dimensional details, Material of constructions etc.
- c. Typical Performance curve for each model of the offered pump for the operating pressure range (design to minimum).
- d. Typical Quality plan for supply of the above equipment.
- e. Reference list
- f. Unpriced commercial offer on the scope of supply as per BHEL spec. (Note – 3).

|                                                                                   |                                                    |                     |
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- g. All the documents called for in the motor specification
- h. Bidder to provide confirmation regarding the compatibility of the offered wetted parts MOC for the medium handled for all systems.
- e. Civil requirements.
- i. In case of any deviation, the Bidder shall indicate the deviation, clause by clause in the deviation format attached in Annexure-2. If there is no deviation "NIL" statement shall be furnished. In the absence of Annexure-2, it will be construed that the bid confirms strictly to the specification. Acceptance or rejection of the offer with or without deviations (either fully or partially) is sole discretion of the purchaser without seeking further clarification from the bidder.

Note: 1. Bidders to note that failing to submit the above documents, the bid shall be considered as incomplete and liable for rejection.

Note: 2. Bidder to confirm in their offer that the details called in Section 6.0 will be provided after order.

Note: 3. Bidder should provide offer for all the dosing systems as called in the spec. They should also provide price break up for each dosing system, piping system spares etc. If the offer is not for all the dosing systems, it will not be considered for evaluation.

## 6.0 DOCUMENTS AFTER ORDER:

6.1 The following documents / Drawings shall be furnished for BHEL / customer approval.

- i) Duly filled up data sheet Annexure-1 enclosed.
- ii) Quality plan for supply of the above equipment in BHEL format (format will be provided after order).
- iii) General arrangement drawings with dimension for pump, tank & accessories
- iv) Dosing/Injection head details.
- v) Cross sectional drawings.

6.2 The following documents/Drawings are to be furnished for BHEL / customer review and acceptance.

- i) Performance test report for flow Vs design pressure and flow Vs minimum pressure for each pump. The pump shall be tested at 25%, 50% & 100 % of the stroke length. The verification / inspection of test results shall be carried out for one pump of each model in the presence of BHEL inspector or BHEL's authorized inspector.
- ii) Performance guarantee certificate

|                                                                                   |                                                    |                     |
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iii) Erection and O&M manuals.

iv) List of despatch details for each system as per BHEL format (format will be provided after order).

Note: Purchase order number& Material code shall be marked / indicated in the system painted / tagged at suitable location for identification of components at site before dispatch.

## 7.0 INSPECTION

By BHEL's inspector or BHEL's authorized representative at Vendor's works.

## 8.0: PACKING & FORWARDING

8.1 The Dosing systems assembly shall be packed properly by the vendor, before despatch to ensure safe transportation without any damages.

8.2 The material shall be despatched to site as per shipping list along with complete BOQ approved by BHEL. The shipping list format & QP formats, etc will be given after order.

8.3 All the loose items shall be numbered , detailed in packing slip and shall be sent in closed wooden box with proper packing inside.

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Annexure-1

BHEL Enquiry / P.O. Reference No. & Date:

### EQUIPMENT DATA SHEET

#### I. TECHNICAL PARAMETERS

##### IA. PUMP

- a. Name of Chemical dosing system :
- b. Make & Model no :
- c. Type :
- d. Flow -Design / Min / Max LPH : / /
- e. Disch. Pr. -Design / Min / Max Kg/cm<sup>2</sup> : / /
- f. Stroke length mm :
- g. Speed Min / Max SPM :
- h. Stroke adjustment Min / Max % :
- i. Steady state accuracy (cl.3.1.b) % :
- j. Repeatability (Cl.3.1.c) % :
- k. Flow accuracy (Cl.3.1.d) % :
- l. Power Supply Details V/Ph/Hz :  
 -Variation in % V/Ph/Hz :  
 -Power consumption Watt :
- m. Material of construction :  
 -Dosing Head :  
 -Fittings :  
 -Valve balls in the pump :  
 -Spring in injection head :  
 -Tubing :  
 -Mounting fasteners :  
 -Other Wetted parts :
- n. Normal operating life at design capacity :  
 -Diaphragm Hrs :  
 -Ceramic balls Hrs :

|                                                                                   |                                                    |                     |
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- o. Pump overall size L,W,H :
- p. Pump weight Kg :
- q. Tube size at Suction / Discharge Inches : /  
- Pressure rating at 20 deg C :
- r. Pump control Manual / Automatic :
- s. Type of control - Stepper motor / Others :

## II. DAY TANK / PREPARATION TANK DAY TANK

## PREPARATION TANK

- a. Capacity ltrs :
- b. Size - Dia & Height mm :
- c. Tank thickness – Shell /Bottom /Top mm :
- d. Baffle plate size & quantity :
- e. Material of construction  
- Tank & Cover :  
- Level indicator :  
- Interconnecting valves & piping :
- f. Type & make of level switch :
- g. Level Indicator make & details :
- h. Colour of the Tank :
- i. Weight of tank with lid :
- j. Type of resin used for FRP tank & cover : Inner :  
Outer :

|                                                                                   |                                                    |                     |
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| III. MIXER (if applicable)                                                          |                | DAY TANK | PREPARATION TANK |
|-------------------------------------------------------------------------------------|----------------|----------|------------------|
| a. Make& Type                                                                       | :              |          |                  |
| b. Material of construction                                                         | :              |          |                  |
| - Impeller                                                                          | :              |          |                  |
| - Shaft                                                                             | :              |          |                  |
| - Protective coating                                                                | :              |          |                  |
| c. Shaft                                                                            | Dia x Length : |          |                  |
| d .Impeller                                                                         | Dia :          |          |                  |
| e. Impeller speed                                                                   | rpm :          |          |                  |
| f. Make of gear reducer                                                             | :              |          |                  |
| g. Model No                                                                         | :              |          |                  |
| IV. MOTOR (AC) particulars                                                          |                |          |                  |
| 1. Dosing pump motor                                                                |                |          |                  |
| i) Application                                                                      | :              |          |                  |
| ii) Type                                                                            | :              |          |                  |
| iii) Frame size                                                                     | :              |          |                  |
| iv) Manufacturer                                                                    | :              |          |                  |
| v) Rated output in KW                                                               | :              |          |                  |
| vi) At rated Voltage and frequency                                                  | :              |          |                  |
| a) Full load current (Amps)                                                         | :              |          |                  |
| b) Rated speed                                                                      | :              |          |                  |
| c) Full load efficiency                                                             | :              |          |                  |
| d) Full load power factor                                                           | :              |          |                  |
| vii) No load current in Amps.                                                       | :              |          |                  |
| viii) Controller input / output signal for<br>flow adjustment for auto pumps in mA: |                |          |                  |
| ix) Type of mounting and shaft<br>Orientation                                       | :              |          |                  |



|                                                                                   |                                                    |                     |
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#### IV. MOTOR (AC) particulars

##### 2. Mixer motor

- i) Application :
- ii) Type :
- iii) Frame size :
- iv) Manufacturer :
- v) Rated output in KW :
- vi) At rated Voltage and frequency :
  - a) Full load current (Amps) :
  - b) Rated speed :
  - c) Full load efficiency :
  - d) Full load power factor :
- vii) No load current in Amps. :
- viii) Controller input / output signal for  
flow adjustment for auto pumps in mA:
- ix) Type of mounting and shaft  
Orientation :
- V. Pressure gauge make :
  - Model number :
  - Type :
- VI. Pressure relief valve make :
  - Model number :
- VII. Calibration Cylinder MOC :
  - Capacity :
- VIII. Level gauge make :
  - Model number :
  - Type :
- IX. Level Switch make :
  - Model number :
  - Type :
- X. In-line Rotameter make :
  - Model number :

|                                                                                   |                                                    |                     |
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|                                                   |       |  |  |  |  |
|---------------------------------------------------|-------|--|--|--|--|
| IV. GENERAL                                       |       |  |  |  |  |
| Material Code                                     | Unit  |  |  |  |  |
| Dosing system description                         |       |  |  |  |  |
| Pump Model No.                                    |       |  |  |  |  |
| Pump operation                      Auto / Manual |       |  |  |  |  |
| Pump Qty / system                                 | Nos.  |  |  |  |  |
| Injection Head / system                           | Nos.  |  |  |  |  |
| Suction Strainer"Y-type" / system                 | Nos.  |  |  |  |  |
| Pressure relief valve / System                    | Nos.  |  |  |  |  |
| Pressure gauge - diaphragm type / System          | Nos.  |  |  |  |  |
| Day tank / system                                 | Nos.  |  |  |  |  |
| Preparation tank / system                         | Nos.  |  |  |  |  |
| Fume absorbers / system                           | Nos.  |  |  |  |  |
| Mixer assembly / system                           | Nos.  |  |  |  |  |
| Low level switch / system                         | Nos.  |  |  |  |  |
| No. of skids / system                             | Nos.  |  |  |  |  |
| Skid size L / B / H                               | Metre |  |  |  |  |
| MOC of skid                                       |       |  |  |  |  |
| Pr. rating of CPVC pipes & valves                 |       |  |  |  |  |
| Make of piping                                    |       |  |  |  |  |
| Make of valves                                    |       |  |  |  |  |
| Pump suction / disch. pipe size                   | Nos.  |  |  |  |  |
| Weight of skid assembly                           | kgs   |  |  |  |  |
| Drawing No. – Pump                                |       |  |  |  |  |
| Drawing No. – Mixer                               |       |  |  |  |  |
| Drawing No. – Day tank / Prpn                     |       |  |  |  |  |

|                                                                                   |                                                    |                     |
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|                              |  |  |  |  |  |
|------------------------------|--|--|--|--|--|
| tank                         |  |  |  |  |  |
| Drawing No. – skid assembly  |  |  |  |  |  |
| Drawing No. – General Arrgt. |  |  |  |  |  |

## ANNEXURE 2

### TECHNICAL DEVIATIONS

| Sl. No | Section no. | Clause No. | Page / No. | Specification | Statement of Deviations/variatioins | Reason for Deviation | cost of withdrawal |
|--------|-------------|------------|------------|---------------|-------------------------------------|----------------------|--------------------|
|        |             |            |            |               |                                     |                      |                    |
|        |             |            |            |               |                                     |                      |                    |
|        |             |            |            |               |                                     |                      |                    |
|        |             |            |            |               |                                     |                      |                    |
|        |             |            |            |               |                                     |                      |                    |
|        |             |            |            |               |                                     |                      |                    |

Date:

Signature & seal of the Bidder



**GENERAL SPECIFICATION FOR  
DOSING SYSTEM**

SPEC. No.: ROS 9012

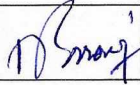
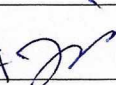
REV: 03

BHARAT HEAVY ELECTRICALS LIMITED,  
RANIPET- 632 406.

**GENERAL SPECIFICATION**

for

**DOSING SYSTEM & ACCESSORIES**

|         |          |                                                                                        |                                                                                         |                                                                                         |                                  |
|---------|----------|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|----------------------------------|
|         |          |                                                                                        |                                                                                         |                                                                                         |                                  |
|         |          |                                                                                        |                                                                                         |                                                                                         |                                  |
|         |          |                                                                                        |                                                                                         |                                                                                         |                                  |
| 03      | 09.07.16 | AJ  | DBN  | MN  | EC&I portion revised             |
| 02      | 17.09.12 | DBN sd/-                                                                               | PP sd/-                                                                                 | SK sd/-                                                                                 | General painting procedure added |
| 01      | 28.03.12 | ABH sd/-                                                                               | IMRL sd/-                                                                               | SK sd/-                                                                                 | Spec. revised                    |
| 00      | 20.05.10 | RR sd/-                                                                                | MN sd/-                                                                                 | KSK sd/-                                                                                | Fresh issue                      |
| Rev. No | Date     | Prepared                                                                               | Checked                                                                                 | Approved                                                                                | Remarks                          |

|                                                                                   |                                                    |                     |
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## 1.0 EQUIPMENT SPECIFICATIONS

This specification covers the design, skid manufacturing, assembly of pumps with motors, interconnecting piping, valves, instruments, tanks, accessories etc. in the skid, shop testing including hydro testing, supply of the dosing system and erection supervision & commissioning the dosing system at site.

### 1.1 CHEMICAL DOSING SYSTEM

- a. Application : To dose applicable chemical solution through electrical motor operated diaphragm pump.
- b. Surrounding : Dusty, humid atmosphere in thermal power plant.
- c. Installation : Indoor / Under shade
- d. Ambient Temperature : 45 °C Maximum & 5°C Minimum
- e. Operation : Continuous / Intermittent
- f. Dosing system : Each system normally consists of electro-mechanical diaphragm pumps, Day tank, Preparation tank (if required), Mixer (if required) for the applicable tank with necessary piping, valves & accessories which are mounted on the skid. For additional information refer enclosed detailed technical specification.

## 2.0 TECHNICAL REQUIREMENT:

Please refer separate Technical Specification for dosing system and accessories.

## 3.0 GENERAL DESIGN REQUIREMENTS

### 3.1 Pump & Accessories:

- a. Positive displacement, mechanically actuated diaphragm pump with provision for auto / manual stroke adjustment as specified in the technical specification.
- b. The pumps with auto operation shall be supplied with suitable components to adjust the stroke length or rate based on the 4-20 mA signal provided by Purchaser These pumps shall also have provision for manual over ride facility.
- c. Manual operated pumps shall have provision for adjusting the stroke length.
- d. Steady state accuracy :  $\pm 1.5\%$  of maximum flow

|                                                                                   |                                                    |                     |
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- e. Repeatability at fixed pressure and stroke setting. :  $\pm 3\%$
- f. Flow accuracy at various discharge pressures and } :  $\pm 6\%$   
specific stroke setting to the entire operating range }
- g. Turn down ratio : 10 : 1
- h. Stroke adjustment : 10 to 100%(Minimum)
- i. Diaphragm : Teflon coated EPDM or better
- j. All Wetted parts shall be compatible to chemical being handled and are subjected to BHEL approval.
- k. Accessories :

Each dosing pump should consist of one injection head, (to suit process line) one suction strainer, one air release valve, one low level switch for each tank with minimum 5 m length cable(if applicable), one tubular level gauge for each tank. Necessary tube connectors for suction, discharge ports, provision for mounting calibration column at pump suction, pressure gauge (4" dial- with chemical seal diaphragm), pump mounting fasteners (bolt, nut with 2 washers) , flow indicator etc. as per typical scheme of dosing system drawing.

- l. Power supply for pump motor :

230 V, AC, single phase 50 Hz, 3 core x 2.5 sq.mm PVCA cable or 415 V, AC, 3phase, 50Hz suitable to terminate 3 core x 2.5 sq.mm PVCA cable. Terminal Block shall be in vendor scope.

- m. Mounting arrangement :

The respective dosing pumps for each dosing system must be assembled in a common skid to have positive suction with suction isolation valve. The delivery of each pump shall be connected to a common discharge CPVC header with dedicated discharge isolation valve. This CPVC common header of each system to be connected to the injection head (fitted in process pipe line) through a common CPVC rigid piping system.

**Note:**

- Electronic solenoid operated diaphragm pumps are not acceptable unless otherwise stated elsewhere.
- Bidder shall quote nearest higher flow capacity pump if the specified capacity is not in their manufacturing range which is subjected to BHEL's acceptance.

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3. The operating pressure of the offered pump should meet the pressure requirements stated in technical specification.

### 3.2 ELECTRICAL MOTORS – A.C

Motors shall be Squirrel cage Induction type. Motors shall be suitable to operate for 415V  $\pm 10\%$ , 3 Phase, 50 Hz  $\pm 5\%$ , combined voltage & frequency 10% (absolute sum), continuously rated (S1), Direct On-Line (DOL) starting, Starting Current shall be limited to IS-12615 tolerance, Degree of Protection – IP-55 and IP-54 for outdoor & indoor respectively and terminal boxes shall be provided with at least IP-55. Class F insulation with temperature limited to Class B, TEFC enclosure, canopy for outdoor motors & two earthing bolts are to be provided one on either side of the motors and another earthing bolt inside the Terminal box. The applicable standard shall be IS325 & IS 12615. The motor make shall be as per customer approved vendors as indicated in this specification. All Motors shall be energy efficient type (IE2).

Single phase 230 Volts  $\pm 10\%$ , 50 Hz  $\pm 5\%$  motors are also acceptable for dosing pump drives.

### 3.3 DAY TANK & PREPARATION TANK

FRP Tanks design considerations:

Tanks shall be vertical, cylindrical, (tapered bottom wherever needed) with level indication. The top cover shall be flanged with suitable reinforcing and bracing. The top cover (One segment) shall have opening for chemical loading and this part shall be hinged type for preparation tank and where ever required. A perforated basket for chemical dissolution shall be provided, in the FRP tank, below this opening for chemical loading.

The support pads shall be provided along the outer circumference, at the mid height of the tank with suitable reinforcing and bracing, so that the tank is rigidly held on the support legs in the skid wherever the tank is mounted on the skid. Otherwise the support pads at the bottom of the tank for necessary grouting during erection.

Each tank shall have four support pads with bolt hole & PCD not more than 150 mm beyond the tank diameter. Tank support pad with bolt hole shall be suitable for mounting the tank on the necessary support legs / channel provided in the skid or support floor.

Nozzles on top, sideways and bottom heads shall have a flanged faces perpendicular to the vertical centerline of the tank and nozzles on sidewalls shall have flanges faces perpendicular to radial centerlines. Tolerance on angle of

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flange face with respect to tank centerline is  $\frac{1}{2}$  degree. All the nozzles with flange shall be molded integrally with tanks. Flanges shall be off CRS.

The tank shall be continuous filament wound type and there shall be no long seam joint in the cylindrical shell. The entire thickness of the cylindrical shell shall be built up prior to removal of the shell from the mandrel. Necessary baffle plate @ 120 deg apart shall be provided for each tank.

Filament wound reinforced tanks shall be considered. The minimum total laminate thickness of the filament wound tank shall not be less than 6 mm all around and minimum 10 mm for tank flange, flanged top cover, tank bottom corners and all nozzle flanges without exception.

Each tank shall have inlet, outlet, drain, overflow, service water inlet, level indication nozzles etc. Drain & overflow lines shall be minimum one size higher than the pump discharge line size. ALL FLANGE DRILLING SHALL CONFIRM TO ANSI B-16.5, CLASS 150.

Each day tank should be provided with a suitable low level switch with 1NO+1NC contact type for interlock through DCS for remote low level trip of respective pumps. The MOC of the wetted parts of the level switch must be compatible for the respective chemical used. This is not applicable for preparation tank.

Each tank shall be provided with a removable type basket (for dissolving chemical) attached to the inner periphery of the tank. This shall be rigidly fixed with the tank. 6 to 10 mm - holes shall be made on the basket

Each tank shall be equipped with a flanged level indicator / gauge. The gauge shall include two CPVC isolation ball valve, 20 mm dia glass tube and indicator board calibrated in cm.

Resin used for the tanks shall be a commercial-grade corrosion-resistant thermosetting, fully tested and accepted for the severe conditions. All internal surfaces, exposed to chemical, shall be resin rich and the thickness of this inner layer shall be minimum of 2 mm by vinyl ester resin. Isothalic resin shall be used for rest of the thickness lamination. The glass content of inner layer shall be 25 to 30 % by weight. The glass content of filament wound structural layer shall be 55 to 70 % by weight.

Applicable Dosing System name & tank capacity shall be indicated / painted in the respective tanks with black letters (25mm height minimum) on yellow background.

Suitable opening shall also be provided in these tanks to house slow speed mixer as the case may be. The above guide lines shall be followed for day and



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preparation tank. The top cover in these tanks shall be sufficiently rigid enough for mounting the mixers.

### 3.4 SKID FRAME.

A skid shall be fabricated with MS channel and angles as per the approved drawing with good engineering practice. The MS skid shall be suitable to assemble the day & preparation tanks with mixer, dosing pumps with motor, piping system, overflow & drain arrangements etc. The pump mounting elevation and space between pumps shall be suitably designed to facilitate easy operation for flow adjustment, valve operation, maintenance and chemical loading etc.

Preparation tanks shall be located at suitable elevation in the skid near the respective day tank. Necessary interconnecting piping and valves to connect this tank with day tank shall be provided. Necessary supports & clamps for tank, piping etc. Lifting hook arrangement shall also be provided. Painting shall be followed as given in the technical specification elsewhere.

## 3.0 Painting

### 3.5.1 GENERAL

- a) All the Equipment and steel structures shall be protected against external and internal (if any) corrosion by providing suitable painting as described below unless otherwise specified elsewhere. However, the surfaces of stainless steel, Galvanised steel, Gunmetal, brass, bronze, UPVC pipes, HDPE pipes and non-metallic components shall not be applied with any painting.
- (b) All painting shall be carried out in conformity with the paint manufacturer's recommendation.

### 3.5.2 CLEANING AND SURFACE PREPARATION

All the external and internal surfaces to be painted shall be thoroughly cleaned before erection by wire brushing, shot blasting and air blowing. The steel surface to be applied with painting shall be thoroughly cleaned before applying paint by brushing, shot blasting etc as per the agreed procedure.

After all machining, forming and welding has been completed, all steelwork surfaces shall be thoroughly cleaned of rust, scale, welding slag or spatter and other contamination prior to painting.

Surfaces shall be cleaned to requisite surface preparation by one of the methods given below as per technical specification and all dust remaining after cleaning shall be removed.

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Grease or oil contamination shall be removed by either wiping or scrubbing the surface with rags or brushes wetted with white spirit and then wiping down with clean dry cloths. Alternatively emulsifying agents may be used for this purpose.

#### **(a) Manual or hand tool cleaning**

The sequence of operation for manual / hand tool cleaning is as follows:

- 1) Solvent cleaning (if required) will be done to remove oil and grease soluble welding influx residues and salts.
- 2) Surface will be manually cleaned by hand hammering or hand chipping to remove stratified rust (rust Scale).
- 3) Brushing/hand scraping will be done to remove all loose mill scale and no adherent rust.

#### **(b) Blast Cleaning**

The surface of the metal will be blast cleaned to a finish confirming to SA 2 1/2 as per Swedish standard SIS-05-5900 using any of the following methods after removal of grease, oil and contaminants:

- 1) Dry sand blasting
- 2) Shot/grit blasting

### **3.5.3 PROTECTIVE COATING**

As soon as the painting items have been cleaned, within four hours of the subsequent drying, they will be coated with suitable anti-corrosion protection. Immediately after the protective coating all vessels and pipes will be suitably sealed off by discs or caps or approved alternatives to prevent ingress from the surrounds.

No painting or filler shall be applied until all repairs, hydrostatic test and final shop inspection are completed.

All painting works (including surface preparation) on piping or equipment at site shall be commenced only after the required tests have been completed.

Prior to painting, proper care shall be taken to protect nameplates, lettering, gauges, sight glasses, light fittings and similar such items, to ensure that these are in no way defaced or damaged during the work

All primers shall be well marked into the, particularly in areas where pitting is evident, and the first priming coat shall be applied as soon as possible after cleaning. The paint shall be applied as per manufacturer's recommendations.

|                                                                                   |                                                    |                     |
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All paints, when applied in a normal full coat, shall be free from runs, sags, wrinkles, patchiness, brush marks.

**Dry Film Thickness(DFT):** Each coat of paints will be allowed to harden before the next is applied as per manufacturer's recommendation. The requirements for DFT of the paint and materials to be used for different items will be as per the "schedules of finishes indicated below.

### 3.6. PIPING SYSTEM.

All the valves, strainer, interconnecting pipes, pump suction and discharge piping shall be of CPVC industrial grade, PN 16 rating, DIN standard or schedule 80 pipe shall be considered.

Prepared solution transfer pipe line from preparation tank to day tank shall be of 1"(DN 25) size minimum. Isolation valves shall also be 1"(DN 25) size.

The distance of discharge piping from the skid to the process line (dosing point) will vary from 10 to 40 meters based on the site layout. The dosing system design should take care of this. The erection of pipe from skid to dosing point will be carried out by others.

ALL FLANGE DRILLING SHALL CONFIRM TO ANSI B-16.5, CLASS 150.

Applicable bill of quantity, for this requirement, to cover all the system shall be separately offered by the bidder as called in the enquiry. Bidder shall also offer unit rates for pipe, fittings & valves etc., to order for any change in requirement based on detailed engineering. The expected quantity variation will be within + or (–) 20% for each item and will be finalized before order. However any minor variation in requirements shall be taken care by the vendor without any commercial implications after ordering.

A "TEE" connection with isolation valve at pump suction shall be provided by the bidder for fixing calibration column / cylinder for calibration of pumps.

### 3.7 MIXER / AGITATOR

- |                  |                                                                    |
|------------------|--------------------------------------------------------------------|
| i) Type          | : Electrical Operated with mounting flange & SS316 fasteners       |
| ii) Power supply | : 415 volts, 3ph, 50Hz.                                            |
| iii) Speed       | : Bidder to provide low speed mixers, preferably less than 300 rpm |

|                                                                                   |                                                    |                     |
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### 3.8 OTHER REQUIREMENTS

- a. All the interconnecting piping shall be CPVC, industrial grade Schedule 80.
- b. The pipe size shall be minimum of dia 1" (DN 25) for Tank Overflow , Drain, Transfer from Preparation tank to day tank , service water inlet
- c. The drain outlet , common pump discharge outlet , terminal points shall be terminated with mating flanges.
- d. The valves of union type socket end and the O rings shall be of either EPDM or VITON.
- e. All mounting fasteners : SS 316  
(Flanges, tank, pump etc.)
- f. Foundation Bolts : SS 316

Items though not mentioned but needed to make the system complete in all respects as stipulated under these specifications are also to be supplied unless otherwise specifically excluded.

### 3.9 JUNCTION BOX (IF applicable)

Junction Box for termination of contacts of field instruments .Enclosure material shall be of 2 mm Cold rolled sheet steel. Material of Removable gland plate shall be of 3mm Hot rolled sheet steel. Enclosure protection shall be of IP 55 as per IS 13947.

### 3.10 MEASURING INSTRUMENTS.

#### Pressure Gauge:

- Diaphragm seal type
- Dial size shall be of 100 mm.
- End connection shall be 1/2 inch NPT (M).
- Accuracy shall be  $\pm 2\%$  of span or better.

#### Level Gauge

- Transparent tubular type with accuracy of  $\pm 2\%$  of span or better.
- Range shall cover 125% of maximum of scale.
- Length of gauge glass shall not be more than 1400 mm.

#### Rotameter

- In-line rotameter with isolation & bypass valve arrangement.

|                                                                                   |                                                    |                     |
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**Level switches:**

- Magnetic Float type level switch.
- MOC of wetted parts shall be PP (chemical compatible).
- 150% of max design pressure.
- Enclosure shall be weather and dust proof as per IP-55.

**3.11 SPECIFICATION OF INSTRUMENT CABLE: (IF applicable)**

Cables shall be of type FRLS HRPVC SCREENED CONTROL CABLES .  
Cross section area of the conductor shall not be less than 0.5 sqmm. Construction shall be of multistrand and number of strands shall be 7. IS: 1554(Part-I Generally) & IS: 694 (Latest editions and its amendments) shall be applicable.

**4.0 DOCUMENTATION :**

The documentation during bid and post order stage shall meet the following requirements.

1. All documents and drawing shall be submitted in English.
2. Hard copies of all documents and drawings, in English, during bid stage to be submitted in duplicate.
3. Hard copies of all drawing and documents for approval shall be submitted in triplicate.
4. Hard copies of all final documents, drawings, erection manual, O&M manual etc., shall be submitted in bound folder in six.
5. Soft copies of all final documents in MS word / MS in the form of CD – 1 set
6. Soft copies of all final calculations in MS word / MS in the form of CD – 1 set
7. Soft copies of all final drawings in Auto Cad, latest version in the form of CD – 1 set

**5.0 DOCUMENTS / DETAILS ALONG WITH BID**

The following documents/ details shall be submitted along with the bid for scrutiny.

- a. Duly filled up data sheet for each dosing system, in Annexure-1 & 2 enclosed.
- b. Catalogues & typical drawings indicating system arrangement, dimensional details, Material of constructions etc.
- c. Typical Performance curve for each model of the offered pump for the operating pressure range (design to minimum).
- d. Typical Quality plan for supply of the above equipment.
- e. Reference list
- f. Unpriced commercial offer on the scope of supply as per BHEL spec. (Note – 3).

|                                                                                   |                                                    |                     |
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- g. All the documents called for in the motor specification
- h. Bidder to provide confirmation regarding the compatibility of the offered wetted parts MOC for the medium handled for all systems.
- e. Civil requirements.
- i. In case of any deviation, the Bidder shall indicate the deviation, clause by clause in the deviation format attached in Annexure-2. If there is no deviation "NIL" statement shall be furnished. In the absence of Annexure-2, it will be construed that the bid confirms strictly to the specification. Acceptance or rejection of the offer with or without deviations (either fully or partially) is sole discretion of the purchaser without seeking further clarification from the bidder.

Note: 1. Bidders to note that failing to submit the above documents, the bid shall be considered as incomplete and liable for rejection.

Note: 2. Bidder to confirm in their offer that the details called in Section 6.0 will be provided after order.

Note: 3. Bidder should provide offer for all the dosing systems as called in the spec. They should also provide price break up for each dosing system, piping system spares etc. If the offer is not for all the dosing systems, it will not be considered for evaluation.

## 6.0 DOCUMENTS AFTER ORDER:

6.1 The following documents / Drawings shall be furnished for BHEL / customer approval.

- i) Duly filled up data sheet Annexure-1 enclosed.
- ii) Quality plan for supply of the above equipment in BHEL format (format will be provided after order).
- iii) General arrangement drawings with dimension for pump, tank & accessories
- iv) Dosing/Injection head details.
- v) Cross sectional drawings.

6.2 The following documents/Drawings are to be furnished for BHEL / customer review and acceptance.

- i) Performance test report for flow Vs design pressure and flow Vs minimum pressure for each pump. The pump shall be tested at 25%, 50% & 100 % of the stroke length. The verification / inspection of test results shall be carried out for one pump of each model in the presence of BHEL inspector or BHEL's authorized inspector.
- ii) Performance guarantee certificate

|                                                                                   |                                                    |                     |
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iii) Erection and O&M manuals.

iv) List of despatch details for each system as per BHEL format (format will be provided after order).

Note: Purchase order number & Material code shall be marked / indicated in the system painted / tagged at suitable location for identification of components at site before dispatch.

## 7.0 INSPECTION

By BHEL's inspector or BHEL's authorized representative at Vendor's works.

## 8.0: PACKING & FORWARDING

8.1 The Dosing systems assembly shall be packed properly by the vendor, before despatch to ensure safe transportation without any damages.

8.2 The material shall be despatched to site as per shipping list along with complete BOQ approved by BHEL. The shipping list format & QP formats, etc will be given after order.

8.3 All the loose items shall be numbered , detailed in packing slip and shall be sent in closed wooden box with proper packing inside.

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Annexure-1

BHEL Enquiry / P.O. Reference No. & Date:

### EQUIPMENT DATA SHEET

#### I. TECHNICAL PARAMETERS

##### IA. PUMP

- a. Name of Chemical dosing system :
- b. Make & Model no :
- c. Type :
- d. Flow -Design / Min / Max LPH : / /
- e. Disch. Pr. -Design / Min / Max Kg/cm<sup>2</sup> : / /
- f. Stroke length mm :
- g. Speed Min / Max SPM :
- h. Stroke adjustment Min / Max % :
- i. Steady state accuracy (cl.3.1.b) % :
- j. Repeatability (Cl.3.1.c) % :
- k. Flow accuracy (Cl.3.1.d) % :
- l. Power Supply Details V/Ph/Hz :  
-Variation in % V/Ph/Hz :  
-Power consumption Watt :
- m. Material of construction :  
-Dosing Head :  
-Fittings :  
-Valve balls in the pump :  
-Spring in injection head :  
-Tubing :  
-Mounting fasteners :  
-Other Wetted parts :
- n. Normal operating life at design capacity :  
-Diaphragm Hrs :  
-Ceramic balls Hrs :



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- o. Pump overall size L,W,H :
- p. Pump weight Kg :
- q. Tube size at Suction / Discharge Inches : /  
- Pressure rating at 20 deg C :
- r. Pump control Manual / Automatic :
- s. Type of control - Stepper motor / Others :

## II. DAY TANK / PREPARATION TANK DAY TANK

## PREPARATION TANK

- a. Capacity ltrs :
- b. Size - Dia & Height mm :
- c. Tank thickness – Shell /Bottom /Top mm :
- d. Baffle plate size & quantity :
- e. Material of construction  
- Tank & Cover :  
- Level indicator :  
- Interconnecting valves & piping :
- f. Type & make of level switch :
- g. Level Indicator make & details :
- h. Colour of the Tank :
- i. Weight of tank with lid :
- j. Type of resin used for FRP tank & cover : Inner :  
Outer :

|                                                                                   |                                                    |                     |
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| III. MIXER (if applicable)                                                          |                | DAY TANK | PREPARATION TANK |
|-------------------------------------------------------------------------------------|----------------|----------|------------------|
| a. Make& Type                                                                       | :              |          |                  |
| b. Material of construction                                                         | :              |          |                  |
| - Impeller                                                                          | :              |          |                  |
| - Shaft                                                                             | :              |          |                  |
| - Protective coating                                                                | :              |          |                  |
| c. Shaft                                                                            | Dia x Length : |          |                  |
| d .Impeller                                                                         | Dia :          |          |                  |
| e. Impeller speed                                                                   | rpm :          |          |                  |
| f. Make of gear reducer                                                             | :              |          |                  |
| g. Model No                                                                         | :              |          |                  |
| IV. MOTOR (AC) particulars                                                          |                |          |                  |
| 1. Dosing pump motor                                                                |                |          |                  |
| i) Application                                                                      | :              |          |                  |
| ii) Type                                                                            | :              |          |                  |
| iii) Frame size                                                                     | :              |          |                  |
| iv) Manufacturer                                                                    | :              |          |                  |
| v) Rated output in KW                                                               | :              |          |                  |
| vi) At rated Voltage and frequency                                                  | :              |          |                  |
| a) Full load current (Amps)                                                         | :              |          |                  |
| b) Rated speed                                                                      | :              |          |                  |
| c) Full load efficiency                                                             | :              |          |                  |
| d) Full load power factor                                                           | :              |          |                  |
| vii) No load current in Amps.                                                       | :              |          |                  |
| viii) Controller input / output signal for<br>flow adjustment for auto pumps in mA: |                |          |                  |
| ix) Type of mounting and shaft<br>Orientation                                       | :              |          |                  |

|                                                                                   |                                                    |                     |
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#### IV. MOTOR (AC) particulars

##### 2. Mixer motor

- i) Application :
  - ii) Type :
  - iii) Frame size :
  - iv) Manufacturer :
  - v) Rated output in KW :
  - vi) At rated Voltage and frequency :
    - a) Full load current (Amps) :
    - b) Rated speed :
    - c) Full load efficiency :
    - d) Full load power factor :
  - vii) No load current in Amps. :
  - viii) Controller input / output signal for  
flow adjustment for auto pumps in mA:
  - ix) Type of mounting and shaft  
Orientation :
- V. Pressure gauge make :
- Model number :
- Type :
- VI. Pressure relief valve make :
- Model number :
- VII. Calibration Cylinder MOC :
- Capacity :
- VIII. Level gauge make :
- Model number :
- Type :
- IX. Level Switch make :
- Model number :
- Type :
- X. In-line Rotameter make :
- Model number :

|                                                                                   |                                                    |                     |
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|---------------------------------------------------|-------|--|--|--|--|
| IV. GENERAL                                       |       |  |  |  |  |
| Material Code                                     | Unit  |  |  |  |  |
| Dosing system description                         |       |  |  |  |  |
| Pump Model No.                                    |       |  |  |  |  |
| Pump operation                      Auto / Manual |       |  |  |  |  |
| Pump Qty / system                                 | Nos.  |  |  |  |  |
| Injection Head / system                           | Nos.  |  |  |  |  |
| Suction Strainer"Y-type" / system                 | Nos.  |  |  |  |  |
| Pressure relief valve / System                    | Nos.  |  |  |  |  |
| Pressure gauge - diaphragm type / System          | Nos.  |  |  |  |  |
| Day tank / system                                 | Nos.  |  |  |  |  |
| Preparation tank / system                         | Nos.  |  |  |  |  |
| Fume absorbers / system                           | Nos.  |  |  |  |  |
| Mixer assembly / system                           | Nos.  |  |  |  |  |
| Low level switch / system                         | Nos.  |  |  |  |  |
| No. of skids / system                             | Nos.  |  |  |  |  |
| Skid size L / B / H                               | Metre |  |  |  |  |
| MOC of skid                                       |       |  |  |  |  |
| Pr. rating of CPVC pipes & valves                 |       |  |  |  |  |
| Make of piping                                    |       |  |  |  |  |
| Make of valves                                    |       |  |  |  |  |
| Pump suction / disch. pipe size                   | Nos.  |  |  |  |  |
| Weight of skid assembly                           | kgs   |  |  |  |  |
| Drawing No. – Pump                                |       |  |  |  |  |
| Drawing No. – Mixer                               |       |  |  |  |  |
| Drawing No. – Day tank / Prpn                     |       |  |  |  |  |

|                                                                                   |                                                    |                     |
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|                              |  |  |  |  |  |
|------------------------------|--|--|--|--|--|
| tank                         |  |  |  |  |  |
| Drawing No. – skid assembly  |  |  |  |  |  |
| Drawing No. – General Arrgt. |  |  |  |  |  |

## ANNEXURE 2

### TECHNICAL DEVIATIONS

| Sl. No | Section no. | Clause No. | Page / No. | Specification | Statement of Deviations/variatioins | Reason for Deviation | cost of withdrawal |
|--------|-------------|------------|------------|---------------|-------------------------------------|----------------------|--------------------|
|        |             |            |            |               |                                     |                      |                    |
|        |             |            |            |               |                                     |                      |                    |
|        |             |            |            |               |                                     |                      |                    |
|        |             |            |            |               |                                     |                      |                    |
|        |             |            |            |               |                                     |                      |                    |
|        |             |            |            |               |                                     |                      |                    |

Date:

Signature & seal of the Bidder



**SPECIFICATION FOR ELECTRICAL  
CONTROL & INSTRUMENTATION**

**SPEC. NO.: ROS 4177**

**REV. NO: 00**

**BHARAT HEAVY ELECTRICALS LIMITED,**

**RANIPET- 632 406.**

**SPECIFICATION**

**FOR**

**ELECTRICAL CONTROL & INSTRUMENTATION FOR DOSING SYSTEM**

**(Applicable For Kilwa Project)**

|        |          |                        |                        |                        |             |
|--------|----------|------------------------|------------------------|------------------------|-------------|
|        |          |                        |                        |                        |             |
|        |          |                        |                        |                        |             |
|        |          |                        |                        |                        |             |
|        |          |                        |                        |                        |             |
|        |          |                        |                        |                        |             |
| 00     | 08.07.17 | MKV <i>[Signature]</i> | MKV <i>[Signature]</i> | VNS <i>[Signature]</i> | Fresh issue |
| Rev.No | Date     | Prepared               | Checked                | Approved               | Remarks     |

|                                                                                  |                                                                       |                            |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------|----------------------------|
|  | <b>SPECIFICATION FOR ELECTRICAL<br/>CONTROL &amp; INSTRUMENTATION</b> | <b>SPEC. NO.: ROS 4177</b> |
|                                                                                  |                                                                       | <b>REV. NO: 00</b>         |

## **SPECIFICATION FOR MOTORS**

### **Design Margin Criteria**

The drive motor rating shall be selected such that a minimum margin requirement is available over the pump input power required at the rated duty point. However, motor rating shall not be less than the maximum power required by the pump at any point on the curve including the run-off condition.

- 25% upto 18.5KW,
- 15% for 22-55KW,
- 10% for above 75 KW

### **1.0.0 APPLICABLE CODES AND STANDARDS**

- IEC 60034 : Specification for rotating machines.
  - IEC 60079 : Electrical apparatus for Explosive gas atmospheres
  - ANSI/UL-674 : Electric Motors and Generators for use in Hazardous location, Class-I Groups C & D, Class-II, Groups E, F & G.
- Motors shall also confirm to other applicable standards amended up to date.

## **2.0.0 TECHNICAL REQUIREMENTS**

### **2.1.0 Motors Design Features**

1. All AC motors shall be squirrel cage three phase/ single phase induction motors. All motors shall be rated for continuous duty except for crane motors be rated for intermittent duty.
2. The motor rating shall be at least 10% over the maximum input power requirement of the driven equipment at rated point.
3. Motors shall be of High efficiency type (IE3) with high power factor.
4. Power supply for AC motors shall be as follows:
  - Below 0.2 kW : 230 V, 1 Phase, 50 Hz.
  - From 0.2 kW and upto 200 kW : 415 V/400 V,  $\pm 10\%$ , 50Hz,  $\pm 5\%$ , 3phase, 4 wire effectively earthed
5. Motors shall be capable of delivering the rated output with supply voltage variation of  $\pm 10\%$  and frequency variation of  $\pm 5\%$  and absolute sum of 10%.
6. The motor characteristics shall match the requirements of the driven equipment so that adequate starting, accelerating, pull up, breakdown and full load torques are available for the intended service.
7. Squirrel cage induction motors shall be designed for direct on line starting. Starting current shall be as specified in the IEC 60034.
8. The motor shall be capable of withstanding the stresses imposed if started at 110% rated voltage. Motor shall start with rated load and accelerate to full speed with 80% rated voltage at motor terminals. Permissible number of starts per hour for continuous duty motors shall be as follows.
  - No. of hourly startups uniformly distributed, starting from final steady working temperature (Hot) - Three.
  - No. of consecutive startups with initial temperature of motor at final steady working temperature (Hot)- Two
9. Motors subject to reverse rotation shall be designed to withstand the stresses encountered when starting with non-energized shaft rotating at 125% of rated speed in reverse direction.
10. The locked rotor withstand time under hot condition at 110% rated voltage shall be more than motor starting time by at least 2.5 seconds for motors with 20 seconds starting time and by 5 seconds for motor with more than 20 seconds starting time. Starting time shall be at the minimum permissible voltage of 80% rated voltage.

|                                                                                  |                                                                       |                            |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------|----------------------------|
|  | <b>SPECIFICATION FOR ELECTRICAL<br/>CONTROL &amp; INSTRUMENTATION</b> | <b>SPEC. NO.: ROS 4177</b> |
|                                                                                  |                                                                       | <b>REV. NO: 00</b>         |

## 2.2.0 Motor Constructional details

1. All Motors located indoor & outdoor shall have IP 55 degree of protection for the enclosure. For vertical mounted outdoor motors a Canopy shall be provided.
2. The motors shall generally be of self ventilated type totally enclosed fan cooled (TEFC).
3. The winding for all the motors shall be of super enameled copper wire of suitable gauge or copper strip conductor depending on its rating. All motors shall be class F insulated limiting temperature rise to class B limit.
4. The windings, fittings and hardware shall be corrosion resistant. The windings shall be tropicalised and shall be impregnated to make them non-hygroscopic and oil resistant. Main insulation and inter turn insulation of Motors shall be capable of withstanding switching surges as per IEC 34, Part 15.
5. Motors of rating 30 kW and above shall be provided with space heaters, suitably located for easy removal or replacement. The space heater shall be rated for 230 V, single phase, 50 Hz, and sized to maintain the motor internal temperature above dew point when the motor is idle.
6. Motor shall be provided with antifriction bearings, unless sleeve bearings are required by the motor application. Vertical shaft motors shall be provided with thrust and guide bearings. Thrust bearing of tilting pad type are preferred.
7. Bearings shall be provided with seals to prevent leakage of lubricant or entrance of foreign matters like dirt, water etc. into the bearing area.
8. Motor terminal boxes shall be provided with a detachable extension box (cable core splitter box). Terminal box shall be capable of being turned 360° in steps of 90°, unless otherwise approved. The terminal boxes shall be split type with removable cover with access to connections and shall have the same degree of protection as motor. The terminal box shall have sufficient space inside for termination/connection of cables.
9. Terminals shall be of stud type, substantially constructed and thoroughly insulated from the frame. The terminals shall be clearly identified by phase markings, with corresponding direction of rotation marked on the non-driving end of the motor. The terminal box shall be capable of withstanding maximum system fault current for 0.25 sec for all breaker operated motors and shall be provided with explosion vent. However for contactor operated motors, the terminal box shall be capable of withstanding fault current for let through time of the fuse/MCCB/MCB preceding it.
10. All accessory equipment such as space heater temperature detector, etc., shall be wired and terminated in a enclosure, separate from motor (power) terminal box. The degree of protection for accessory terminal box shall be same as that of motor. Terminal box shall be complete with double compression brass glands and stud type terminals and shall be suitably mounted on the side of the motor. If possible, the accessory terminal boxes shall be located on the same side of the motor as the main (power) terminal box.
11. The noise level and vibration limits shall not exceed the limits specified in relevant IEC standards.
12. The frame of each motor shall be provided with two separate and distinct grounding pads complete with tapped hole, GI bolts and washer. The cable terminal box shall have a separate grounding terminal.



|                                                                                  |                                                                       |                            |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------|----------------------------|
|  | <b>SPECIFICATION FOR ELECTRICAL<br/>CONTROL &amp; INSTRUMENTATION</b> | <b>SPEC. NO.: ROS 4177</b> |
|                                                                                  |                                                                       | <b>REV. NO: 00</b>         |

13. The grounding connection shall be suitable for accommodation of following sizes of earthing materials.

- LT motors rated above 90KW : 150 sq.mm Cu.
- Motors above 30kW and up to & including 90kW : 95 sq.mm Cu.
- Motor Cable Terminal box, LPB station : 10 sq.mm Cu.

#### **AUTO STROKE CONTROL (As specified for dosing pumps in General Mechanical section)**

The stroke control mechanism shall be able to adjust the stroke of dosing pump/vary the dosing rate as per the input signal from PLC/DCS. In addition, the operating dosing rate has to be transmitted back to PLC/DCS.

Input signal: 4-20mA (isolated 2 wire) for receiving auto stroke command

Output signal: 4-20mA (isolated 2 wire) for actual dosing rate FB to PLC

#### **PRESSURE INSTRUMENTATION (Pressure gauges & Pressure switches)**

Pressure gauges will be generally 150mm dial, solid front safety case type with blowout back, 1/2" NPT bottom connection, drawn stainless steel case, 316SS bourdon and socket, stainless steel movement, micrometer pointer. Pulsation dampers are to be provided for dosing services. Liquid filled gauges shall be used for all dosing pump discharges firmly fitted with supports within the skid. For chemical dosing pressure gauges, chemical seal diaphragms to be provided.

#### **LEVEL INSTRUMENTATION (Level gauges & Level switches)**

a. Transparent gauge glasses will be used for low-pressure applications. Transparent or reflex gauges will be used for high-pressure applications. All gauge glasses will be equipped with gauge valves, FRP C frame support including a safety ball check. Level gauges are to be firmly fitted with supports within the skid with cushion supports to avoid breakage/damage.

b. Level switches shall generally be cage float / Displacer type, with min 2 NO +2 NC contacts. Wherever level switches are required to function in mixer tanks, perforated still well arrangement is to be provided. Level switches are to be fitted on to respective flange on dosing tank with gaskets and fasteners. MOC of wetted parts shall be suitable for the fluid being handled and shall preferably be PP/ CPVC/ PVDF/ PTFE. Side mounted level switches are not suitable and bidder to offer top mounted type level switches only.

#### **FLOW INSTRUMENTATION (Flow gauges)**

Variable area flow indicators to be provided at the common outlet header of dosing skid with isolation and bypass valves. The MOC selected shall be suitable for the fluid being dosed as the maximum pressure available at the dosing pump. Flow gauges are to be firmly fitted with supports within the skid with isolation and bypass valves.

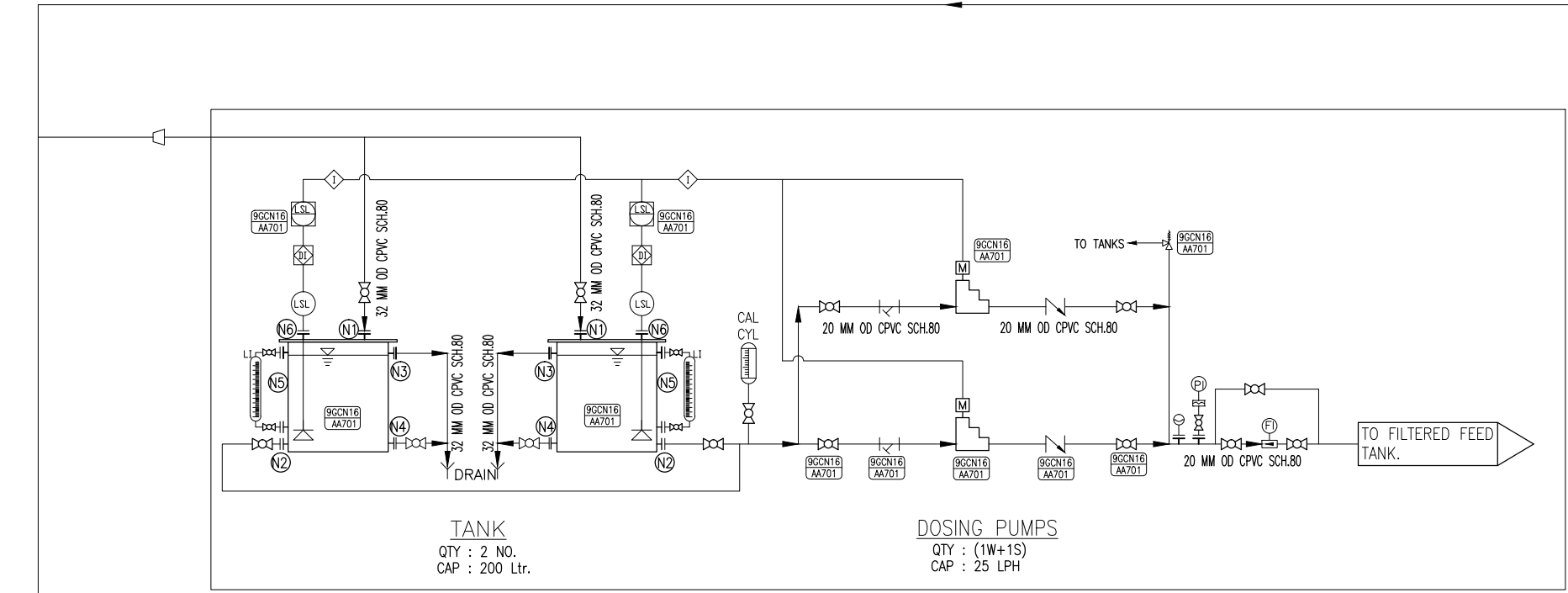
#### **3.0 Mandatory spares for Motors**

Please refer Mechanical Specification.

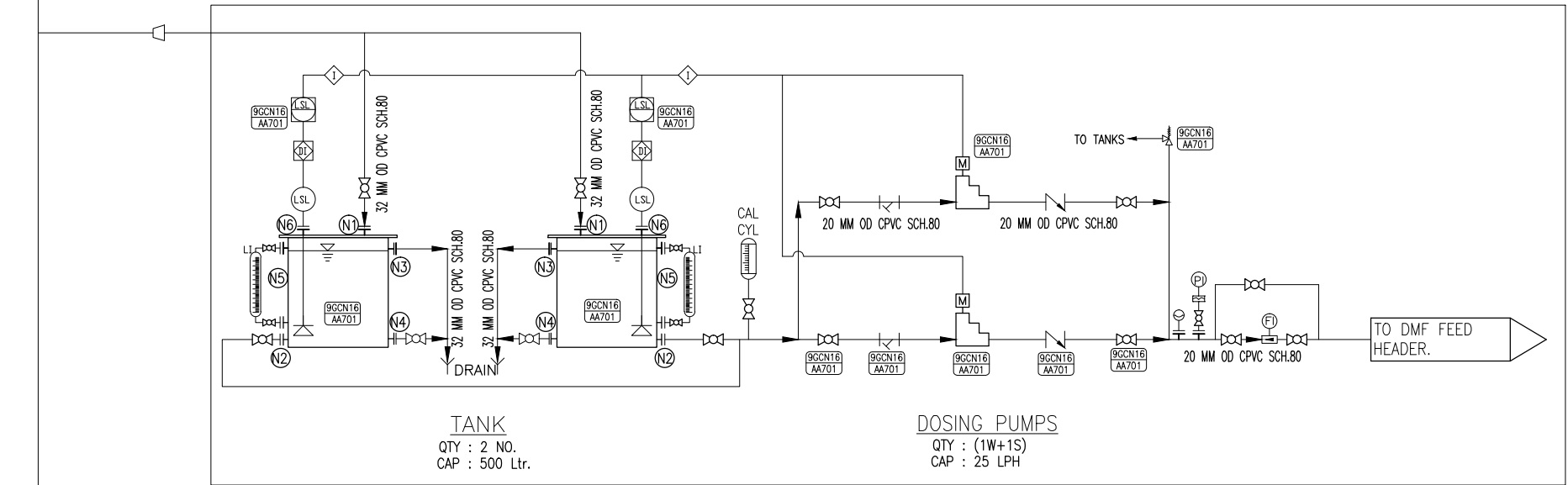
#### **4.0 Mandatory spares for Instruments**

Please refer Mechanical Specification.

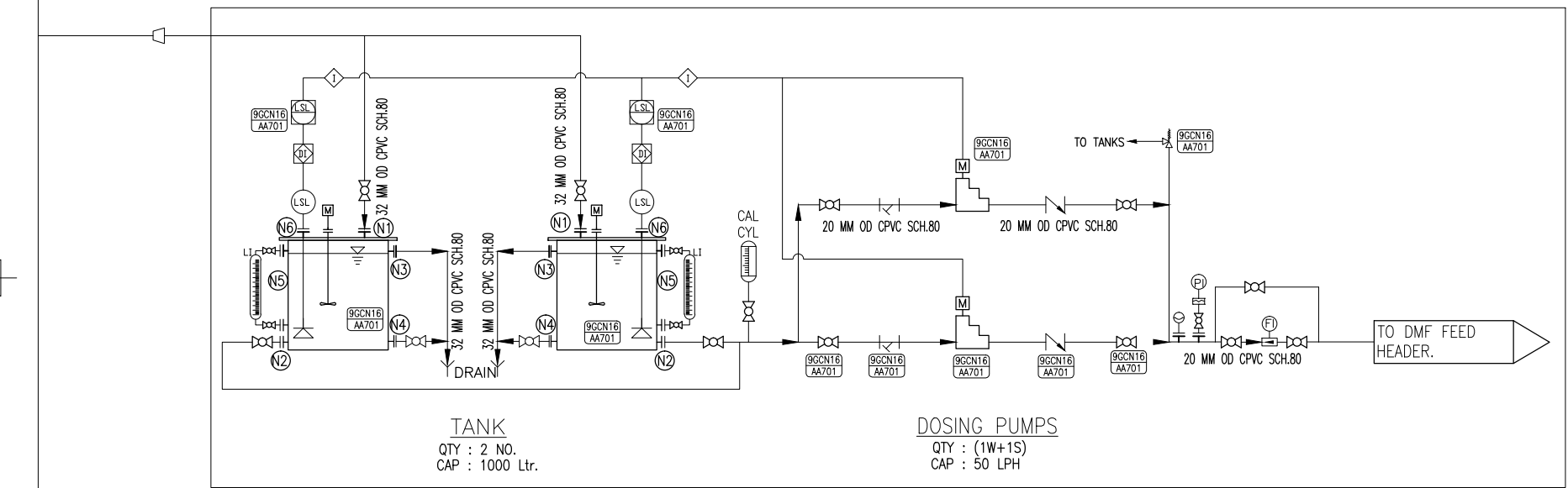
DRG. NO. 1-WT-030-01052



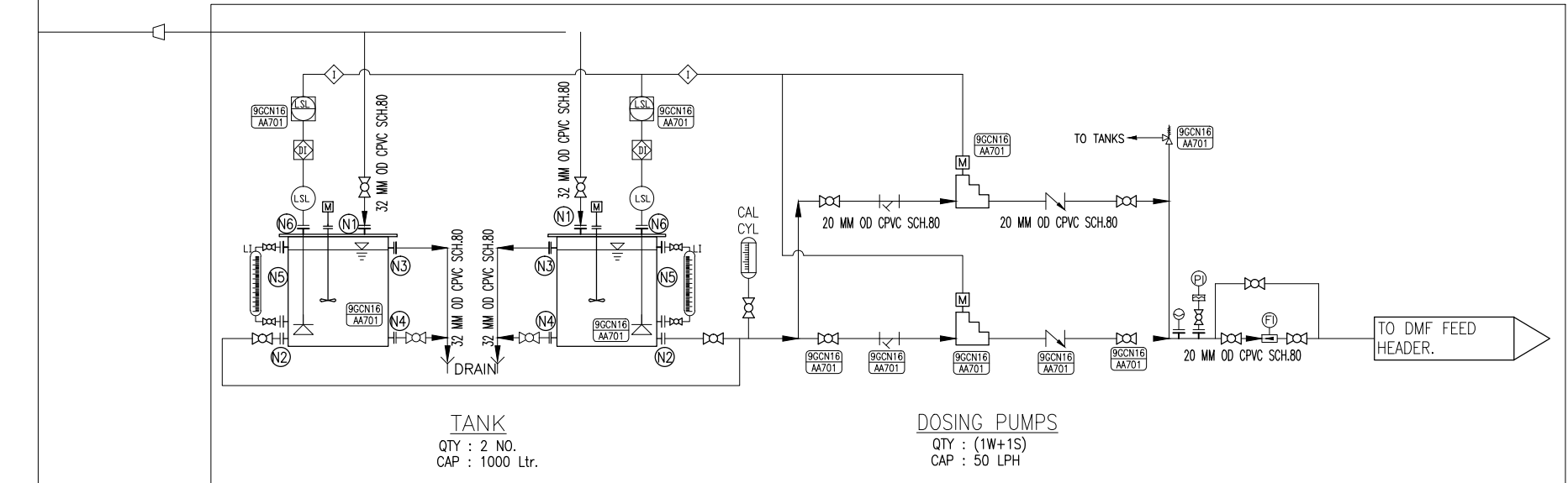
NaOCl Dosing Skid (PWS)



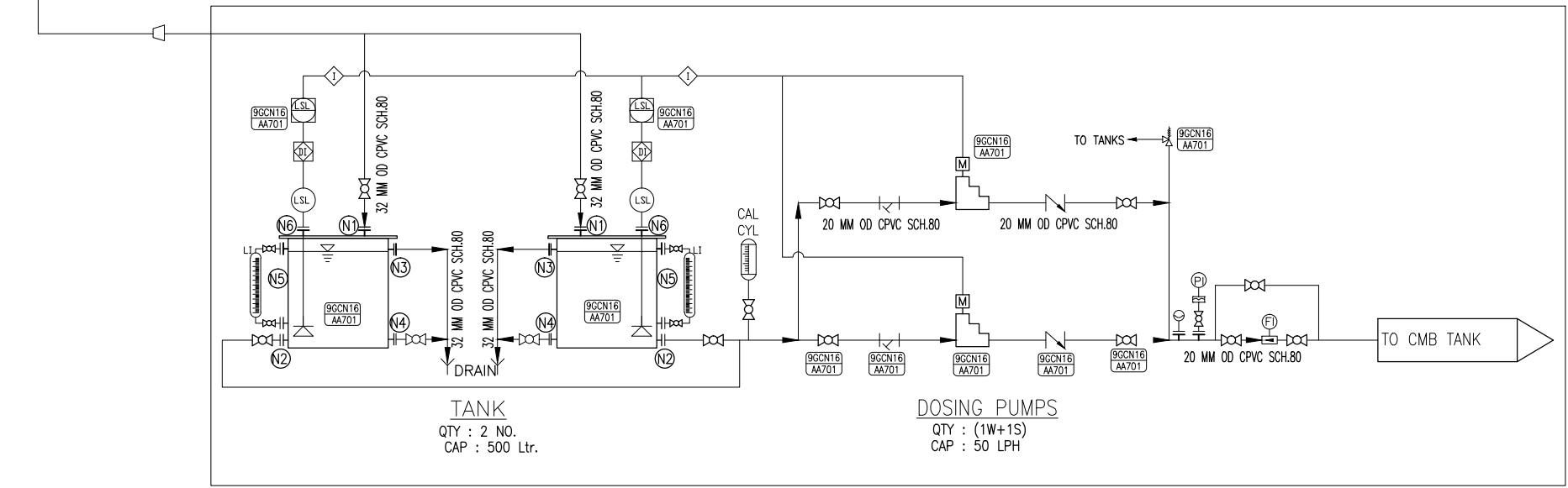
HCL Dosing Skid (PWS)



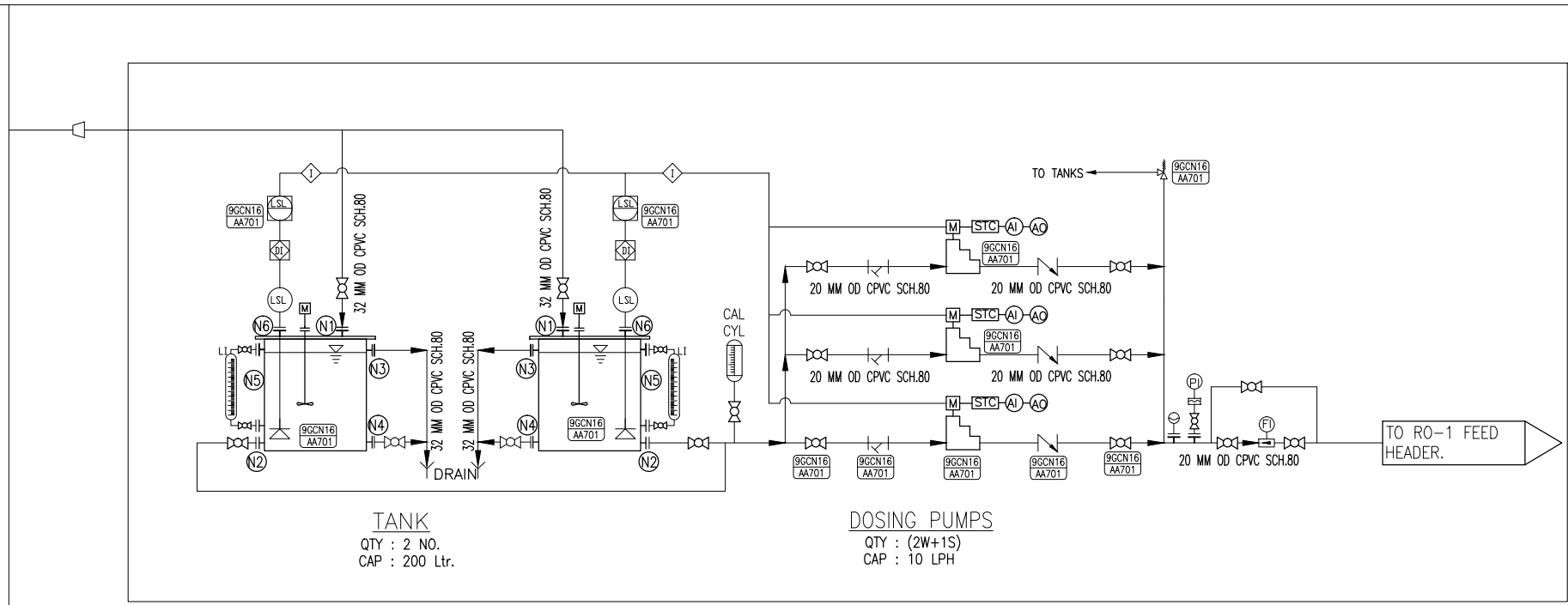
Coagulant Dosing Skid (PWS)



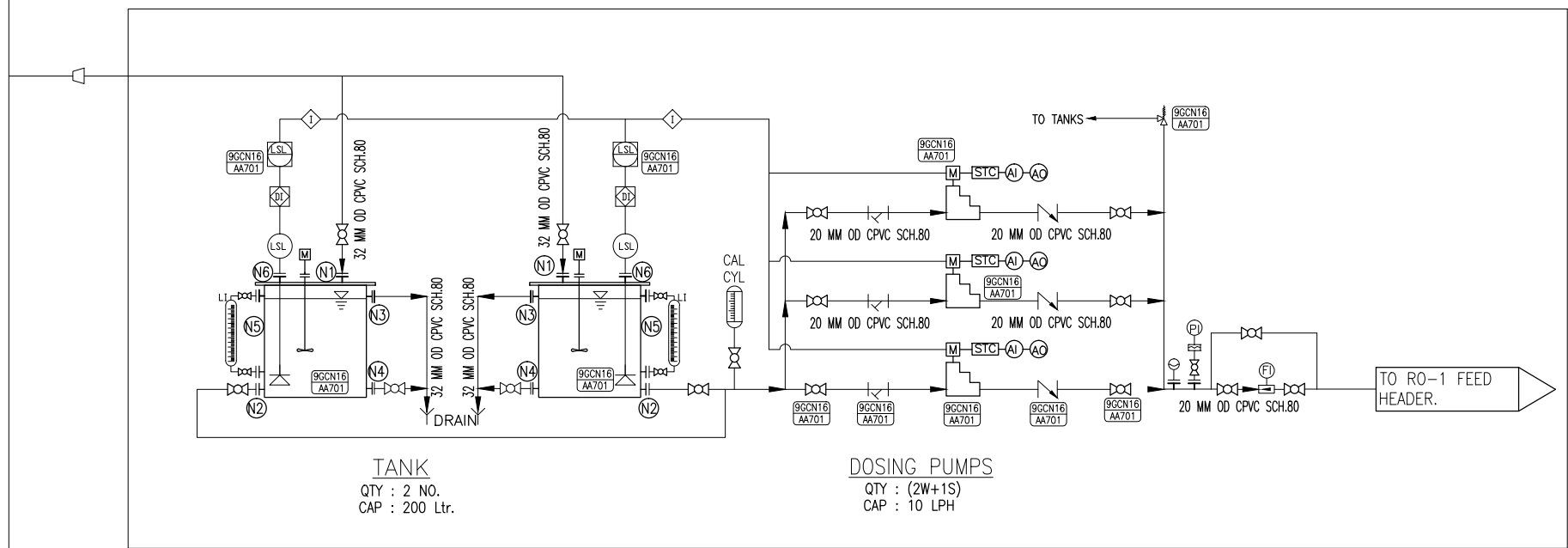
Coagulant Aid Dosing Skid (PWS)



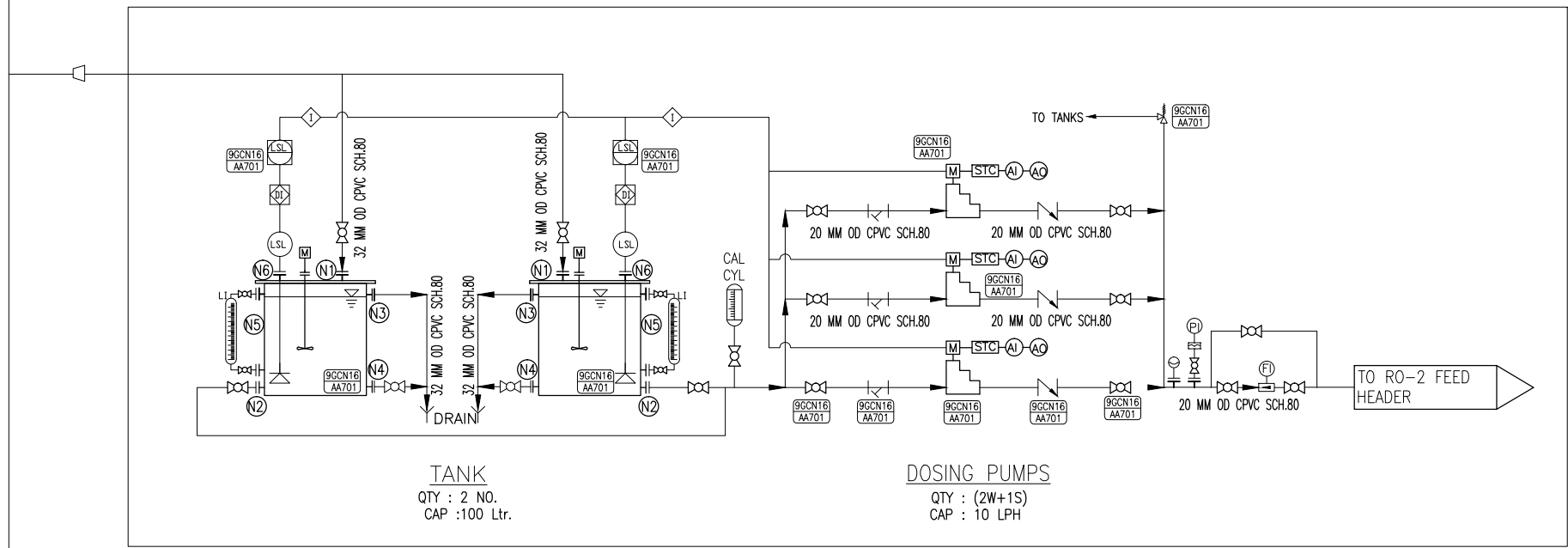
HCL Dosing Skid (ETP-CMB)



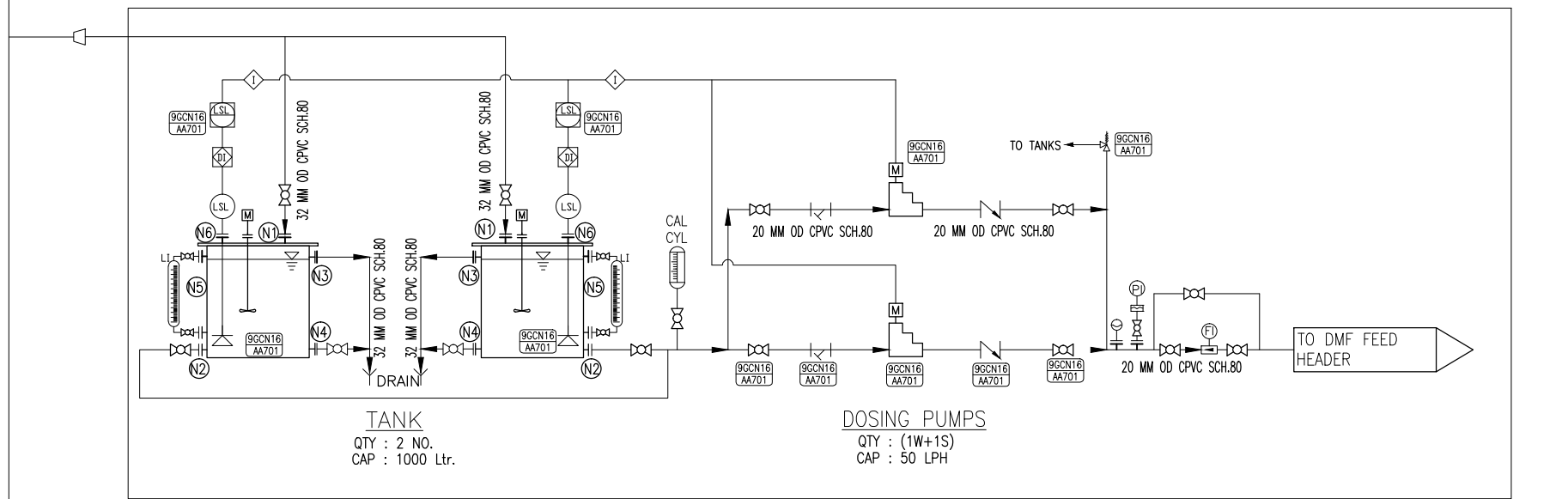
Antiscalant Dosing Skid (RO-PWS & ETP)



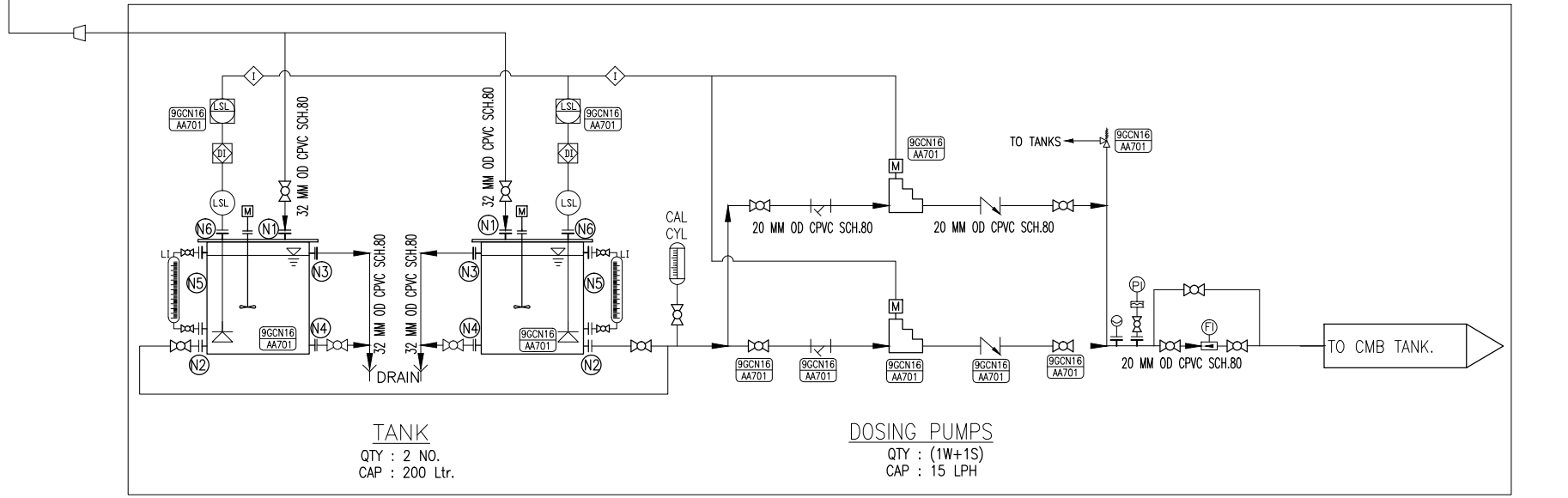
De-chlorination Dosing Skid (RO-PWS & ETP)



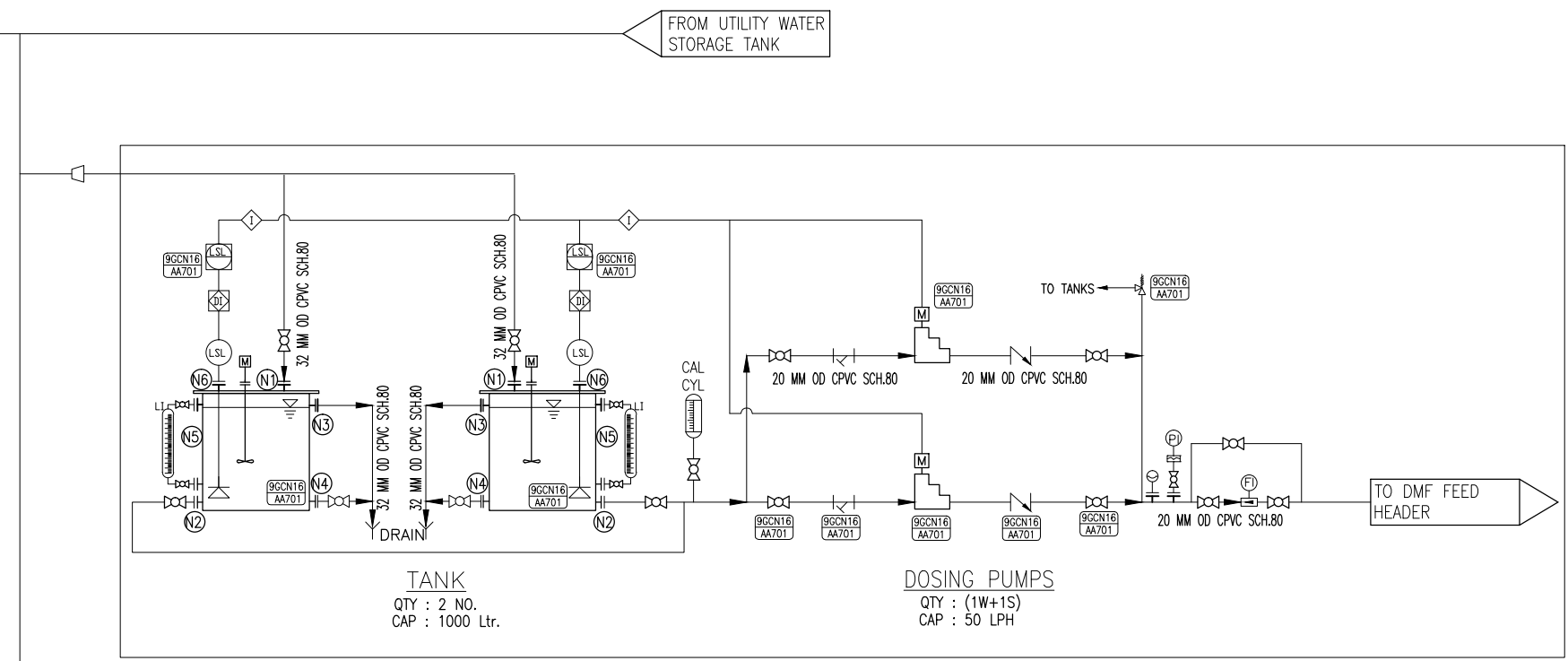
NaOH Dosing Skid (RO-PWS)



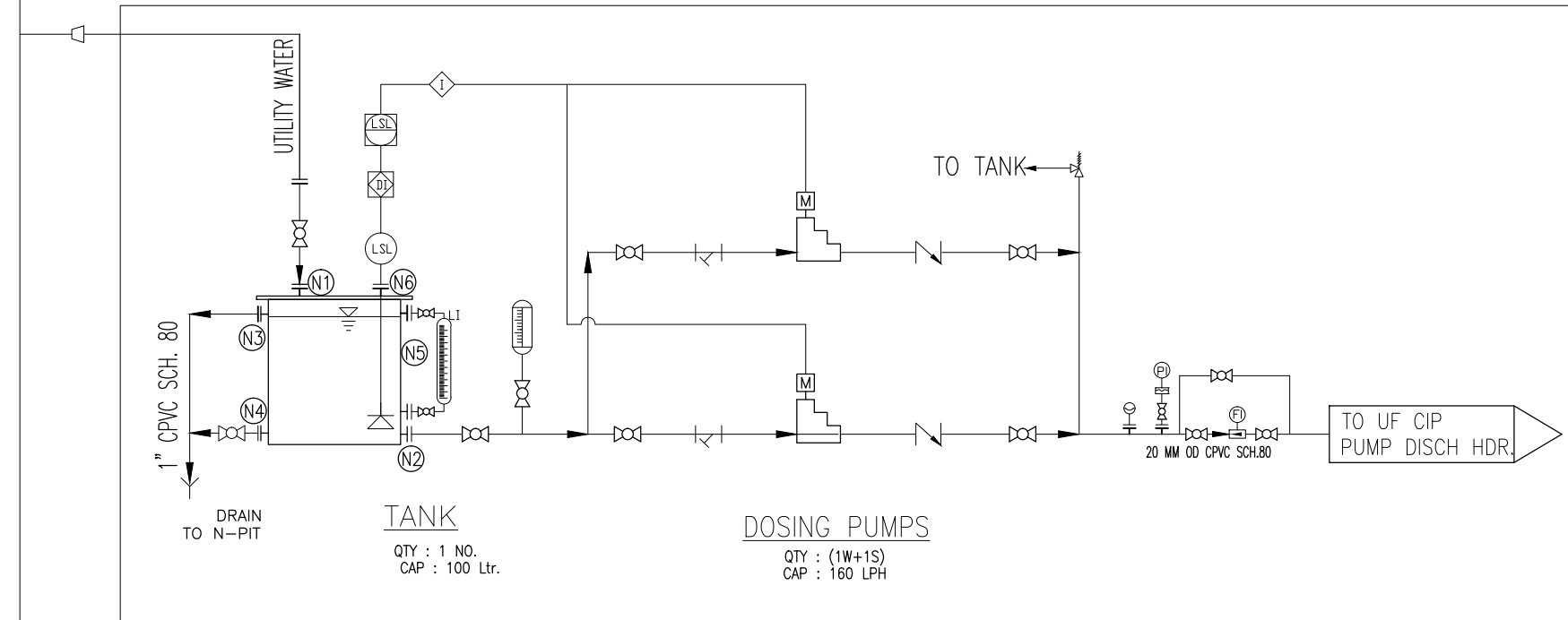
Coagulant Dosing Skid (ETP)



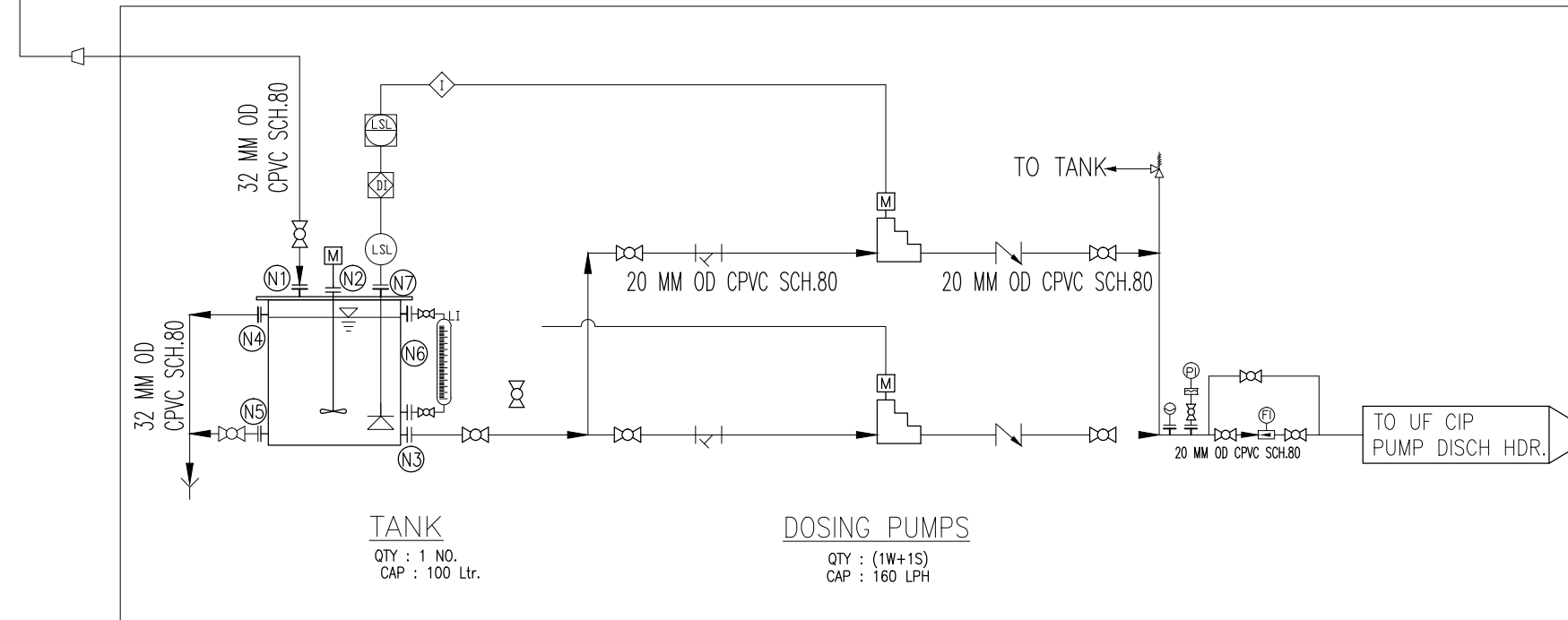
NaOH Dosing Skid (ETP-CMB)



Coagulant Aid Dosing Skid (ETP)



NaOCl Dosing Skid (UF CIP)  
(FOR PWTS & ETP)



Citric Acid Dosing Skid (UF CIP)  
(FOR PWTS & ETP)

LEGEND :

- FRP CLOSED TANK
- MOTORIZED MIXER
- DOSG. PUMP & MOTOR ASSY
- BALL VALVE
- NON RETURN VALVE
- PRESSURE RELIEF VALVE
- 'Y' TYPE STRAINER
- FLOW INDICATOR
- CHEMICALLY SEALED DIAPHRAGM
- PULSATING DAMPNER
- PRESSURE INDICATOR
- LEVEL INDICATOR
- LEVEL SWITCH

FOR TENDER PURPOSE

|             |                                                              |                                                               |          |
|-------------|--------------------------------------------------------------|---------------------------------------------------------------|----------|
| CUSTOMER:   |                                                              | KILWA ENERGY COMPANY LIMITED                                  |          |
| CONSULTANT: |                                                              | FICHTNER CONSULTING ENGINEERS (INDIA) PVT. LTD. -CHENNAI      |          |
| PROJECT:    |                                                              | 1x371.2MW NATURAL GAS BASED COMBINED CYCLE POWER PLANT, KILWA |          |
| BH&P        | BHARAT HEAVY ELECTRICALS LTD. UNIT: BOILER AUXILIARIES PLANT |                                                               |          |
|             | NAME                                                         | SIGN                                                          | DATE     |
|             | DRN. D.BALARAJU                                              | sd/-                                                          | 08.07.17 |
|             | CHD. P.PALANI                                                | sd/-                                                          | 08.07.17 |
|             | APPD. MN RAJAN                                               | sd/-                                                          | 08.07.17 |

BOQ FOR INSTRUMENTS FOR  
DOSING SYSTEM

| BILL OF QUANTITY FOR INSTRUMENTS IN BIDDER SCOPE.            |                                                                                   |        |              |
|--------------------------------------------------------------|-----------------------------------------------------------------------------------|--------|--------------|
| PROJECT: KILWA TANZANIA                                      |                                                                                   |        |              |
| PACKAGE: DOSING SYSTEM (PWTS & ETP)                          |                                                                                   |        |              |
| S.NO                                                         | DESCRIPTION                                                                       | LEGEND | QTY          |
| <b>NAOCL DOSING SKID (PWS)</b>                               |                                                                                   |        |              |
| 1                                                            | Level Indicator with isolation ball Valve at Tank                                 | LI     | 2NO PER SKID |
| 2                                                            | Level Switch low at tank Top mounted                                              | LSL    | 2NO PER SKID |
| 3                                                            | Pressure Indicator with isolation Ball valve at dosing Pump Common Discharge Line | PI     | 1NO PER SKID |
| 4                                                            | Flow Indicator with isolation Ball valve to Filtered feed tank                    | FI     | 1NO PER SKID |
| <b>HCL DOSING SKID (PWS)</b>                                 |                                                                                   |        |              |
| 1                                                            | Level Indicator with isolation ball Valve at Tank                                 | LI     | 2NO PER SKID |
| 2                                                            | Level Switch low at tank Top mounted                                              | LSL    | 2NO PER SKID |
| 3                                                            | Pressure Indicator with isolation Ball valve at dosing Pump Common Discharge Line | PI     | 1NO PER SKID |
| 4                                                            | Flow Indicator with isolation Ball valve to Filtered feed tank                    | FI     | 1NO PER SKID |
| <b>COAGULANT DOSING SKID (PWS)</b>                           |                                                                                   |        |              |
| 1                                                            | Level Indicator with isolation ball Valve at Tank                                 | LI     | 2NO PER SKID |
| 2                                                            | Level Switch low at tank Top mounted                                              | LSL    | 2NO PER SKID |
| 3                                                            | Pressure Indicator with isolation Ball valve at dosing Pump Common Discharge Line | PI     | 1NO PER SKID |
| 4                                                            | Flow Indicator with isolation Ball valve to Filtered feed tank                    | FI     | 1NO PER SKID |
| <b>COAGULANT AID DOSING SKID (PWS)</b>                       |                                                                                   |        |              |
| 1                                                            | Level Indicator with isolation ball Valve at Tank                                 | LI     | 2NO PER SKID |
| 2                                                            | Level Switch low at tank Top mounted                                              | LSL    | 2NO PER SKID |
| 3                                                            | Pressure Indicator with isolation Ball valve at dosing Pump Common Discharge Line | PI     | 1NO PER SKID |
| 4                                                            | Flow Indicator with isolation Ball valve to Filtered feed tank                    | FI     | 1NO PER SKID |
| <b>HCL DOSING SKID (ETP-CMB)</b>                             |                                                                                   |        |              |
| 1                                                            | Level Indicator with isolation ball Valve at Tank                                 | LI     | 2NO PER SKID |
| 2                                                            | Level Switch low at tank Top mounted                                              | LSL    | 2NO PER SKID |
| 3                                                            | Pressure Indicator with isolation Ball valve at dosing Pump Common Discharge Line | PI     | 1NO PER SKID |
| 4                                                            | Flow Indicator with isolation Ball valve to Filtered feed tank                    | FI     | 1NO PER SKID |
| <b>ANTISCALANT DOSING SKID (RO-PWS &amp; ETP)</b>            |                                                                                   |        |              |
| 1                                                            | Level Indicator with isolation ball Valve at Tank                                 | LI     | 2NO PER SKID |
| 2                                                            | Level Switch low at tank Top mounted                                              | LSL    | 2NO PER SKID |
| 3                                                            | Pressure Indicator with isolation Ball valve at dosing Pump Common Discharge Line | PI     | 1NO PER SKID |
| 4                                                            | Flow Indicator with isolation Ball valve to Filtered feed tank                    | FI     | 1NO PER SKID |
| <b>DE-CHLORINATION DOSING SKID (RO-PWS &amp; ETP)</b>        |                                                                                   |        |              |
| 1                                                            | Level Indicator with isolation ball Valve at Tank                                 | LI     | 2NO PER SKID |
| 2                                                            | Level Switch low at tank Top mounted                                              | LSL    | 2NO PER SKID |
| 3                                                            | Pressure Indicator with isolation Ball valve at dosing Pump Common Discharge Line | PI     | 1NO PER SKID |
| 4                                                            | Flow Indicator with isolation Ball valve to Filtered feed tank                    | FI     | 1NO PER SKID |
| <b>NAOH DOSING SKID (RO-PWS)</b>                             |                                                                                   |        |              |
| 1                                                            | Level Indicator with isolation ball Valve at Tank                                 | LI     | 2NO PER SKID |
| 2                                                            | Level Switch low at tank Top mounted                                              | LSL    | 2NO PER SKID |
| 3                                                            | Pressure Indicator with isolation Ball valve at dosing Pump Common Discharge Line | PI     | 1NO PER SKID |
| 4                                                            | Flow Indicator with isolation Ball valve to Filtered feed tank                    | FI     | 1NO PER SKID |
| <b>COAGULANT AID DOSING SKID (ETP)</b>                       |                                                                                   |        |              |
| 1                                                            | Level Indicator with isolation ball Valve at Tank                                 | LI     | 2NO PER SKID |
| 2                                                            | Level Switch low at tank Top mounted                                              | LSL    | 2NO PER SKID |
| 3                                                            | Pressure Indicator with isolation Ball valve at dosing Pump Common Discharge Line | PI     | 1NO PER SKID |
| 4                                                            | Flow Indicator with isolation Ball valve to Filtered feed tank                    | FI     | 1NO PER SKID |
| <b>NAOH DOSING SKID (ETP-CMB)</b>                            |                                                                                   |        |              |
| 1                                                            | Level Indicator with isolation ball Valve at Tank                                 | LI     | 2NO PER SKID |
| 2                                                            | Level Switch low at tank Top mounted                                              | LSL    | 2NO PER SKID |
| 3                                                            | Pressure Indicator with isolation Ball valve at dosing Pump Common Discharge Line | PI     | 1NO PER SKID |
| 4                                                            | Flow Indicator with isolation Ball valve to Filtered feed tank                    | FI     | 1NO PER SKID |
| <b>COAGULANT AID DOSING SKID (ETP)</b>                       |                                                                                   |        |              |
| 1                                                            | Level Indicator with isolation ball Valve at Tank                                 | LI     | 2NO PER SKID |
| 2                                                            | Level Switch low at tank Top mounted                                              | LSL    | 2NO PER SKID |
| 3                                                            | Pressure Indicator with isolation Ball valve at dosing Pump Common Discharge Line | PI     | 1NO PER SKID |
| 4                                                            | Flow Indicator with isolation Ball valve to Filtered feed tank                    | FI     | 1NO PER SKID |
| <b>NAOCL DOSING SKID (UF CIP) (FOR PWTS &amp; ETP)</b>       |                                                                                   |        |              |
| 1                                                            | Level Indicator with isolation ball Valve at Tank                                 | LI     | 1NO PER SKID |
| 2                                                            | Level Switch low at tank Top mounted                                              | LSL    | 1NO PER SKID |
| 3                                                            | Pressure Indicator with isolation Ball valve at dosing Pump Common Discharge Line | PI     | 1NO PER SKID |
| 4                                                            | Flow Indicator with isolation Ball valve to Filtered feed tank                    | FI     | 1NO PER SKID |
| <b>CITRIC ACID DOSING SKID (UF CIP) (FOR PWTS &amp; ETP)</b> |                                                                                   |        |              |
| 1                                                            | Level Indicator with isolation ball Valve at Tank                                 | LI     | 1NO PER SKID |
| 2                                                            | Level Switch low at tank Top mounted                                              | LSL    | 1NO PER SKID |
| 3                                                            | Pressure Indicator with isolation Ball valve at dosing Pump Common Discharge Line | PI     | 1NO PER SKID |
| 4                                                            | Flow Indicator with isolation Ball valve to Filtered feed tank                    | FI     | 1NO PER SKID |

### Annexure-I

**MANDATORY SPARES for RO system (Ref. Matl. Code RWT 705300018 & Spec. ROS: 6175/R.00, ROS:4177/R.00)**

Mechanical and E C&I :

|          |                                              |         |
|----------|----------------------------------------------|---------|
| <b>1</b> | <b>NaOCl Dosing pump (20 LPH)</b>            | 1 lot   |
| a.       | Bearings                                     | 1 Set   |
| b.       | Oils seals for gear box                      | 1 Set   |
| c.       | Stuffing Box Packing                         | 1 Set   |
| d.       | Diaphragm                                    | 10 Sets |
| e.       | Pulser                                       | 4 Sets  |
| f.       | Nuts & Bolts for connecting rod              | 1 Set   |
| g.       | Solenoid Assembly                            | 4 Sets  |
| <b>2</b> | <b>HCl Dosing pump (50 LPH)</b>              | 1 lot   |
| a.       | Bearings                                     | 1 Set   |
| b.       | Oils seals for gear box                      | 1 Set   |
| c.       | Stuffing Box Packing                         | 1 Set   |
| d.       | Diaphragm                                    | 10 Sets |
| e.       | Pulser                                       | 4 Sets  |
| f.       | Nuts & Bolts for connecting rod              | 1 Set   |
| g.       | Solenoid Assembly                            | 4 Sets  |
| <b>3</b> | <b>FeCl<sub>3</sub> Dosing pump (50 LPH)</b> | 1 lot   |
| a.       | Bearings                                     | 1 Set   |
| b.       | Oils seals for gear box                      | 1 Set   |
| c.       | Stuffing Box Packing                         | 1 Set   |
| d.       | Diaphragm                                    | 10 Sets |
| e.       | Pulser                                       | 4 Sets  |
| f.       | Nuts & Bolts for connecting rod              | 1 Set   |
| g.       | Solenoid Assembly                            | 4 Sets  |
| <b>4</b> | <b>Coagulant aid Dosing pump (50 LPH)</b>    | 1 lot   |
| a.       | Bearings                                     | 1 Set   |
| b.       | Oils seals for gear box                      | 1 Set   |
| c.       | Stuffing Box Packing                         | 1 Set   |

|          |                                             |         |
|----------|---------------------------------------------|---------|
| d.       | Diaphragm                                   | 10 Sets |
| e.       | Pulser                                      | 4 Sets  |
| f.       | Nuts & Bolts for connecting rod             | 1 Set   |
| g.       | Solenoid Assembly                           | 4 Sets  |
| <b>5</b> | <b>Antiscalant Dosing pump (10 LPH)</b>     | 1 lot   |
| a.       | Bearings                                    | 1 Set   |
| b.       | Oils seals for gear box                     | 1 Set   |
| c.       | Stuffing Box Packing                        | 1 Set   |
| d.       | Diaphragm                                   | 10 Sets |
| e.       | Pulser                                      | 4 Sets  |
| f.       | Nuts & Bolts for connecting rod             | 1 Set   |
| g.       | Solenoid Assembly                           | 4 Sets  |
| <b>6</b> | <b>De-chlorination Dosing pump (10 LPH)</b> | 1 lot   |
| a.       | Bearings                                    | 1 Set   |
| b.       | Oils seals for gear box                     | 1 Set   |
| c.       | Stuffing Box Packing                        | 1 Set   |
| d.       | Diaphragm                                   | 10 Sets |
| e.       | Pulser                                      | 4 Sets  |
| f.       | Nuts & Bolts for connecting rod             | 1 Set   |
| g.       | Solenoid Assembly                           | 4 Sets  |
| <b>7</b> | <b>NaOH Dosing pump (10 LPH)</b>            | 1 lot   |
| a.       | Bearings                                    | 1 Set   |
| b.       | Oils seals for gear box                     | 1 Set   |
| c.       | Stuffing Box Packing                        | 1 Set   |
| d.       | Diaphragm                                   | 10 Sets |
| e.       | Pulser                                      | 4 Sets  |
| f.       | Nuts & Bolts for connecting rod             | 1 Set   |
| g.       | Solenoid Assembly                           | 4 Sets  |
| <b>8</b> | <b>NaOCl Dosing pump (15 LPH)</b>           | 1 lot   |
| a.       | Bearings                                    | 1 Set   |
| b.       | Oils seals for gear box                     | 1 Set   |
| c.       | Stuffing Box Packing                        | 1 Set   |



|                                      |                                                                              |         |
|--------------------------------------|------------------------------------------------------------------------------|---------|
| d.                                   | Diaphragm                                                                    | 10 Sets |
| e.                                   | Pulser                                                                       | 4 Sets  |
| f.                                   | Nuts & Bolts for connecting rod                                              | 1 Set   |
| g.                                   | Solenoid Assembly                                                            | 4 Sets  |
| <b>9</b>                             | <b>NaOCl/Citric Acid Dosing pump (160 LPH)</b>                               | 1 lot   |
| a.                                   | Bearings                                                                     | 1 Set   |
| b.                                   | Oils seals for gear box                                                      | 1 Set   |
| c.                                   | Stuffing Box Packing                                                         | 1 Set   |
| d.                                   | Diaphragm                                                                    | 10 Sets |
| e.                                   | Pulser                                                                       | 4 Sets  |
| f.                                   | Nuts & Bolts for connecting rod                                              | 1 Set   |
| g.                                   | Solenoid Assembly                                                            | 4 Sets  |
| <b>10</b>                            | Gaskets ( for each type/variant of GRP tank)                                 | 01 Set  |
| <b>11</b>                            | Agitator bearing , coupling and oil seal (for each type/variant of agitator) | 01 No   |
| <b>12</b>                            | <b>ELECTRICAL</b>                                                            |         |
| a.                                   | Motor in each rating                                                         | 2 Nos   |
| b.                                   | Bearing for motor in each rating                                             | 2 Nos   |
| c.                                   | Auto stroke controlled dosing pump motor assembly                            | 2 Nos   |
| d.                                   | Agitator motor                                                               | 2 Nos   |
| <b>CONTROL &amp; INSTRUMENTATION</b> |                                                                              |         |
| e.                                   | Local gauges (pressure, level)                                               | 2 Nos   |
| f.                                   | Flow meters                                                                  | 2 Nos   |
| g.                                   | Field switches                                                               | 2 Nos   |

**VOLUME IIB**

**TECHNICAL SPECIFICATION  
FOR  
SEAWORTHY PACKING FOR EXPORT JOBS**

**SPECIFICATION NO. PE-TS-888-100-A001**



**BHARAT HEAVY ELECTRICALS LIMITED  
POWER SECTOR  
PROJECT ENGINEERING MANAGEMENT  
NEW DELHI, INDIA**

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## 1.0 Purpose

The purpose of this specification is to describe minimum packing requirements for the different items/equipment for all export Project and also to define marking and shipping requirements during transportation by ship, road and air for all export jobs.

## 2.0 SCOPE

For export jobs, sea worthy packing capable of performing all necessary functions like prevention of damage to the contents, sufficient to support frequent handling and lengthy period of outdoor storage in adverse weather conditions are required. Workmanship and materials used shall be of high standard meeting the technical requirements and in accordance with best commercial export packing practices. Vendor shall be responsible for sea worthy export packing, however it shall meet the minimum requirements specified herein. Equivalent or better packing methods may be deployed subject to approval of the BHEL/Purchaser. Vendor shall submit the packing procedure for its equivalent for purchaser's approval during detailed engineering.

The scope this specification is to define VENDOR's responsibilities in terms of:

- Preservation of the GOODS/items/equipments before packing.
- Packing of the GOODS for road, rail, sea and/or air transportation to desired destination i.e. project site
- Making cases/crates
- Chemical Treatment/Fumigation before packing to prevent fungus, damage due to termite, borer, rats, etc.
- Marking of cases/crates.
- Other Services required.

## 3.0 Application

This specification is applicable to all the goods to be transported to project site and requires to be in transit for longer duration. *However, for "Misc cable erection items", "Fire sealing system" & "Exothermic welding material", the packing requirements shall be as per the procurement specification.*

## 4.0 Definitions

- "BHEL" : Main EPC vendor
- "OWNER" : Customer for a particular export project.
- "VENDOR" : Company(ies)/VENDOR(s) to whom the BHEL has placed Purchase Order for GOODS/ items/system/package.
- "GOODS": means all or part of the articles, material, equipment supplies including technical documentation, as described in the Purchase Order, to be supplied by VENDOR.
- "PACKER": Packaging Company to whom VENDOR intends to sub-contract the packing in case they do not have own packing capability/facilities .
- "FREIGHT FORWARDER" : Means the Company responsible for performing freight forwarding activities.

## 5. General Information



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The following requirements are intended as minimum requirements, and compliance to these requirements in no way absolves or relieves **VENDOR** of any responsibility or obligation outlined in the Purchase Order. In all circumstances, the packing will be designed and constructed in order to support **GOODS** during transportation as well as to prevent the Goods from damage due to impact, extreme climatic conditions, sun and rain. It must be ensured that the delivery of the **GOODS** to the jobsite by sea, road or air, in good condition.

**GOODS** shall be export packed in compliance with the best-established practices for international projects, in accordance with the following instructions. In the event of any conflict between these specified requirement and the established practices, specification requirement shall govern.

Due to climatic conditions and the complex transport operation(s), it is essential that protection and packing is of the highest standard. Packing means to efficiently protect the **GOODS** during the total transport operation; from the moment they leave the factory until they are delivered to the jobsite, including handling operations (loading/unloading) and storage.

When **VENDOR** do not have packing capabilities/facilities of their own and therefore intends to sub-contract, **VENDOR** have to inform **BHEL/Purchaser** of the name and address of proposed **PACKER(s)** for approval.

#### **6.0 Criteria for Selection of Packaging**

Packages are to be made according to categories, described in articles 8.1 to 8.5, depending on the type of materials, their fragility and size.

These categories have been established for the protection of equipment and material during multi-mode transports, i.e.: combination of overland and sea transport; containerization, air transportation.

In a general manner, the **GOODS** have to be packed in such a way that crates, bundles, pallets can be stored into General Purpose containers, wherever possible.

If **VENDOR** has any doubt about the correct method of protection or packing, he should contact **BHEL/Purchaser** in order to mutually agree on the adequate type of packing to be used.

Materials can be classified in following categories

- Hazardous Material
- Non-Hazardous Material
- 

Further to above categorisation, non-hazardous materials can be sub- categorised for selection of packing.

#### **6.1 Hazardous Materials**

Though handling of hazardous material may is not applicable in the scope of this specification. All hazardous material must be packed in adherence to the detailed requirement relating to packing, marking and labelling set out in the most recent report of the Board's Standard Advisory Committee on the Carriage of Dangerous Goods in Ships for sea freight, and the Restricted Articles Regulations, laid down by the International Air Transport Association for airfreight.

#### **6.2 Non-Hazardous GOODS**

The scope of this specification is to provide necessary guidelines for packing for power plant equipment, components, Pipings & Valves, Fittings, other structural items, electrical items, spare parts and erection materials. The procedure is defined in subsequent paragraphs in details in clause no. 8.0.

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## 7.0 Marking Instructions & Despatch details, Storage Code

### 7.1 Marking Instructions & despatch details

Packages and crates will be marked with indelible black paint, resistant to seawater. Marking must be perfectly legible.

The shipping marks, which will be as per fig-13, shall be stencilled on two sides and one end in clear characters at least 5 centimetres high (where crate size permits, otherwise use optimum size for each package dimension).

When the GOODS are to be shipped in containers then marking may be stencilled on one end only. However, packages must be stowed in a manner that shows these marks.

Crates containing fragile articles must be packed with special precaution against risk of breakage and must be stencilled on all sides "FRAGILE - HANDLE WITH CARE". Where crates are not to be overturned, VENDOR must show on the crates, clear and readily visible identification as per fig-12, to ensure they are kept in the correct position.

Packages/equipment of 2,000 kg or more must be marked with slinging points on all sides, in addition to the centre of gravity marks.

Number packages consecutively i.e. 1 of 10, 2 of 10, etc. Do not duplicate package numbers. VENDOR is responsible for any loss or damage caused by incorrect marking.

All cases/crates shall also be marked with the appropriate international standard graphic symbols for handling as shown in Fig 12.

As a minimum, all cases/crates are to be marked clearly on all four sides with:

- "HANDLE WITH CARE"
- "RIGHT SIDE UP"
- "KEEP DRY"

In the case of packages with a single gross weight totalling 2,000 kg and/or a height of more than 1m, the centre of gravity shall be clearly marked with the symbol on two adjoining sides. For all items of equipment with an eccentric centre of gravity this symbol shall be marked at the bottom, side and top of the package.

The slinging and lashing points shall be marked with a chain symbol.

When packing in cases/crates, these packages shall also have metal corners at the slinging points. (Fig-11)

External front and rear sides of the boxes to be planed for writing instructions.

Dispatch details such as consigner/consignee address, contract and case details, country of origin, port of delivery, stacking instructions shall be written on one side of the boxes. An anodized aluminum plate as per details and specifications given in fig-13 shall be provided on one side of the boxes.

One copy of packing slip wrapped in polyethylene bag covered with aluminum packing slip holder to be nailed on the external surface of the box. One more copy of the packing slip wrapped in polyethylene bag is to be kept inside the box at the pertinent place.

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## 7.2 Storage Code

The type of storage required is required to be specified, it will be shown on each packaging in **RED colour**.

- X Crates or packages to be stored outdoor without covers
- XX Crates or packages to be stored under tarpaulin
- XXX Crates or packages to be stored in covered or enclosed premises
- XXXX Crates or packages which must be stored in air-conditioned premises

## 8.0 GUIDELINES FOR PACKING GOODS

**8.1** In the subsequent paragraphs details of different types of packings for different types of GOODS are defined. Vendor shall make packing details/procedure based on the guidelines and submit for approval.

### 8.1.1 Packing for Pipe, Fittings, Flanges and Valves, Structural Steel

Particular attention should be brought to pipe, fittings, flanges, valves and structural steel. Packing categories for piping and fittings will differ according to the diameter and wall thickness of these products. VENDOR shall comply with the following established practice.

#### IMPORTANT NOTE:

***Depending on the project schedule and availability of ocean vessels, the piping and structural steel may be shipped in containers. In this event, VENDOR has to arrange the packages in such a way it allows the stuffing into Open Top in gauge containers.***

### 8.1.2 Pipe

Where practicable, pipe lengths shall be limited to 11.8 meters.

All pipes 2" included and below shall be packed in crates. All pipes to be capped and ends sealed with waterproof tape.

Pipes over 2" up to 6", shall be bundled and banded in bundles of uniform length. Bundling is carried out with U-IRON or traversal planks, joined with threaded connecting rods with locknuts. Quantities and strapping positions depend on the lengths, with a 120 cm spacing to prevent distortion. Bundle weight shall not exceed 2,000 kg. All pipes are to be capped and ends sealed with waterproof tape (tape is not necessary if end caps are of the pre-shrunk or self-sealing type).

Pipes larger than 6" shall be shipped as single lengths with the ends capped. End caps are to be of the recessed type to enable the use of soft faced hooks, but still completely sealing the end and also protecting the weld.

All stainless steel piping must be packed separately in wooden crates. Any banding of bundles is to be with the same material.

### 8.1.3 Pipe Fittings, Flanges and Valves

All pipe fittings, flanges and valves up to 6", are to be packed in cases/crates. For items over 6", these may be fixed securely to a pallet base and enclosed in a crate, for protection. Where valves have actuators attached, rigidity must be ensured for the valve and actuator. The vulnerable parts of the actuator are to be completely protected within a wooden crate.

All stainless steel fittings, flanges and valves of all sizes, must be packed separately in wooden crates. Any strapping is to be with the same material.

### 8.1.4 Structural Steel

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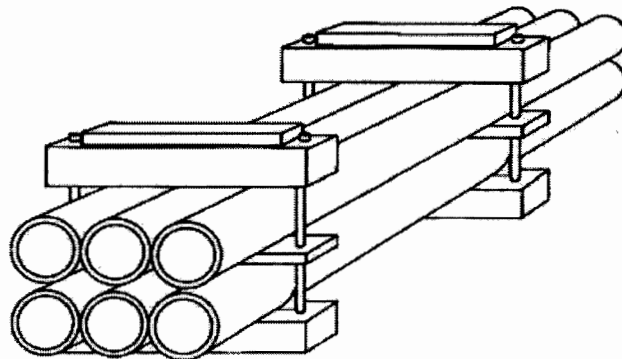
Structural Steel, reinforcing rods, bars, etc., should be packed in bundles of uniform length. Refer to articles 8.1.2, for strapping requirements. Bundle weight not normally to exceed 2,000 kg. Fabricated structures and structural steelwork, etc, should be bundled and packed using wooden beams and long bolting to secure the load.

## 8.2 Bundling – Packing Category I

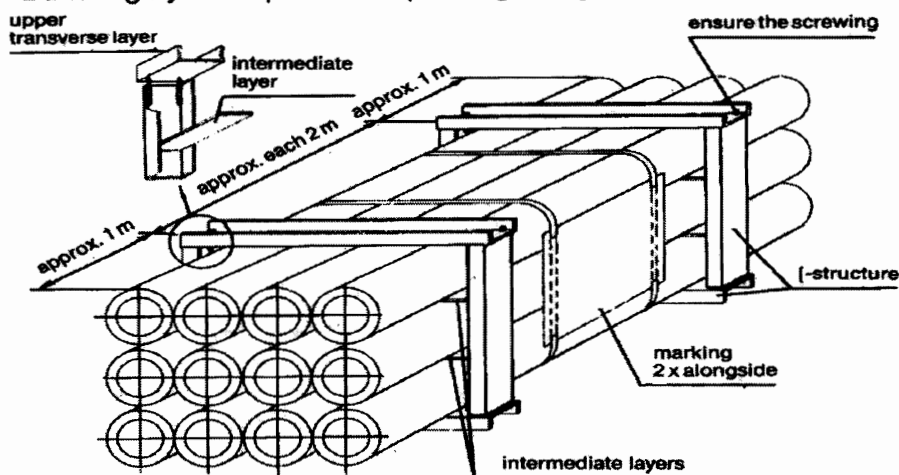
### 8.2.1 Type of Equipment

Equipment which is not subject to damage by corrosion or mechanical effect, i.e. pipes, piping, structural steel.

#### Packing category I



#### Bundling by U-shaped iron – packing category I A



### 8.2.2 Type of Construction

|                                                                                   |                                                                                                  |                                      |                 |
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- Bundling has to be effected
- By squared timber and threaded rods.
- With an intermediate layer (threaded on tightening bolts) according to the weight of the package.
- Wedge-shaped timbers must be added at the outer points of lower layer.
- Between the bolts a spacer must be nailed.
- The bolts must be secured (e.g. by locking nut).
- If single parts could protrude, an appropriate protection must be installed (flat iron or plates).
- Bundling with steel straps or PVC straps is not accepted.

### 8.3 Skids, Square Timber Constructions, Casings – Packing (Category II)

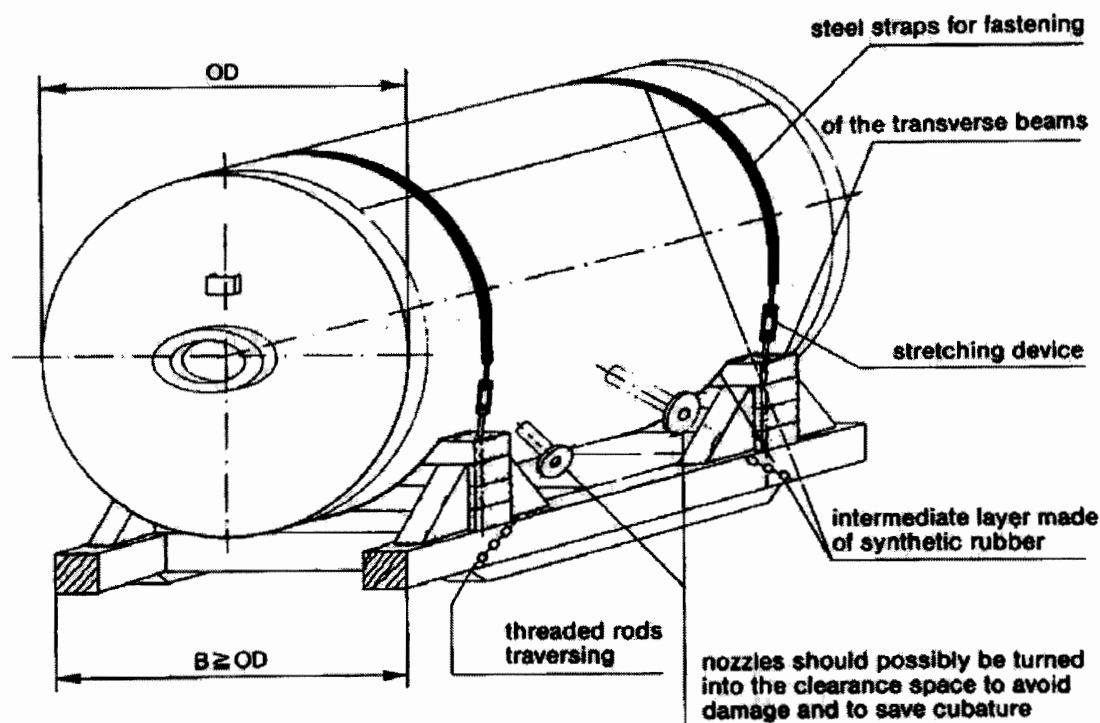
#### 8.3.1 Type of Equipment

Voluminous apparatus, tanks and/or heavy pieces those are not vulnerable to mechanical or corrosive effects.

#### 8.3.2 Type of Construction

- The construction skid can be made of wood or of metal.
- The fastening of the packages on the skid will be made by steel straps (flat iron) which have to be elastically lined, non-slip and securely bolted onto the skids.
- Flange openings have to be closed with gaskets and blind flanges or, if necessary, provided with cover.
- Skid constructions may not be less than the dimensions of the package in length or in width.
- Tanks and apparatus with their own support cradles must be supplied with an anti-slip lining.

#### PACKING CATEGORY-II



|                                                                                   |                                                                                                  |                                      |                 |
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#### 8.4 Packing of GOODS in Wooden Crates/Cases/Boxes

*The construction of wooden crate/cases/boxes shall be as per the details indicated in clause 9.0 & Fig 1 to 11. Details indicated in the sketches for different categories Packing crates/boxes are only for a typical equipment considered for illustration.*

##### 8.4.1 Packing Category III

###### 8.4.1.1 Type of Equipment

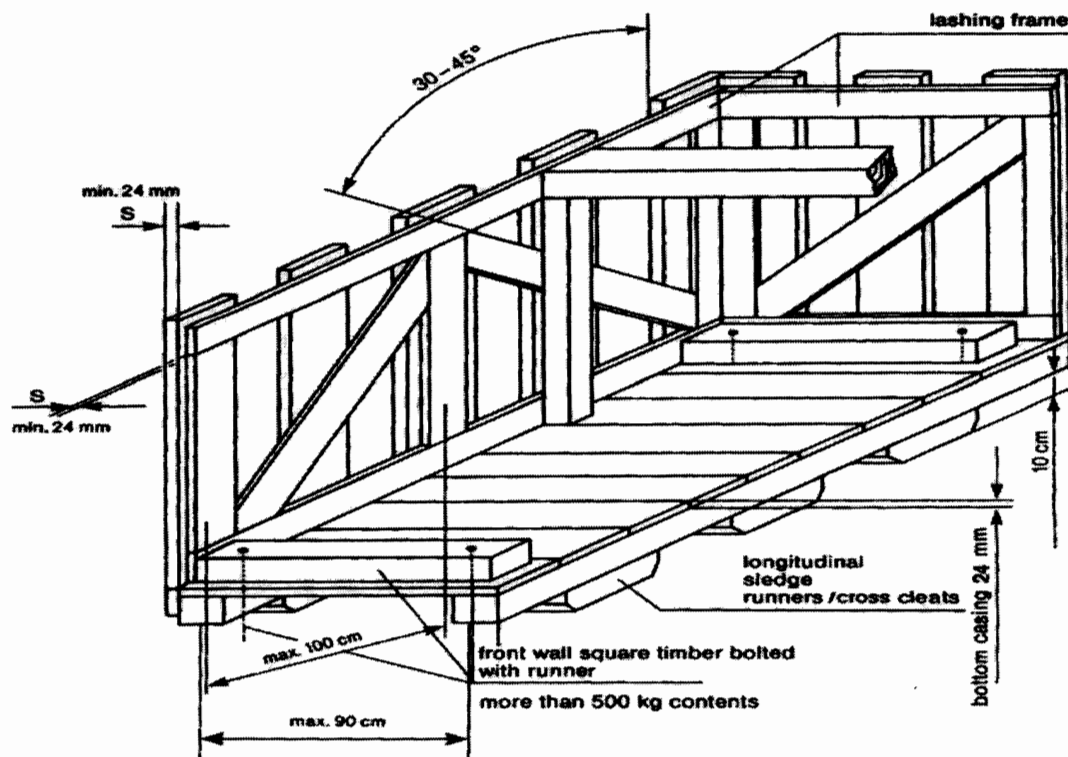
Fabricated equipment, which cannot be transported on cradles; frame-works, prefabricated piping and fittings, mechanical and electrical assemblies. *This type of packing is recommended where many parts of the equipment/component/assembly are not protruding out.*

###### 8.4.1.2 Type of Construction

The equipment must be safely fastened to the bottom with bolts, possibly by the runners or to be spread in such a manner that no protruding parts are possible. For parts, sensitive to rainwater and/or debris, a protection has to be made by a foil cap.

If it is possible that single part could protrude through the front/back side wall, they shall be closed completely. The marking of the package shall be done on plywood plates at the prescribed sides.

##### Packing Category III



|                                                                                   |                                                                                                  |                                      |                 |
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## 8.4.2 Cases with Lining – Packing Category IV

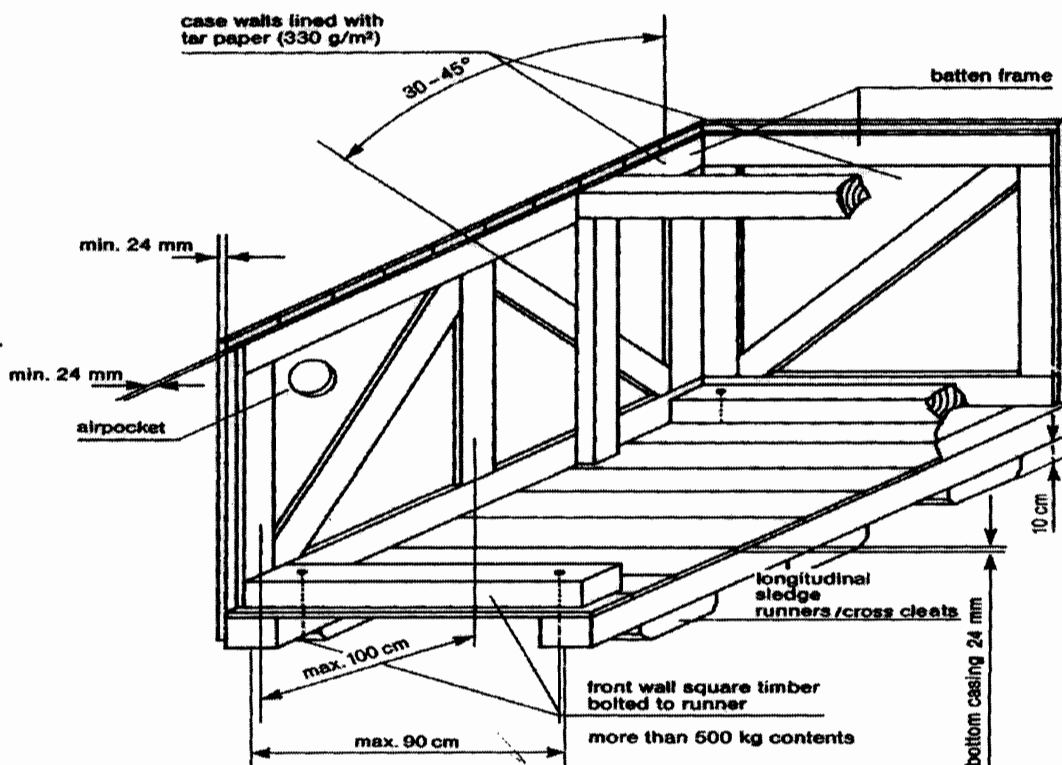
### 8.4.2.1 Type of Equipment

*Recommended for equipment and mechanical parts Equipment sensitive to mechanical damage or parts and components that are particularly at risk of theft or loss; pumps, elbows, flanges, fittings, tools, erection materials, etc.*

### 8.4.2.2 Type of Construction

The same type of construction as article 8.4.1.2, but with all sides completely boarded without space between the boards. Sides to be provided with waterproof lining; fabric-reinforced waterproof tar paper or polyethylene-foils resistant to ultraviolet rays can be used. Polyethylene-foil shall be fixed under the lid cover to avoid penetration of water. At weights of more than 500 kg the longitudinal runner must be bolted to the front all square timber. For ventilation inside the case, an opening in the waterproof lining must be placed between the diagonal battens and diagonal joists.

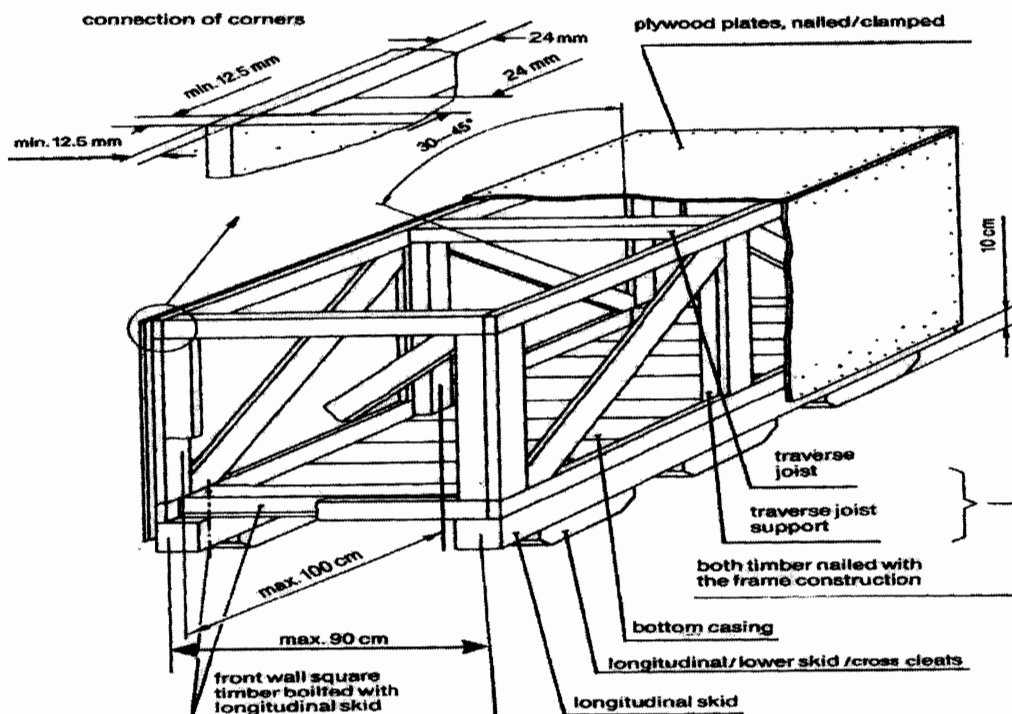
### Packing Category IV



## 8.4.3 Cases with Alternative Surface Materials

### 8.4.3.1 Plywood Box – Packing Category IV A

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Case constructed of 5 layers of watertight, glued plywood with a total thickness of 12.5 mm. The frame must be constructed from minimum 24 mm timber or as per guide lines given above against clause 8.0, Fig 1 to 11 and must be suitable for the weight and nature of the parts to be packed. Planed square timber must be bolted with longitudinal skid and covered with diagonal joists. If applicable, construction of the cover and sides is to include diagonal bracing. Covers consisting of several layers of plywood are to be sealed with durable elastic putty or additional water-resistant sheets to be fixed.

#### 8.4.4 Case with Barrier Material – Polyethylene Foil – Packing Category V

##### 8.4.4.1 Type of Equipment

Sensitive equipment, simple electrical equipment, insulation materials, fire-resistant materials, with non-corrosion- guarantee for a period up to twelve (12) months.

##### 8.4.4.2 Type of Construction

Preservation by welding in polyethylene-foil with addition of desiccants and if necessary, application of non-corrosive contact agents, otherwise, type of construction as indicated in article 8.4.2.2.

Additional marking:

- Case with desiccants.

#### 8.4.5 Case with Barrier Material – Aluminium Compound Foil – Packing Category VI

##### 8.4.5.1 Type of Equipment



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Electrical equipment such as, switchboards, electric motors, sensitive equipment, with non-corrosion guarantee, for a period up to twelve (12) months.

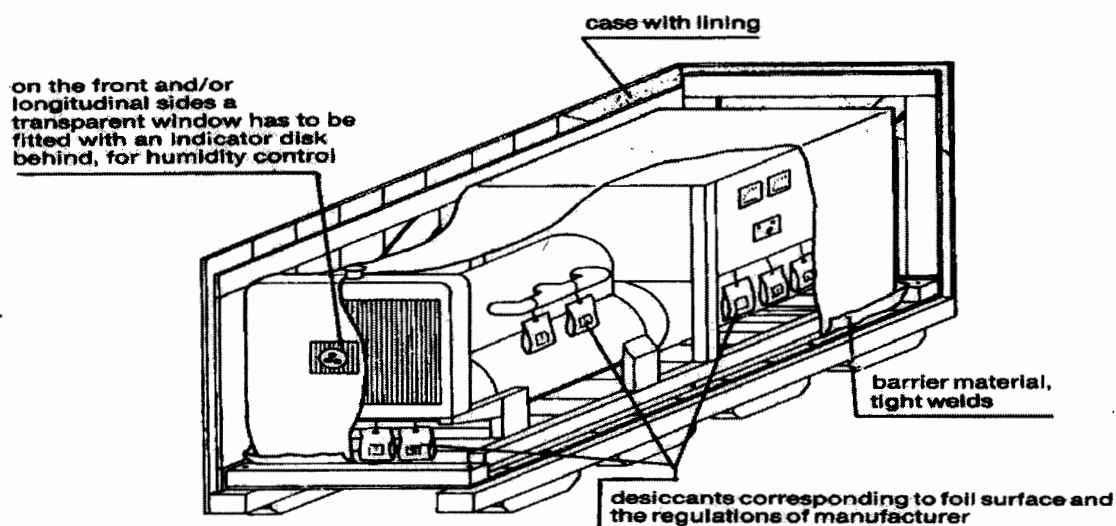
#### 8.4.5.2 Type of Construction

Type of construction as indicated in article 8.4.2.2. Preservation by sealing an aluminium compound foil, with the addition of desiccants. Humidity indicators, if required and installed in the barrier wrapping, shall allow easy control from the outside.

Additional marking:

- Case with desiccants.

#### Packing Category V/VI



#### 8.4.6 Double Case – Packing Category VII

##### 8.4.6.1 Type of Equipment

GOODS which are of high sensitivity to shock, impact and vibration, for instance, special electrical equipment like computers, switchboards, laboratory instruments

##### 8.4.6.2 Type of Construction

Case construction as indicated in article 8.4.2.2, with additional floating inner packing (case-in-case principle), padding corresponding to weight and sensitiveness. Preservation by sealing in aluminium compound foil with the addition of desiccants. The inner case has to be made of plywood or equivalent material with a thickness of 8-12 mm, depending on the weight of the GOODS to be packed. The inner buckles and/or frame borders have to be dimensioned so that the full stability of the inside case will be reached and no twisting is possible. The inner sides of the inside case will be lined with bituminous kraft paper on all sides (except bottom).

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#### **8.4.7 Cable Drum – Packing Category VIII**

##### **8.4.7.1 Type of Equipment**

All type of cables, wires, ropes, hoses.

##### **8.4.7.2 Type of Construction**

For all type of cables refer clause no. 11.1. For other items (wires, ropes, hoses) new or practically new drums are to be used. Planking of the e drums by use of boards, thickness minimum 20 mm, with additional double steel strapping, nailed, and carefully preserved/protected cable ends prior to packing.

#### **8.4.8 Hazardous Materials – Packing Category IX**

##### **8.4.8.1 Type of Equipment**

Hazardous materials according to the law are explosives, compressed gases, liquefied gases dissolved under pressure or deeply refrigerated, flammable liquids, flammable solids: substances liable to spontaneous combustion; substances which, on contact with water, emit flammable gases, oxidizing substances, organic peroxides, poisonous (toxic) and infectious substances; radioactive materials, corrosives, miscellaneous dangerous goods.

##### **8.4.8.2 Type of Construction**

Hazardous materials shall always be packed and documented separately from any other material. Selection of packaging materials, execution of packing and marking as well as documentation shall always be in compliance with the applicable laws and regulations. Any certificates required for transportation or for authorities to be supplied before shipment of the GOODS.

#### **8.4.9 Wooden Floor as a Transport Support – Packing Category X**

##### **8.4.9.1 Type of Equipment**

Any materials to be stuffed in containers or on flat racks and that are not stowed on standard pallets or otherwise suitably packed

##### **8.4.9.2 Type of Construction**

- Longitudinal internal square timbers bolted to the front wall runners, longitudinal skid.
- Maximum distance between longitudinal runners 90 cm (middle to middle of the runner).
- Full boarding of the floor.
- Attaching of lifting lugs and/or iron ropes for lifting/pulling the units off the transport equipment.
- If applicable, preservation of the equipment by sealing in polyethylene-foil or aluminium compound foil and the addition of desiccants.

#### **8.5 Air Transport Packing**

##### **8.5.1 General**

Certain types of material may have to be shipped by air from their country of origin. This means of transport will be exceptional, and will be used only:

- For GOODS, which are highly sensitive to shock or vibrations, such as computers, electronic instruments, or those of small dimensions and weight.
- For GOODS urgently required at the module yard(s) and/or jobsite.

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### 8.5.2 Type of Packing

Depending on the goods to be packed, VENDOR may use one of the following types:

- A triple-corrugated cardboard container made with waterproofed glue and a barrier layer of polyethylene on the outsides to keep out humidity.
- Wooden/cardboard packing cases: the wood being used for the framework and base of the cases, waterproofed triple-corrugated cardboard being used for the sides and top. These cases are of the "Bell" type, and used for material of small or medium dimensions.
- For larger dimensions, plywood cases are acceptable. The timber characteristics, cross-sections and thickness will be systematically determined by the nature of the loads to be packed.

### 8.5.3 Dimensions

In order to optimize the existing transport facilities (passenger or cargo aircraft), the dimensions of:

- Triple-corrugated containers.
  - Wooden/cardboard packing cases.
  - Plywood cases.
- Are to be adapted to pallets used for air transportation.

## 9.0 Detailed specification for Wooden Crates/Boxes/Cases and other packing materials

### 9.1 Technical specification for wood

The wood shall be Fir, Chir, Silver Oak (Gravillea Robusta), chemically treated mango and Pinewood with moisture content not exceeding 50%. The wood shall have flexural and compressive strength, stiffness, shock absorption and nail retention properties. The wood shall be free from common defects such as warp, bone, twist, knot, cracks, splits, end splits, bend, visible sign of infection and any kind of decay caused by insects or fungus, etc. Surface cracks with maximum depth of 3mm are permissible. A continuous crack of any depth all along the length is not allowed.

### 9.2 Chemical Treatment of Wood:

The wood shall be chemically treated to provide protection against deterioration due to fungi and attack by termites, borers, marine organism and any other kind of infection. It shall be treated only after final processing like cutting, planning, joint grooving, etc.

### 9.3 TYPE, DESIGN & DIMENSION OF WOODEN PACKING CASES:

#### 9.3.1 PACKING OF EQUIPMENTS

Various mechanical, electrical and C&I equipment e.g. Pumps, motors, equipment skids, heat exchangers, control panels, switch gears, transformers, etc. shall be wrapped in weather proof packing and then secured in wooden packing cases. The construction of wooden packing cases/crates shall be as per details given below and also given in figure 1 to 11.

##### 9.3.1.1 Bottom Frame

|                                                                                   |                                                                                                  |                                             |                 |
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The construction of bottom frame shall be as per Fig-2. The No. of slides/runners for bottom frames shall be selected depending upon the weight and overall dimensions of the load to be carried. The equipment shall be secured by fixing their base frame/plate with the help of bolt and nuts etc. to bottom frame of the wooden packing cases/crates. The equipment not provided with base frame/plate like cylindrical vessels, etc to be secured to the bottom frame of the wooden cases with "C" clamps fabricated from steel channels/ angle iron.

#### 9.3.1.2 TOP FRAME

The construction of top frame shall be as per fig-3.

#### 9.3.1.3 END PANELS

The dimension of the end and lateral panels shall be calculated according to overall dimensions of the items to be packed. Diagonal braces shall be used for packing cases having height exceeding 500mm. Details of bracings shall be as per fig 5 to 9.

#### 9.3.1.4 Sling Plate

To facilitate lifting of cases, longitudinal under slide boards shall be fixed. To avoid damage to the box while lifting sling plates shall be provided. Refer fig-11.

#### 9.3.1.5 Angle Iron Cleats

Angle iron cleats shall be used for strengthening the joints as indicated in fig-10

#### 9.3.1.6 Other Requirements

- The thickness of planks for top, bottom, side and end panels shall be at least 25mm. Planks used for this purpose shall be joined with each other by tongue and groove joint. The groove dimension shall be such that tongue fits tightly into groove to make the joint.
- Runners/slides, traverse bars, etc shall be of single length i.e. without any joint. Planks for sheathing, diagonal bracing etc shall also be of single length up to 2400mm, proper jointing is permitted for planks for sheathing and diagonal bracings.
- Each equipment to be individually covered with double polyethylene petticoat. Sheet thickness of polythene sheet shall not be less than 0.175 mm (175 microns). The sealing shall be such so as not to allow moisture inside.
- The inner surface of 4 sides of shooks shall be nailed with bituminized water proof craft paper. Wherever 2 pieces of kraft paper are used, joint shall have an overlap of minimum 20 mm.
- All the inner sides of the box shall be nailed with bitumen coated HESSIAN POLYTHYLENE KRAFT PAPER. For top frame it shall project on all sides by 100mm and shall be nailed on sides. Wherever 2 pieces of kraft paper are used, joint shall have an overlap of minimum 20 mm.
- For delicate equipment like control panels and switchgears, lighting panels and lighting transformers, suitable cushioning material like rubberised coir (min. 50 mm thick and 100 mm wide) shall be provided on their bottom support and the gap between the panel and casing

|                                                                                   |                                                                                                  |                                      |                 |
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shall be filled with rubberized coir with distance between consecutive supports less than 500 mm (ref fig15). For other equipment suitable support from sides of the casing shall be provided.

- Switchgear cubicles, control panels and control desks shall be packed and shipped in separate convenient sections. The components e.g. circuit breakers relays and instruments etc. which are removed from panels for shipping purpose and shall be separately packed and shipped as per packing instructions in clause 10.4.
- Packing case for control panels and switchgear panels shall be finally covered with GI sheet of minimum thickness of 0.4mm.
- Packing cases shall be bound at edges by nailing MS clamps/brackets at sufficient intervals. Further heavier boxes shall be strapped with C clamps (ref fig-4) fabricated from steel channels/angles and lighter boxes shall be strapped with hoop iron strips.
- Silica gel is used for this purpose to protect contents over sufficiently long time from corrosion. Silica gel shall be indicating type confirming to IS-304 (1979) packed in cotton bags placed at different positions inside the packing for absorbing moisture and shall not come into directly contact with equipment/material inside the package. The quantity of silica gel shall be adequate for storage period of one year, however it shall not be less than 4 gm. per ltr. Volume of case subject to minimum 400 gm. Per case.



# TITLE

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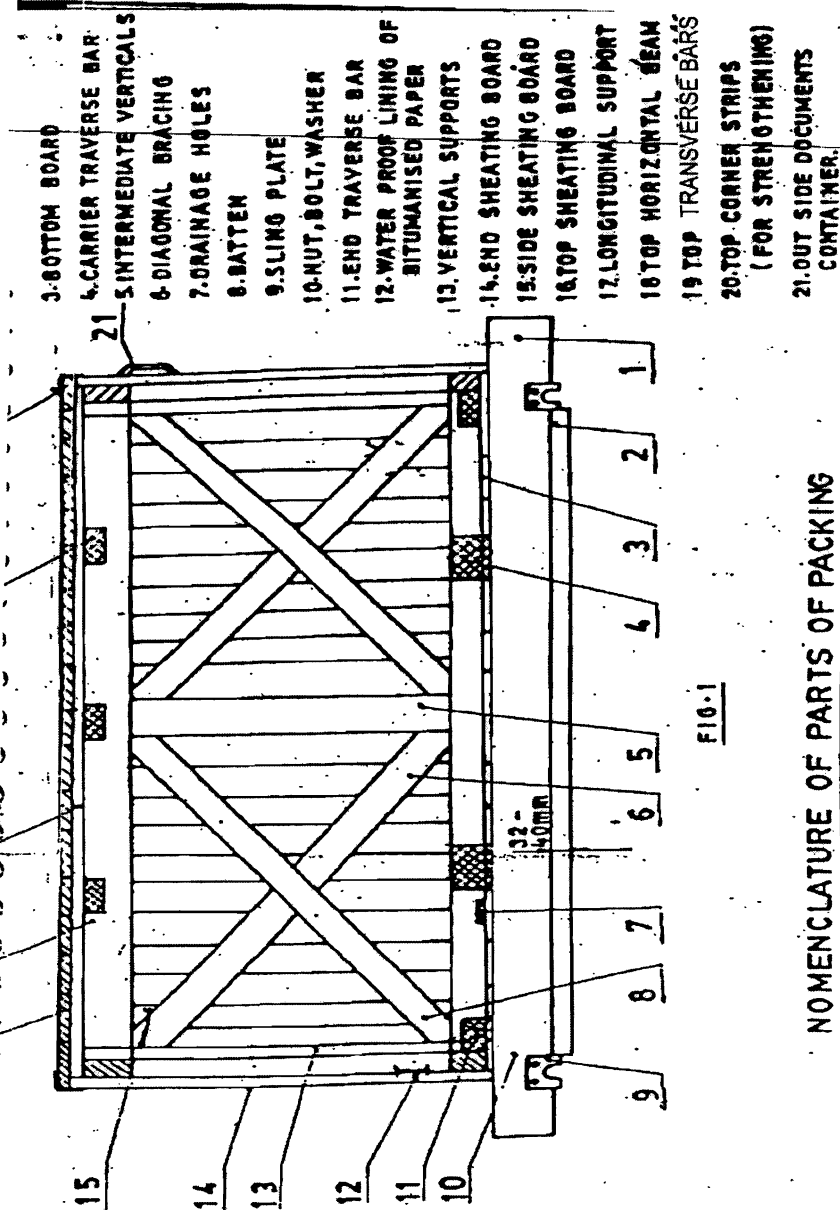
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## BOTTOM FRAME ARRANGEMENTS

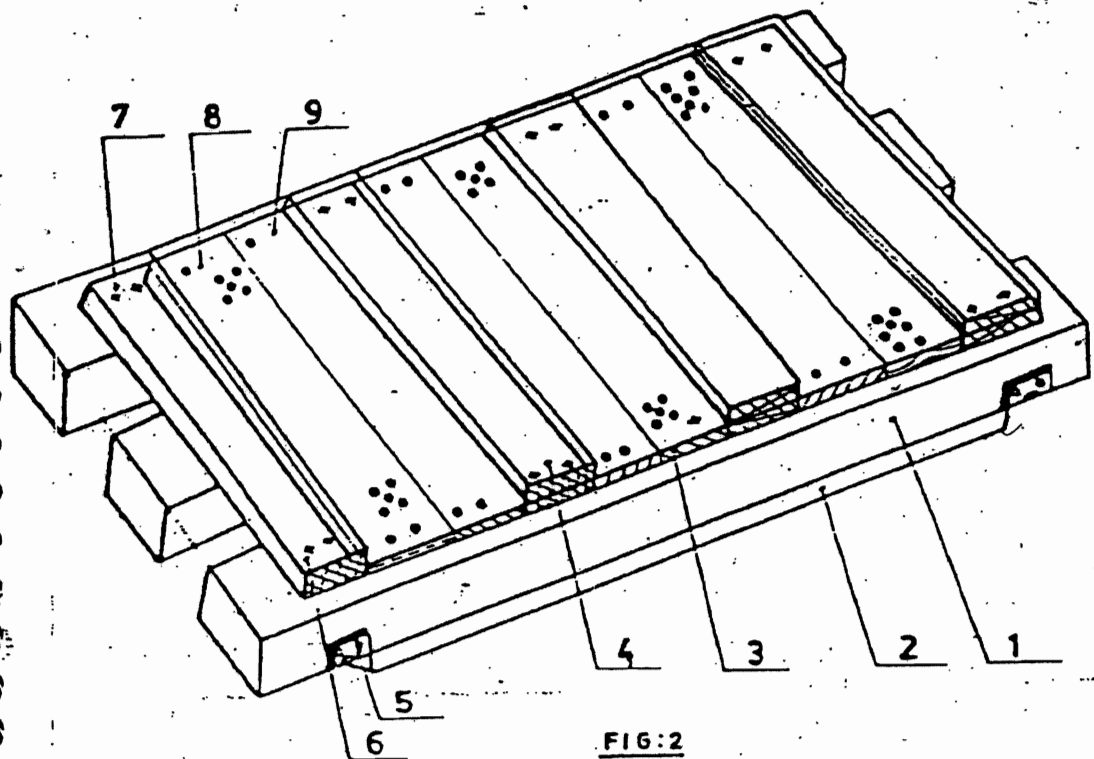


FIG:2

Nos. of slides: Minimum 2 Nos.  
For length more than 1800 mm or  
load more than 1000kg, Nos. of  
slides shall be minimum 3 Nos.  
For dimensions of slides, refer Table 1  
Cross section of end traverse bar; 100 x 100 mm.  
(minimum)

1. SLIDE
2. UNDER SLIDE BOARD
3. BOTTOM BOARD
4. CARRIER TRAVERSE BAR
5. SLING PLATE
6. TRAVERSE BAR
7. BOLT, NUT & WASHER
8. DRAINAGE HOLES
9. NAILS

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## TOP FRAME ARRANGEMENT

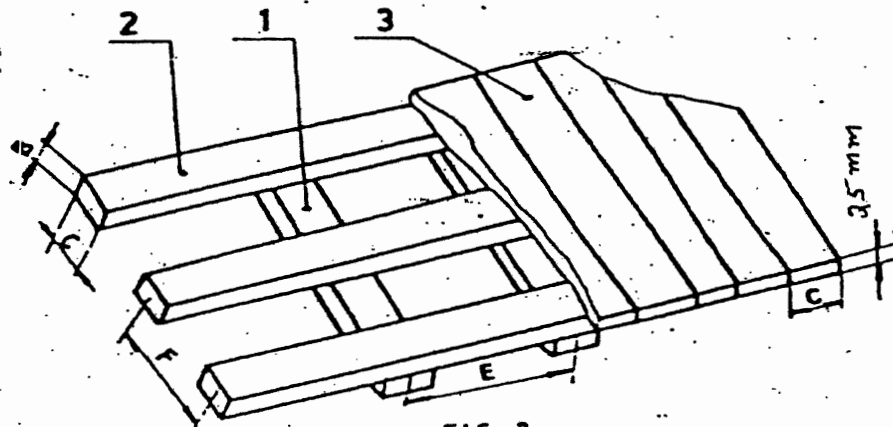
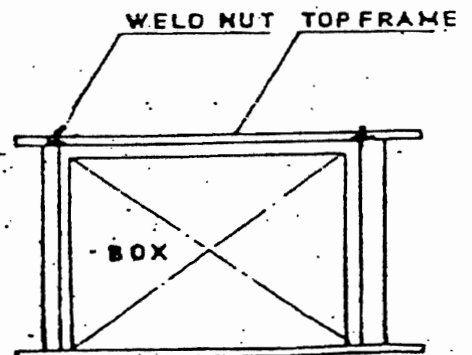
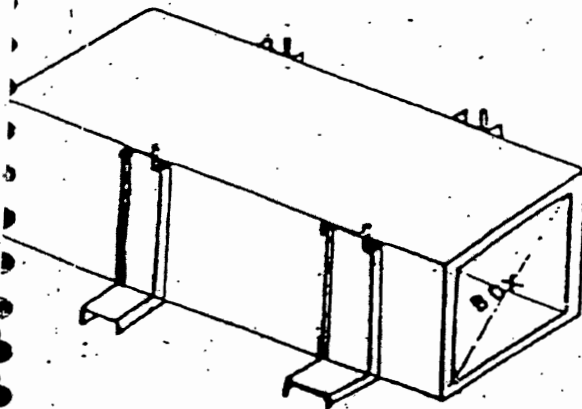


FIG-3

F : 700 to 1000 mm  
E : 500 to 900 mm  
30 x 100 mm.

- 1 - Traverse Bars
- 2 - Horizontal Soans
- 3 - Top Board

## ARRANGEMENT OF C-CLAMPS AROUND CASES





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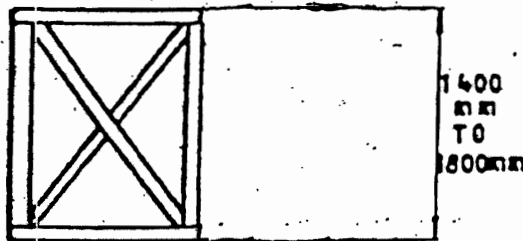
**ARRANGEMENT OF DIAGONAL BRACING AND  
HORIZONTAL SUPPORT**

FIG: 6

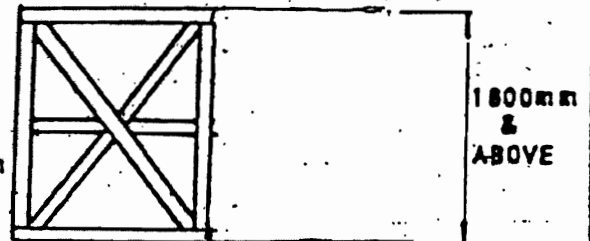


FIG: 8

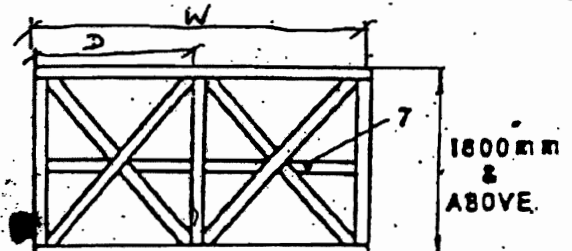


FIG: 7

7- Middle Horizontal Support

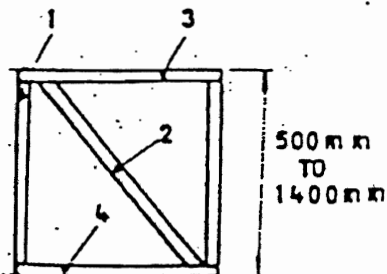


FIG: 5

1- Vertical Support

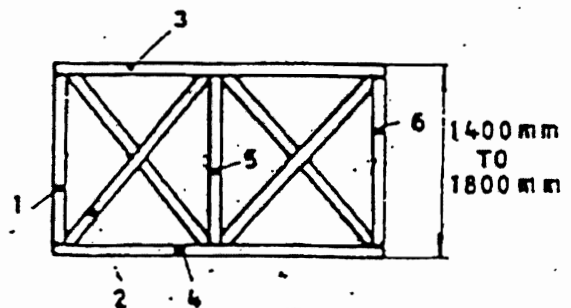


FIG: 7

1, 5, 6 - Vertical Support

**TITLE**

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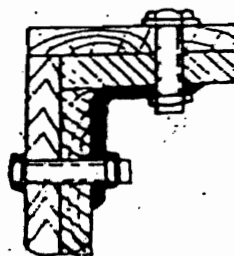
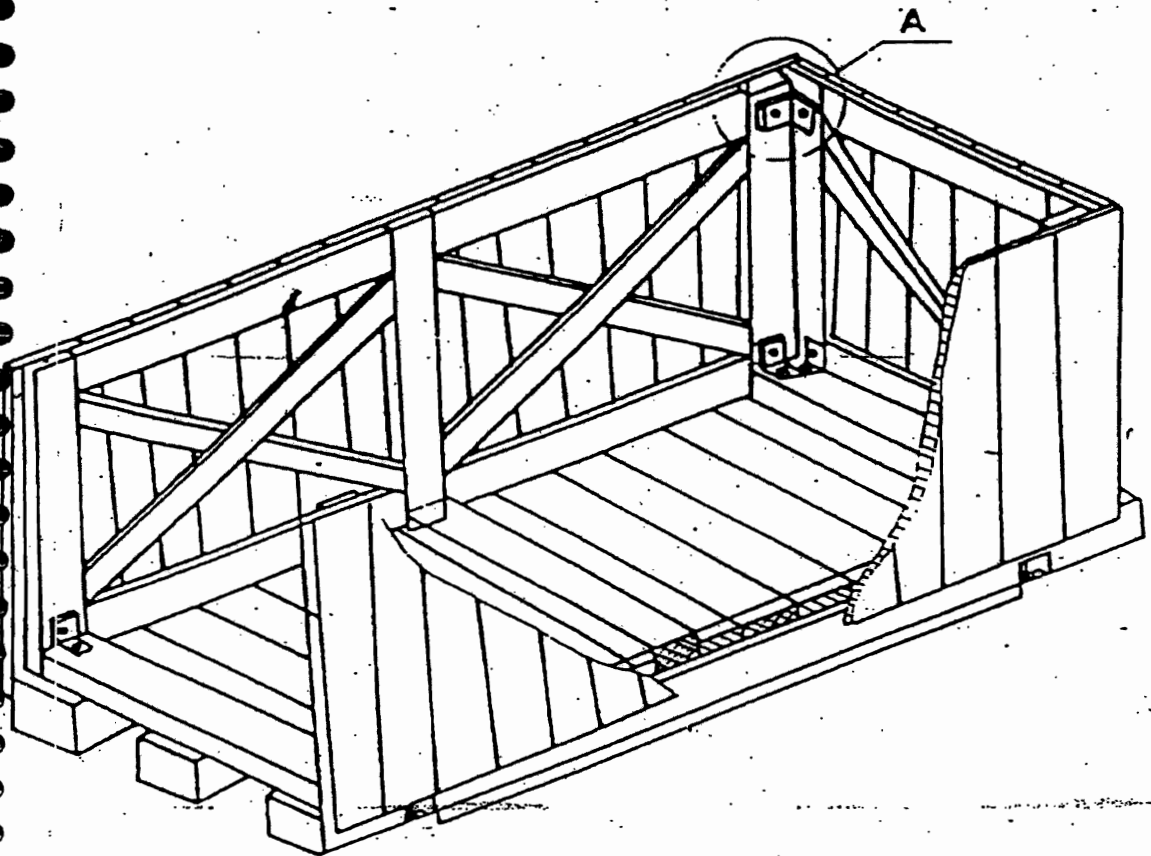
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## ARRANGEMENT OF PACKING CASE



DETAIL-A

**HOLE DIAMETER  
MUST CONFORM  
TO BOLT DIA**

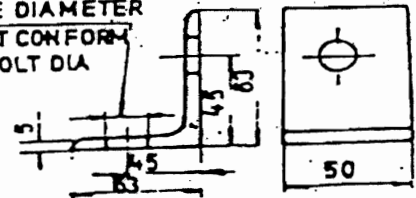


FIG:10

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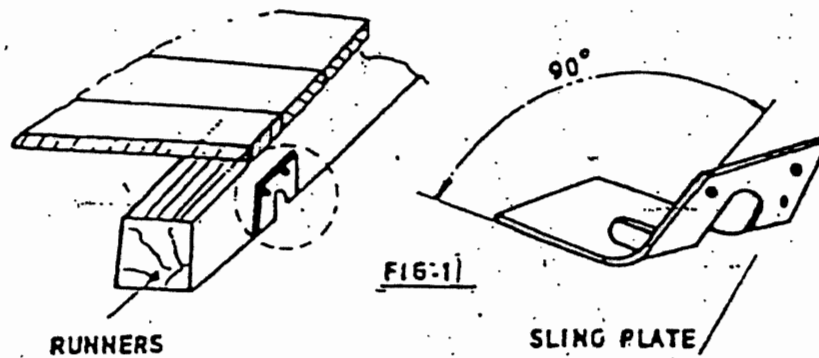
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**ARRANGEMENT OF SLING & PLATE ON  
CASES**

|                                                                                   |                                                                                                  |                                             |                 |
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**TABLE-1**

| LOADS | LENGTHS OF SLIDES      |                 |                 |                 |                                                                                                                               |                 |                 |
|-------|------------------------|-----------------|-----------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------|
|       | 600                    | 800             | 1000            | 1200            | 1300                                                                                                                          | 1500            | 2000            |
|       | Cross section<br>b x c |                 |                 |                 | <div style="border: 1px solid black; display: inline-block; width: 80px; height: 15px; vertical-align: middle;"></div> c<br>b |                 |                 |
| 500   | 50<br>X<br>100         | 50<br>X<br>100  | 50<br>X<br>100  | 50<br>X<br>100  | 75<br>X<br>100                                                                                                                | 75<br>X<br>100  | 100<br>X<br>100 |
| 800   | 50<br>X<br>100         | 50<br>X<br>100  | 75<br>X<br>100  | 75<br>X<br>100  | 75<br>X<br>100                                                                                                                | 75<br>X<br>100  | 100<br>X<br>100 |
| 1000  | 75<br>X<br>100         | 75<br>X<br>100  | 75<br>X<br>100  | 100<br>X<br>100 | 100<br>X<br>100                                                                                                               | 100<br>X<br>110 | 100<br>X<br>150 |
| 1500  | 75<br>X<br>100         | 75<br>X<br>100  | 100<br>X<br>100 | 100<br>X<br>100 | 100<br>X<br>100                                                                                                               | 100<br>X<br>150 | 100<br>X<br>150 |
| 2000  | 75<br>X<br>100         | 100<br>X<br>100 | 100<br>X<br>100 | 100<br>X<br>150 | 100<br>X<br>150                                                                                                               | 100<br>X<br>150 | 150<br>X<br>150 |
| 2500  | 75<br>X<br>100         | 100<br>X<br>100 | 100<br>X<br>150 | 100<br>X<br>150 | 100<br>X<br>150                                                                                                               | 150<br>X<br>150 | 150<br>X<br>150 |
| 3000  | 100<br>X<br>100        | 100<br>X<br>150 | 150<br>X<br>150 | 150<br>X<br>150 | 150<br>X<br>150                                                                                                               | 150<br>X<br>150 | 150<br>X<br>150 |

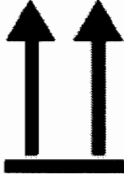
|                                                                                   |                                                                                                  |                                      |                 |
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**Table-2**

| End and side panels | Width of the panel "W" | Distance between longitudinal support (Dimension "D") |     |      |      |             |      |      |
|---------------------|------------------------|-------------------------------------------------------|-----|------|------|-------------|------|------|
|                     |                        | 600                                                   | 800 | 1000 | 1200 | 1400        | 1600 | 1800 |
|                     |                        | Cross section<br>b x c                                |     |      |      | Item 1 to 7 |      |      |
| Fig- 5 to Fig-9     | 600 to 1200            | 30                                                    | 30  | 30   | 30   | 30          | 30   | 30   |
|                     |                        | X                                                     | X   | X    | X    | X           | X    | X    |
|                     | 1201 to 1600           | 100                                                   | 100 | 100  | 130  | 130         | 130  | 130  |
|                     |                        | X                                                     | X   | X    | X    | X           | X    | X    |
|                     | 1601 to 2000           | 130                                                   | 130 | 130  | 130  | 130         | 130  | 130  |
|                     |                        | X                                                     | X   | X    | X    | X           | X    | X    |
|                     | 2001 to 3000           | 130                                                   | 130 | 130  | 130  | 130         | 130  | 130  |
|                     |                        | X                                                     | X   | X    | X    | X           | X    | X    |
|                     | 3001 to 4000           | 130                                                   | 130 | 130  | 130  | 130         | 130  | 150  |
|                     |                        | X                                                     | X   | X    | X    | X           | X    | X    |
|                     |                        | 150                                                   | 150 | 150  | 150  | 150         | 150  | 150  |

|                                                                                   |                                                                                                  |                                             |                 |
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#### INDICATION MARKS ON CASES/BOXES/CRATES

| Designation                               | Symbol                                                                              | Explanation                                                                                                                                                                                                                                                                                                                |
|-------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fragile, Handle with care                 |    | The symbol should be applied to easily broken cargoes. Cargoes marked with this symbol should be handled carefully and should never be tipped over or slung.                                                                                                                                                               |
| Use no hooks                              |    | Any other kind of point load should also be avoided with cargoes marked with this symbol. The symbol does not automatically prohibit the use of the plate hooks used for handling bagged cargo.                                                                                                                            |
| Top                                       |   | The package must always be transported, handled and stored in such a way that the arrows always point upwards. Rolling, swinging, severe tipping or tumbling or other such handling must be avoided.                                                                                                                       |
| Keep away from heat (solar radiation)     |  | Compliance with the symbol is best achieved if the cargo is kept under the coolest possible conditions. In any event, it must be kept away from additional sources of heat. It may be appropriate to enquire whether prevailing or anticipated temperatures may be harmful.                                                |
| Protect from heat and radioactive sources |  | Stowage as for the preceding symbol. The cargo must additionally be protected from radioactivity.                                                                                                                                                                                                                          |
| Sling here                                |  | The symbol indicates merely where the cargo should be slung, but not the method of lifting. If the symbols are applied equidistant from the middle or center of gravity, the package will hang level if the slings are of identical length. If this is not the case, the slinging equipment must be shortened on one side. |
| Keep dry                                  |  | Cargo bearing this symbol must be protected from excessive humidity and must accordingly be stored under cover. If particularly large or bulky packages cannot be stored in warehouses or sheds, they must be carefully covered with tarpaulins.                                                                           |

|  |                                                                                                  |                                      |                 |
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|--------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Center of gravity              |  | This symbol is intended to provide a clear indication of the position of the center of gravity. To be meaningful, this symbol should only be used where the center of gravity is not central. The meaning is unambiguous if the symbol is applied onto two upright surfaces at right angles to each other.                            |
| No hand truck here             |  | The absence of this symbol on packages amounts to permission to use a hand truck on them.                                                                                                                                                                                                                                             |
| Stacking limitation            |  | The maximum stacking load must be stated as "... kg max.". Since such marking is sensible only on packages with little loading capacity, cargo bearing this symbol should be stowed in the uppermost layer.                                                                                                                           |
| Clamp here                     |  | Stating that the package may be clamped at the indicated point is logically equivalent to a prohibition of clamping anywhere else.                                                                                                                                                                                                    |
| Temperature limitations        |  | According to regulations, the symbol should either be provided with the suffix "...°C" for a specific temperature or, in the case of a temperature range, with an upper ("...°C max.") and lower ("...°C min.") temperature limit. The corresponding temperatures or temperature limits should also be noted on the consignment note. |
| Do not use forklift truck here |  | This symbol should only be applied to the sides where the forklift truck cannot be used. Absence of the symbol on other sides of the package amounts to permission to use forklift trucks on these sides.                                                                                                                             |
| Electrostatic sensitive device |  | Contact with packages bearing this symbol should be avoided at low levels of relative humidity, especially if insulating footwear is being worn or the ground/floor is nonconductive. Low levels of relative humidity must in particular be expected on hot, dry summer days and very cold winter days.                               |

|                                                                                   |                                                                                                  |                                             |                        |
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|                        |                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Do not destroy barrier |  | A barrier layer which is (virtually) impermeable to water vapor and contains desiccants for corrosion protection is located beneath the outer packaging. This protection will be ineffective if the barrier layer is damaged. Since the symbol has not yet been approved by the ISO, puncturing of the outer shell must in particular be avoided for any packages bearing the words "Packed with desiccants". |
| Tear off here          |  | This symbol is intended only for the receiver.                                                                                                                                                                                                                                                                                                                                                                |

**FIG-12**



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|                             |                                                            |
|-----------------------------|------------------------------------------------------------|
| BHEL-PEM-DELHI-INDIA        |                                                            |
| CONSIGNEE                   |                                                            |
| MATERIAL                    |                                                            |
| CUSTOMER REF.               | MO. NO.                                                    |
| DESPATCH<br>ADVICE NOTE NO. | CASE NO.                                                   |
| DIMENSIONS(MM)<br>LXBXH     | NET<br>WT -KGS                                             |
|                             | GROSS<br>WT -KGS                                           |
| SPECIAL<br>INSTRUCTIONS     | HANDLE WITH CARE -- KEEP DRY<br>DO NOT DROP -- DO NOT TILT |

FIG-13: MARKING PLATE



# TITLE

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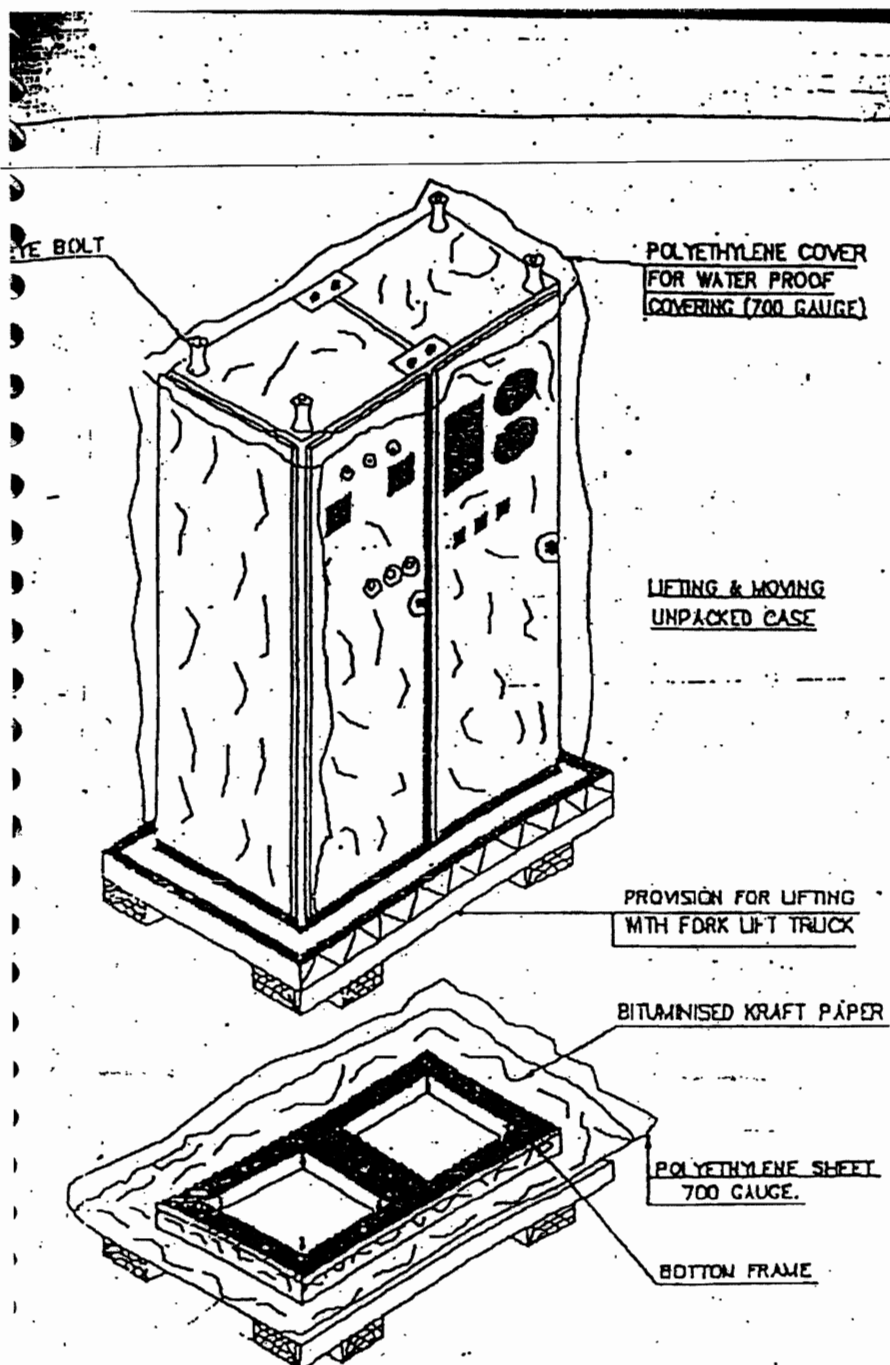


FIGURE-14



# TITLE

## TECHNICAL SPECIFICATION FOR SEAWORTHY PACKING FOR EXPORT JOBS

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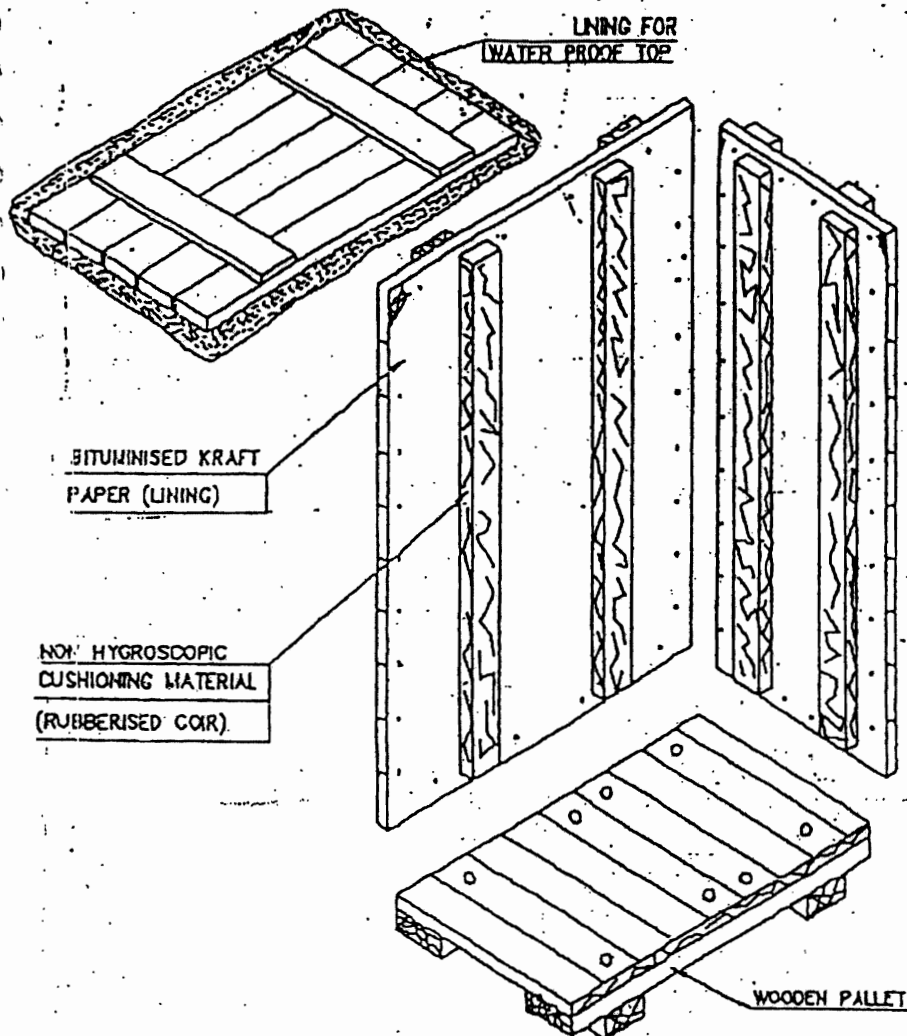
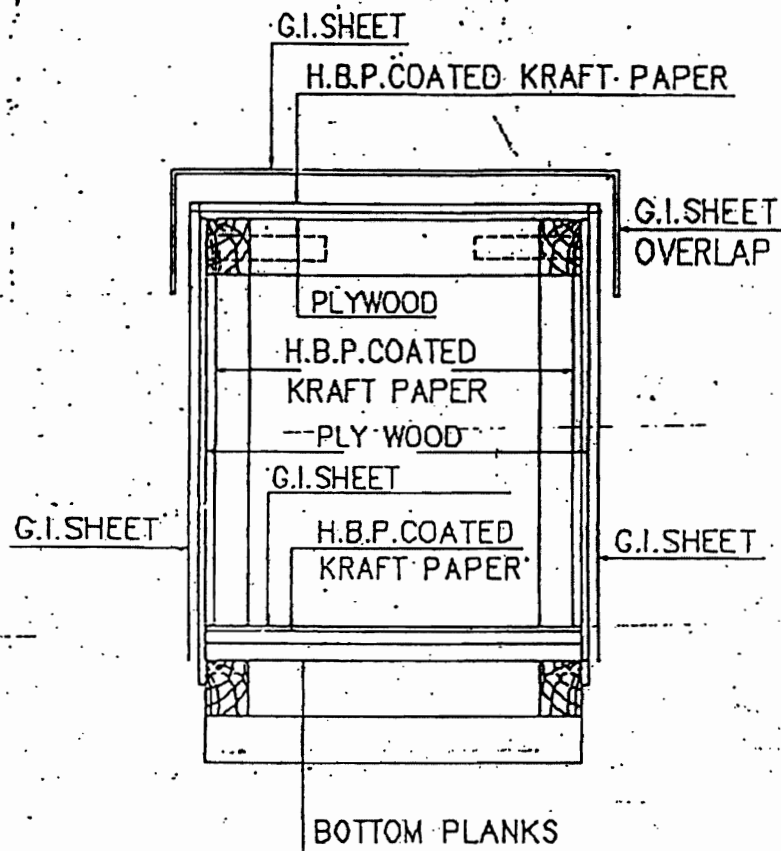


FIGURE-15

|                                                                                   |                                                                                                  |                                      |                 |
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**FIG-16 : CLOSED PACKING CASE WITH G.I. SHEET  
SHOWING LAYERS OF PACKING MATERIALS.**

|                                                                                   |                                                                                                  |                                             |                 |
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## 10.0 TYPICAL PACKING DETAILS/PROCEDURE FOR MECHANICAL ITEMS

### 10.1 INSULATION MATERIAL (MINERAL WOOL MATTRESSES)

This specification covers the requirements of seaworthy packing and marking for bonded mineral (rock) wool mattresses having metallic hexagonal wire netting as facing on one or both sides.

#### 10.1.1 TYPE OF CONSTRUCTION

Mattress shall be packed in Polythene (of 0.2 mm thickness) all around and sealed to prevent moisture absorption during transit and storage. Further it shall be wrapped with Bitumen coated Polythene bonded/lined Hessian and stitched and then packed in 5 ply DFC carton box.

Silica gel is used for this purpose to protect contents over sufficiently long time from corrosion. Silica gel shall be of indicating type conforming to IS:304-1979 packed in cotton bags placed at different positions inside the packing for absorbing moisture and shall not come into direct contact with the material inside the package. The quantity of silica gel shall be enough for storage period of one year. However, it shall not be less than 4 gms per litre volume of case subject to minimum of 400 gms per case.

Each mattress as well as the packages shall be serial numbered. Also, printed sheets indicating the nominal thickness, density and wire netting details (i.e. material and size) shall be placed below the wire netting.

Following details shall be legibly written on the packages. The details shall also be typed on a sheet of paper & kept in a sealed Polythene cover, inside the packages

- a) Project Name
- b) Purchase Order No.
- c) Sl. No. of package
- d) Size of mattress (Thickness x Length x Width)
- e) Density
- f) Wire netting material and size
- g) Weight of the package

### 10.2 INSULATION MATERIAL (ALUMINIUM COIL)

Heavy Gauge Aluminium Coil Packaging are done by Eye-to-Sky packaging or by Eye to eye packaging as per the proven practice being followed by manufacturer of Aluminium sheets.

#### 10.2.1 Type of construction for Eye to Sky packaging

- a. Strapping of coil with polyester strap around circumference at one place.
- b. Putting paper I. D. Edge protector.
- c. Wrapping the coil with VCI stretch film after putting silica gel bags (4 nos.) Inside the coil.
- d. Wrapping the coil with HDPE film.
- e. Covering the coil including its build up & bore with masonite / particle board.
- f. Putting metallic I. D on coil.
- g. Putting O.D edge protector (paper) on coil.

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- h. Putting circumferential polyester strap (3 nos.) & eye polyester strap ( 4 nos.).
- i. After placing the coil on coil tilter ply wood (10mm thick) of suitable size along with wooden pallet is to be put at the bottom side of the coil.
- j. Coil is to be tilted to eye-to-sky position.
- k. Final strapping with metallic strap to unit coil and skid at 2 places with top cover of plywood.
- l. Fixing the coil with wooden blocks at 4 corners.
- m. Labeling 2 nos.(one metallic & one adhesivetype) For specification, net wt. & gross wt.

#### **10.2.2 Type of construction for Eye to Eye packaging**

- a. Strapping of coil with polyester strap around circumference at one place.
  - b. Putting paper I. D. Edge protector.
  - c. Wrapping the coil with VCI stretch film after putting silica gel bags (4 nos.) Inside the coil.
  - d. Wrapping the coil with HDPE film.
  - e. Covering the coil including its build up & bore with masonite / particle board.
  - f. Putting metallic I. D on coil.
  - g. Putting O.D edge protector (paper) on coil.
  - h. Putting circumferential polyester strap (3 nos.) & eye polyester strap ( 4 nos.).
  - i. Placing of coil on wooden skid Coil is to be tilted to eye-to-sky position.
  - j. Final strapping of coil and skid at 2 places with steel strap. Fixing the coil with wooden blocks at 4 corners.
- Labeling 2 nos.(one metallic & one adhesive type) For specification net wt. & gross wt.

#### **10.3 Packing Procedure for Online Tube Cleaning System and accessories**

This procedure is applicable for the shipment of Onload Tube Cleaning System and accessories by sea.

##### **10.3.1 Packing details:**

- The Packing case shall be made of treated rubber wood. The design of the case shall be as per Annexure IIIA & IIIB.
- The Equipments shall be placed on the wooden base of the Packing case and fastened if required to arrest the movement of the same.
- Equipment shall be covered by Polythene sheet and inside wall surfaces of the wooden cases also shall be covered by polythene sheet.
- All Nozzles shall be closed with plywood dummies.
- All electrical components assembled or loose shall be covered with polythene sheets along with silica gel pack.
- Silica gel desiccants shall be kept inside each case in sufficient quantities in order to absorb the moisture.

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- Thermocol packing shall be made for glass items like Ball vessel sight glass, Vpiece
- sight glass & pressure gauge.
- Silica gel desiccants shall be kept inside of each case to absorb the moisture.
- A Packing list covered in a polythene envelope shall be fixed inside and outside of each packing case.
- Shipping marks and consignee address shall be painted on the outer surface of the case.
- All handling instruction required for the case like top, sling, rain, handle with care etc, shall be marked on the case as per the symbol attached.
- Machined surface will be applied with Anti rust oil and covered by polyurethane sheet to protect from external oxidation.
- All valves will be closed with dummies to protect the internals and placed in the wooden case which will covered by polyurethane sheet.



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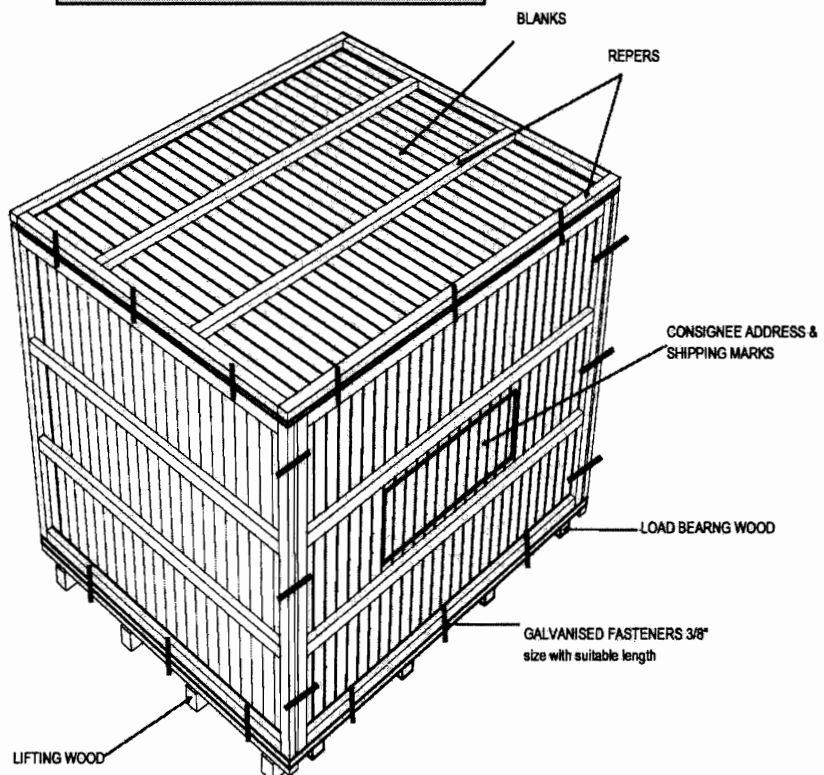
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MODEL: FASTNERS TYPE (BASE, SIDE & TOP  
ATTACHED WITH BOLT, NUT & WASHER)

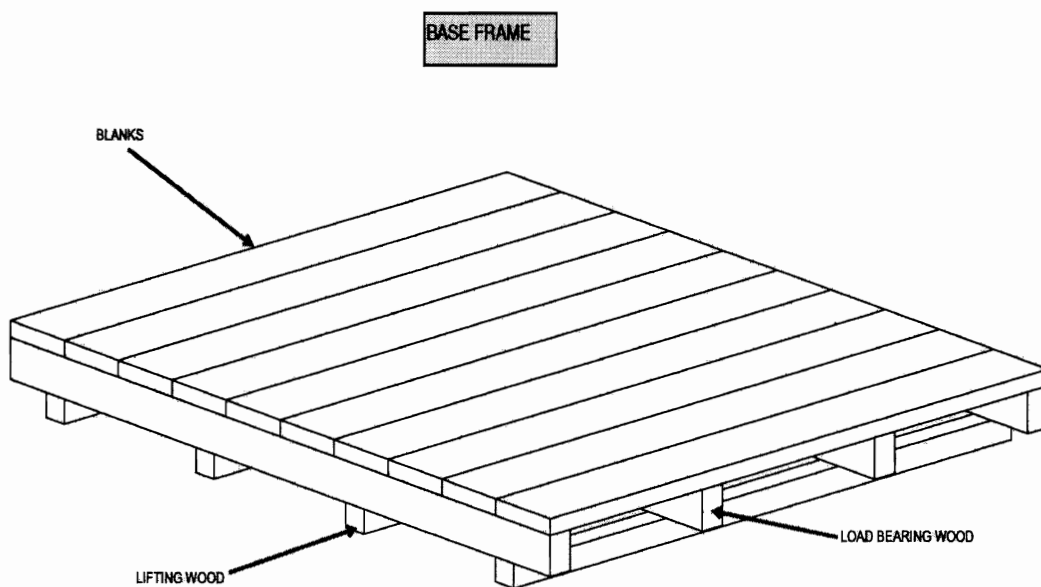
This Type of case to be used for  
following items:

1. BALL SEPERATOR
2. BALL COLECTOR SKID





|                                                                                   |                                                                                                  |                                             |                 |
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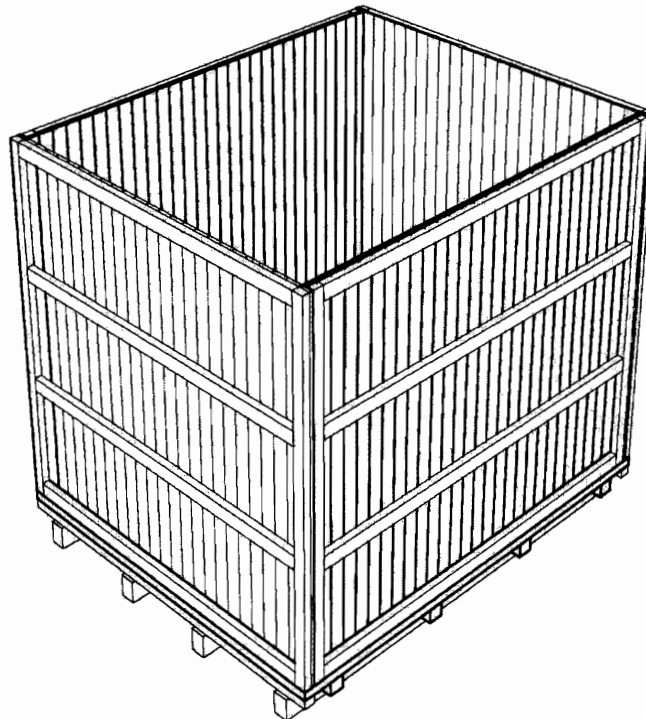
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MODEL: FASTNERS TYPE - WITHOUT TOP





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MODEL: NAILING TYPE  
(FRAME & INSIDE REEFER NAILED)

- THIS TYPE OF CASE TO BE USED FOR THE FOLLOWING ITEMS:
1. PUMP SKID
  2. CONTROL PANEL
  3. LOOSE ITEMS, TOOLS & TACKLES
  4. DPMS, BRM
  5. SPARES
  6. CLEANING BALLS
  7. CABLES & ACCESSORIES

Shipping marks & Consignee  
Address

BLANKS

LIFTING WOOD

BLANKS

REEPERS

BLANKS

REEPERS

LOAD BEARING WOOD

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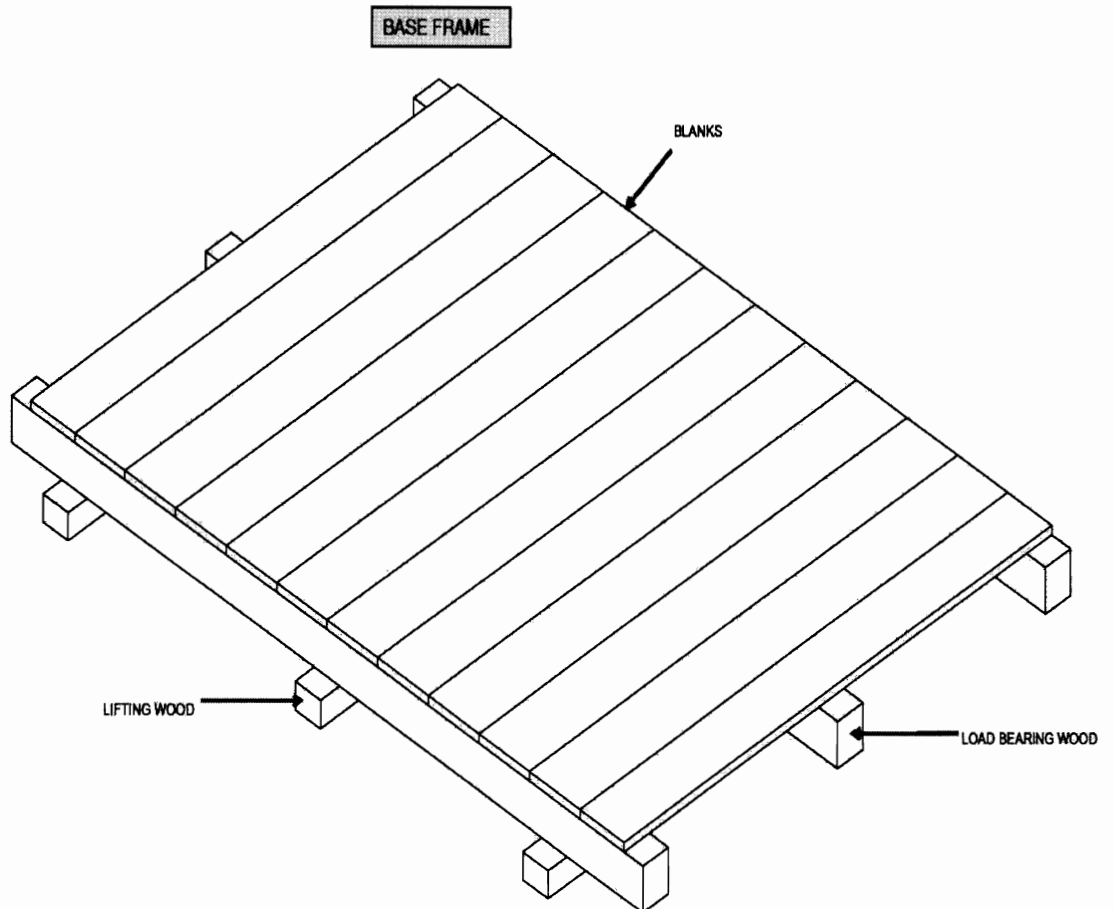
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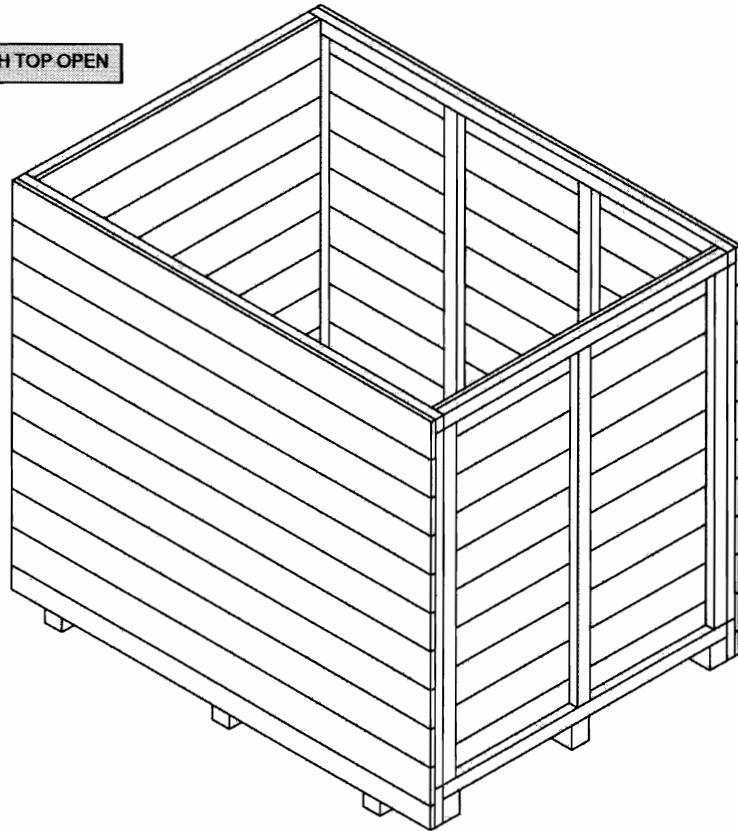
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NAILING TYPE MODEL WITH TOP OPEN



|                                                                                   |                                                                                                  |                                             |                 |
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#### 10.4 PACKING OF LOOSE ITEMS

Loose mechanical, electrical and C&I items e.g. valves, fittings, pressure/temperature gauges/switches, circuit breakers, relays etc shall be individually wrapped using polyethylene sheets/U foam/ thermocol sheets/air bubble sheets depending upon the items and then packed in wooden boxes. The left out spaces and top of the boxes shall be filled with rubberized coir to get proper cushioning effect, Special attention shall be paid to relays, instruments etc for arresting the movements of their operating mechanism during transportation.

The construction of wooden packing cases shall be as per clause 9.3.1 retaining its all features concerning strength of the box. The construction of wooden packing case for electrical and C&I items shall be as per fig-16.

Inner surface of 6 sides of the box shall be lined with bitumen coated hessian polyethylene kraft paper. Rubberized coir of min. 25mm thickness and 100 mm width shall be nailed to inner surfaces of bottom and 4 sides of the boxes.

#### 11.0 PACKING OF ELECTRICAL ITEMS

##### 11.1 CABLES

**11.1.1 Type of Equipment**  
All type of cables..

##### 11.1.2 Type of Construction

New or practically new cable drums made of steel and painted with epoxy resin paint are to be used. Cable ends are carefully protected before packing. Over the cables polyethylene sheet shall be wrapped and then sealed properly. Cable drum can be put in wooden crates for ease in transportation and handling. (Wooden cable drum is also acceptable, however vendor to furnish constructional details for approval).



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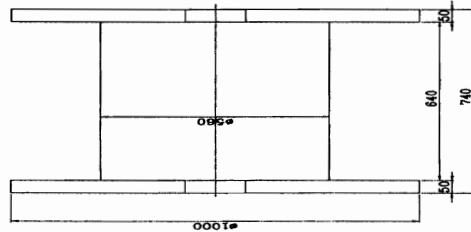
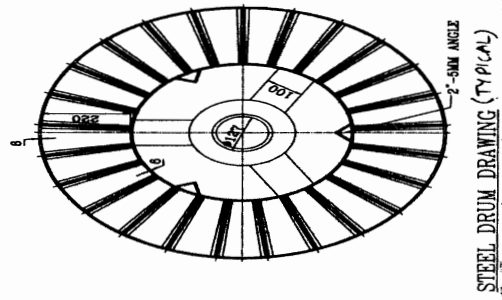
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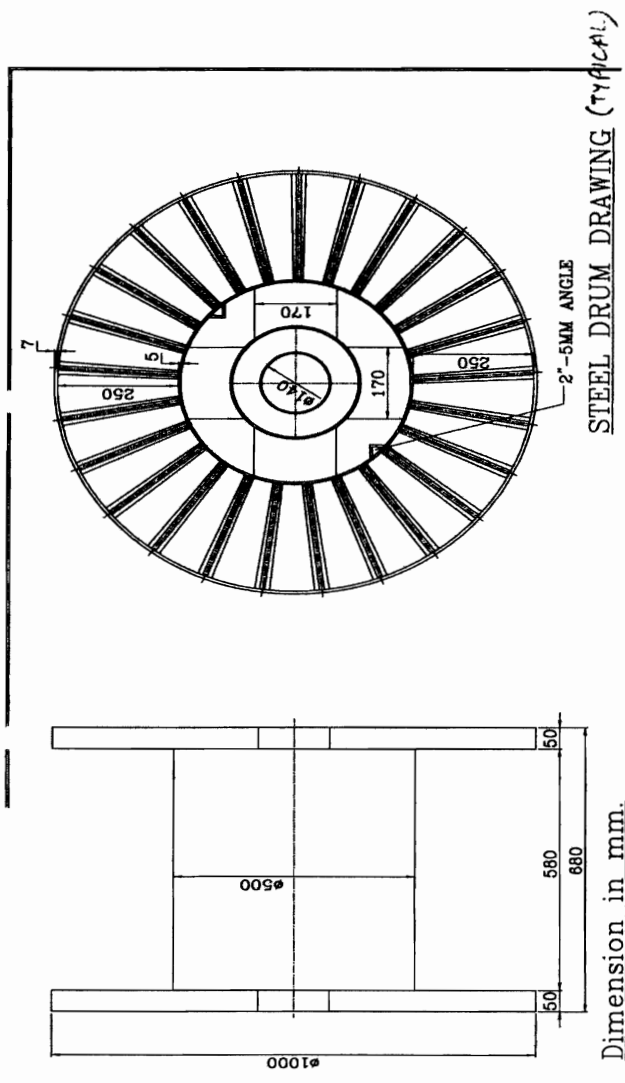
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Dimension in mm.

|                                                                                   |                                                                                                  |                                             |                 |
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## 11.2 PACKING OF CABLE TRAYS & ACCESSORIES AND CABLE TRAY SUPPORT MATERIAL

11.2.1 Cable trays can be packed in wooden boxes as per fig 1 to 11 or in steel boxes. Details of steel box construction is as indicated below.

- 1) All Dimensions are in "mm" unless otherwise stated.
- 2) Packing Box shall be fabricated using 50x50x6mm MS Angle, 50x3mm Flat, 2.5 mm thick C Channel, 1mm & 1.6mm Thick sheet.
- 3) Finish of Packing Box Shall be Galvanized.
- 4) Angle & Channel Section forming part of the Main frame shall be welded thoroughly with each other to give a rigid structure.
- 5) Sheet Section and Flat section shall be bolted/ Riveted/ Welded suitably to the Main frame stated in '4' above.



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- 6) Welding Portion on galvanized surfaces shall be painted with Zinc Rich Paint.
- 7) Dispatch details such as consignor/consignee address, contract and case details, 'country of origin, port of delivery, stacking instructions shall be written on one of the side of boxes. An anodized aluminium plate as per details and specifications given in page 3 of 5 shall be provided on the boxes
- 8) One copy of packing slip wrapped in polythylene bag covered with suitable aluminium .packing slip holder to be nailed on the external surface of the box. One more copy 9f the packing Slip wrapped in polythylene bag to be kept inside the box at the prominent place.
- 9) **INDICATION MARKS ON THE BOXES:** Markings shall be provided on the boxes indicating position of Boxes for handling, storage and nature of consignment. For guidelines referred page 4 of 5. The ink issued for this purpose as well as for marking dispatch instruction shall be indelible/non-washable marking ink.
- 10) Each item as mentioned in BOQ shall be packed & supplied as a set comprising of required numbers of associated fasteners & hardware etc



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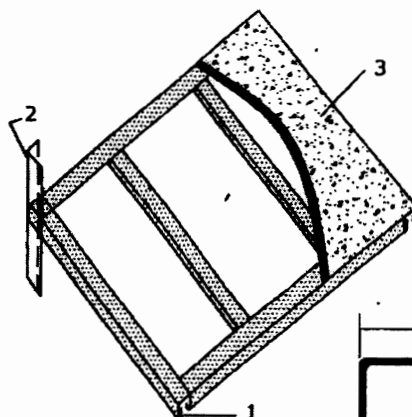
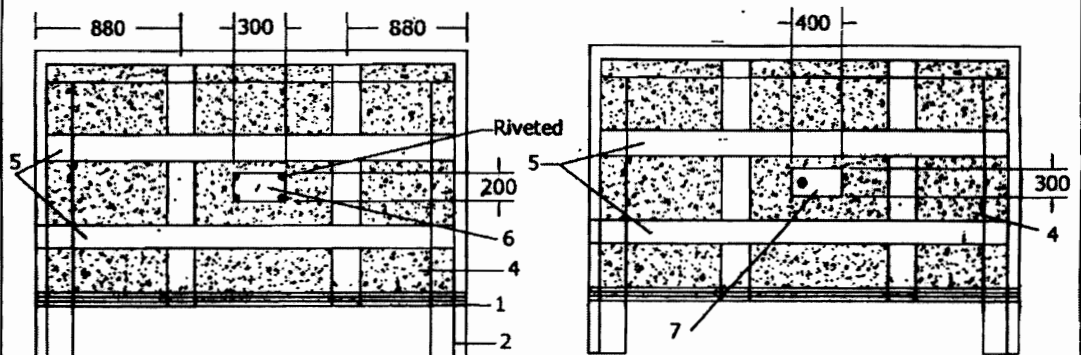
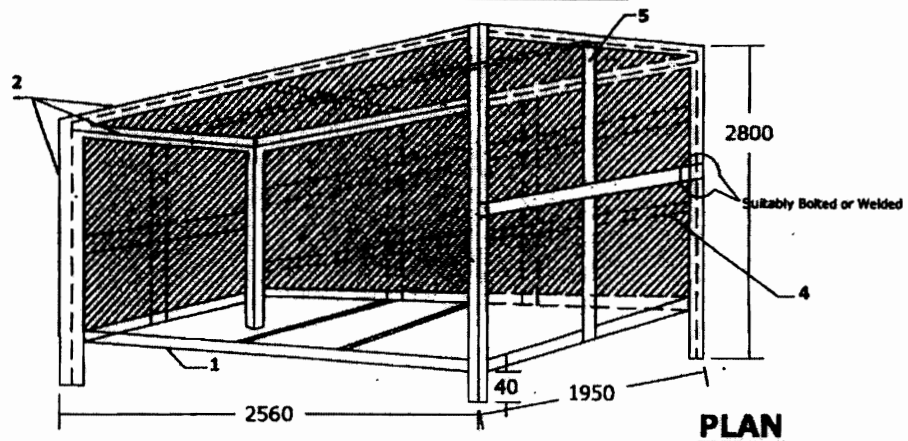
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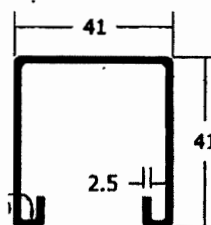
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### STEEL PACKING (TYPICAL DETAILS)



#### Note:

1. "C" Channel to be used on Bottom Frame.
2. 50x50x6 Angle to be used Vertically on four sides of the Box and Horizontally on four sides on the top Frame.
3. 1.6mm thick sheet (plain) on Bottom Plate.
4. 1.0mm thick sheet to cover top & four sides of BOX.
5. 50x3 Flat as additional cross members to be used Horizontally & Vertically on top & Four Sides of Box.
6. Anodised Aluminium Plate for Marking.
7. Hinged Inspection Window.



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### 11.3 PACKING FOR STATION LIGHTING SYSTEM

Aspects of packing specific to equipments / items of station lighting system are given here. All other instructions / aspects as per the main specification of export packing which are not covered here shall also be applicable.

#### 11.3.1 For LIGHTING TRANSFORMER, DISTRIBUTION BOARDS, LIGHTING PANELS,

- Construction of packing case for LIGHTING DISTRIBUTION BOARDS, LIGHTING PANELS, TRANSFORMER . shall be EITHER as per FIGURE 1,2,3,5,6,7,8,9,10,11 OR FIGURE 14,15,16.
- Each Panel/Transformer shall be individually covered with double polythene sheet of thickness 175 microns minimum.
- All the 6 inner surfaces of packing shall be nailed with bitumen coated hessian polythene craft paper. Wherever 2 pieces of craft paper are used, the joint shall have minimum overlap of 20mm.

For the top frame it shall be project on all sides by 100mm and shall be nailed on sides .

- The gap between the panels and packing case shall be filled with rubberized coir of thickness 50mm minimum and width 100mm. The distance between two consecutive supports of rubberized coir shall be less than 500mm.
- Silica get packed in cotton bags shall be placed at different positions inside the packing.
- Packing case shall be finally covered with GI sheet of thickness 0.4mm minimum.

#### 11.3.2 For LUMINARIES, RECEPTACLES. EMERGENCY LIGHT, 240/24V TRANSFORMER, CEILING FAN, SWITCH BOARDS, FLEXIBLE CONDUIT, WIRES, EARTH WIRE. JUNCTION BOXES, ERECTION COMMISSIONING SPARES, RECOMMENDED SPARES , ERECTION MATERIAL AND CONSUMABLES

- Construction of packing case for THE ABOVE MATERIAL shall be as per FIGURE 1to11.
- Items placed inside the case shall be covered with double polythene sheet of thickness 175 microns minimum.
- All the 6 inner surfaces of packing shall be nailed with bitumen coated hessian craft paper. wherever 2 pieces of craft paper are used, the joint shall have minimum overlap of 20mm. For the top frame it shall be project on all sides by 100mm and shall be nailed on sides.
- Silica get packed in cotton bags shall be placed at different positions inside the packing.

#### 11.3.3 For CONDUIT PIPE

As per international practice pipes are shipped in open bundles with metal strapping. Packing as per attached figure A shall be provided which is described as following:

- Each bundle shall be wrapped with 2 layers of 175 microns thick polythene sheet.
- Then bundle will be wrapped with bitumen coated hessian craft paper.
- Bundle shall be strapped with steel straps.
- An anodized aluminium packing description plate as per Figure No. 13 shall be provided.

#### 11.3.4 For POLES

Poles will be wrapped with 2 layers of minimum 175 microns thick polythene sheet and then with bitumen coated hessian craft paper, packed as per Figure – C i.e. bundling.

#### 11.3.5 For STRUCTURAL STEEL

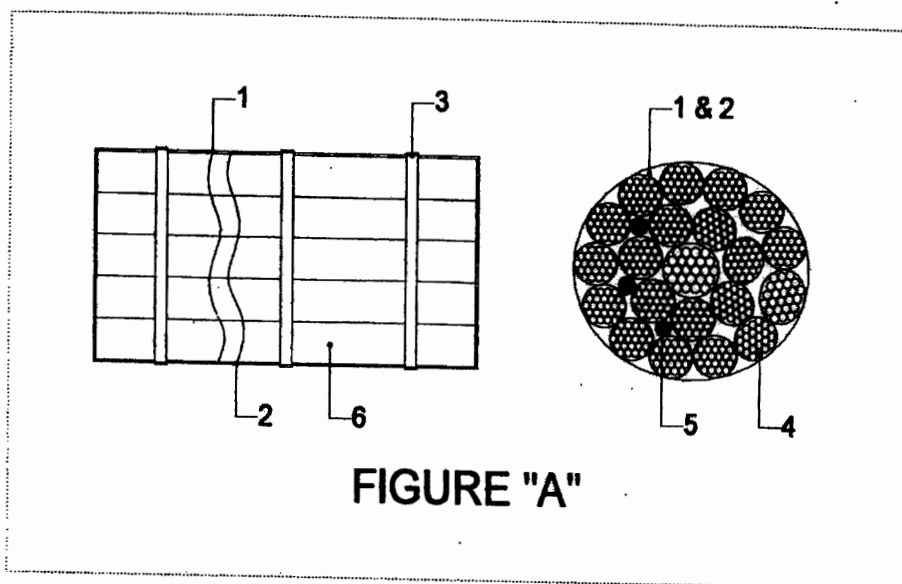
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Structural steel will be different sizes and shapes. Hence it will be packed as per Figure No. B and described as following :

- a) Each bundle shall be wrapped with 2 layers of 175 microns thick polythene sheet.
- b) Then bundle will be wrapped with bitumen coated hessian craft paper.
- c) Bundle shall be strapped with steel straps.
- d) An anodized aluminium packing description plate as per Figure No. 13 shall be provided.

|                                                                                   |                                                                                                  |                                      |                 |
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### **PACKING PROCEDURE FOR CONDUIT PIPE**



**FIGURE "A"**

- 1) LAYER OF BITUMEN COATED HESSIAN KRAFT PAPER.
- 2) LAYER OF POLYTHENE SHEET.
- 3) METAL STRAPPING.
- 4) CONDUIT PIPES.
- 5) SILICA GEL POUCHES.
- 6) BUNDLES OF CONDUIT PIPES.

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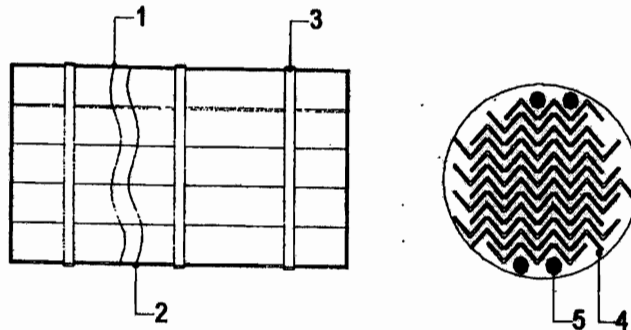
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**PACKING PROCEDURE FOR STRUCTURAL STEEL****FIGURE "B"**

- 1) LAYER OF BITUMEN COATED HESSIAN KRAFT PAPER.
- 2) LAYER OF POLYTHENE SHEET.
- 3) METAL STRAPPING.
- 4) STRUCTURAL STEEL.
- 5) SILICA GEL POUCHES.



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FOR EXPORT JOBS

SPECIFICATION NO. PE-TS-888-100-A001

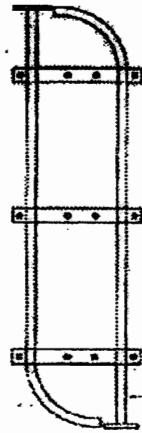
VOLUME II B

SECTION D

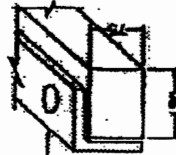
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## packing procedure for poles



POLES WRAPPED WITH POLYTHENE SHEET &  
EXTRUDING COATED HESSIAN CLOTH



TOP WOODEN BATTEN TO BE  
FIXED WITH 150x80x6 MM ON TOP  
OF IT FOR TIEING THE ROD  
25 MM DIA



BOTTOM WOODEN BATTEN TO BE  
FIXED ON 150x80x6 MM ANGLE

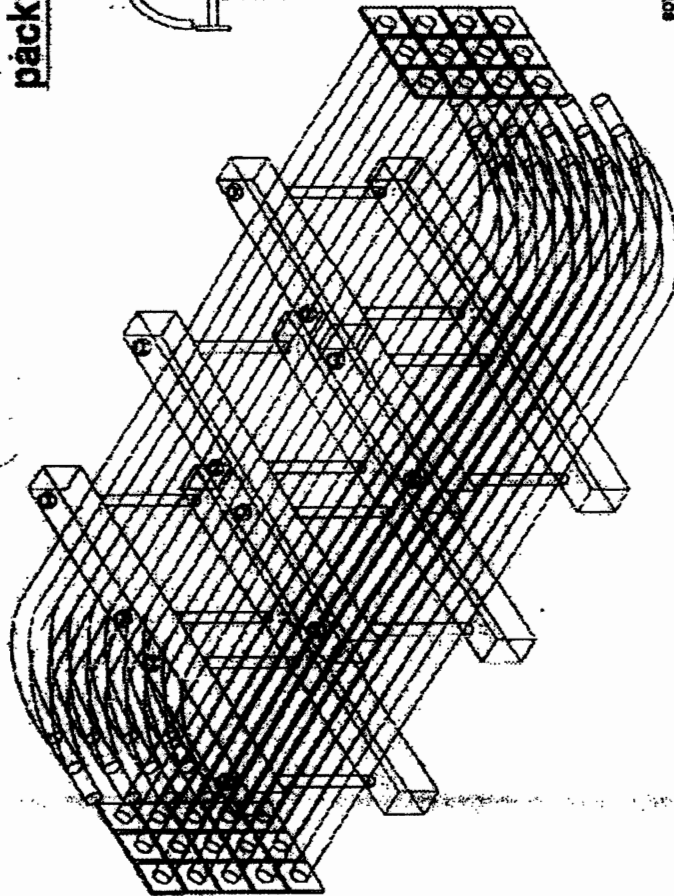


FIGURE "C"

|                                                                                   |                                                                                                  |                                      |                 |
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#### **11.4 PACKING FOR DC BATTERY**

The packing procedure for seaworthy packing of DC Battery is defined below, which is capable of withstanding impacts, compression, vibration, toppling, sea water spray, prevention against rust, temperature and extreme atmospheric conditions. Aspects of packing specific to equipments / items of DC Battery are given here. All other instructions / aspects as per the main specification of export packing which are not covered here shall also be applicable.

The packing procedure consists of various stages namely primary packing, cushioning, securing, desiccant, outside packing box, Runners/ sliders/ transverse bars of plywood, etc., provided for each movement.

- a) The packing boxes shall be made up of plywood boxes (thickness 9mm min.) with blocks at the bottom of the box for provision for handling the boxes using the forklift. The packing boxes sizes are generally standardized to half-euro size (capable of handling equipment's weight).
- b) Rubberized coir of 25mm thickness shall be provided as cushioning material at the bottom and thermocole of 20mm shall be provided inside on all four sides. Other than this polyethylene film wrap or cover also will be provided. Left out spaces to be filled with rubberized coir/ thermocol to get cushioning effect.
- c) Silica gel in dust free air permeable cotton/paper bag shall be placed in the packing boxes for storage period of 1 year as per IS 304 (1979)
- d) While packing the cells, transit caps (polypropylene) of red and blue shall be used for big size cells for ensuring that cells does not get damaged during the transport due to vibrations etc.
- e) The battery accessories shall be packed with suitable precautions as follows:
  - i) Copper connectors shall be packed after making bunches with lead wire seals to avoid misplacement.
  - ii) Hardware items shall be packed in polyethylene bags (Thickness  $\geq 0.175\text{mm}$ ) with item slip
  - iii) Battery rack shall be packed in dismantled condition, wrapped with polyethylene sheet
  - iv) For Ni-Cd type battery, electrolyte in solid form for dry cells shall be packed in cans with KOH, LiOH being packed separately.
  - f) Galvanized Steel straps are provided for binding the packing box sides.
  - g) The handling instructions shall be marked in indelible/ non-washable ink, indicating the upright position.

#### **11.5 PACKING OF SERVICE TRANSFORMERS(OIL FILLED) & ACCESSORIES**

This instruction is applicable for packing of transformers (oil filled), its accessories and components so as to ensure safe delivery to end user. Aspects of packing specific to equipments / items of transformers(oil filled) are given here. All other instructions / aspects as per the main specification of export packing which are not covered here shall also be applicable.

##### **11.5.01 PACKING DETAILS :**

- a) Items shall be packed in case / crates as per the shipping list.
- b) All fragile items and small items shall be packed in cases and to be marked as "Fragile, handle with care Fragile items".
- c) Fragile accessories are to be first packed in their original boxes (VENDOR's packing). Very



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- d small / delicate items such as glass thermometer, door keys shall be packed in separate box.
- d In case original box is found damaged, suitable alternate box or packing method using felt or foam sheet and polythene wrap to be used.
- e These boxes are then placed in identified wooden boxes. Inside of such boxes are lined with a layer of polythene sheet, packing wool / grass and another layer of polythene sheet before placing the boxes. All boxes are then wrapped with this polythene sheet before closing the box. Fragile items shall not be placed loose, one above the other inside the case.
- f All wiring cables, connection flats of non-ferrous materials, CTs, valves bellows shall also be packed.
- g Items like CTs, Oil communicating bushings, insulators, wired equipments and housings such as RTCC Panel, M. Box, Drive Mechanism, thermometers, gauges shall be wrapped in polythene from all around.
- h Buchholz relay and OSR relay openings will be blanked using covers, before putting them in the box
- i Items shall be carefully lowered and arranged inside the crate / case and each item shall be locked from all sides in such a way to avoid its movement in any way. Wooden stoppers and separators shall be provided for this and nailed to the crate / case wood.
- j Wooden planks and batons in contact with fragile items shall be provided with kit foam at the locations of contact.
- k Oil communication bushings shall be packed in separate case on V or U shape wooden felted supports, as in case of condenser bushings.
- l While placing and arranging the items inside the crates / cases, these shall be verified for correctness and then the packing note shall be signed. The cover top of the crate / case shall then be closed.
- m The main equipment like transformer tank shall be packed suitably to prevent any damage during transit / storage. Support structures like frame, header supports etc. shall be crated. Conservator headers shall also be crated. Radiators pipe work and other instruments & components shall be packed in cases. All the cases shall be lined with polythene from inside.

#### **11.6 ALTERNATIVE PACKING CASES FOR CONTROL PANELS AND SWITCH GEARS**

For Control and switch gear panels, construction of wooden packing cases may be provided as per fig 14 & 15 and as detailed below.

Thickness of planks for all sides, binding and jointing battens shall be at least 25 mm. Width of the plank shall be at least 125mm and that of binding and jointing planks shall be at least 100mm.

Top frame shall be suitable so that it does not collapse due to sandwiching between slings while lifting. Longitudinal and traverse bars for the bottom wooden pallet to be suitably selected.

Diagonal bracings shall be as per cl 9.3.1.3 and all other requirements shall be as per clauses 9.3.1.4 to 9.3.1.6.

#### **12.0 Containerization**

As required by BHEL, the VENDOR shall stuff the GOODS into 20 or 40 foot containers (dry, open top, flat racks, etc.).

The maximum inside dimensions of containers are to be considered:

|                                                                                   |                                                                                                  |                                      |                 |    |    |
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- 40 foot containers: 11.80 m x 2.20 m x 2.05 m
- 20 foot containers: 5.80 m x 2.20 m x 2.05m
- 

The present definition of containerization is valid for sea containers only. Vendor to check the size of containers before start of packing of equipment.

#### 12.1 Protection of Cases/Crates

Since shipping containers are in general not water tight, packing in contact with the floor of the container shall be raised in order to prevent it from being damaged by the accumulation of water.

#### 12.2 Mechanical Constraints

The mechanical constraints for "general use" closed containers are of a different nature (height of "stacking" being limited inside the containers), the packing for the GOODS may be of a lighter structure. However, it is necessary that the packing be appropriate so as to protect the GOODS on site during the storage period, as required after discharging of the GOOD'S from the containers.

**Note:**

*It is the responsibility of the VENDOR to ensure that the cases/crates are stowed, secured and fastened inside the container. The VENDOR will take all necessary precautions to conform to the maximum weight allowed and the centre of gravity of the container. The securing and fastening of the cases/ crates can be carried out by nailing timbers on the bottom or on the vertical sides of the container.*

#### 13.0 Other Services to be provided by Vendor

In addition to the packing and shipping documents, VENDOR must also carry out the following services, which shall be included in his quotation:

Carriage of VENDOR's sub-contracted equipment and material, which must be re-grouped in VENDOR's or PACKER's workshops, whilst waiting for packaging.

BHEL reserves the right to postpone the shipping of the GOODS. In this event, any storage and insurance costs during the first ninety (90) days shall be borne by the VENDOR.

Loading, including lifting, securing, lashing, and stowing, of all cases, crates, or packages onto means of transportation such as, but not limited to, trailers, containers, etc.

#### 14.0 Responsibilities and Guarantees

VENDOR is responsible for the choice of category for packing according to the transport facilities used, and on the basis of the present document. In case of doubt or disagreement regarding the choice, VENDOR must inform BHEL prior to packing and await BHEL's approval. All phases of packaging, marking, loading, etc. will be subject to BHEL inspection.

BHEL reserves the right to reject the packing when the packing does not conform to these instructions and/or when the packing does not ensure perfect protection of the GOODS. VENDOR is responsible for the weights and dimensions declared, and the marking of the packages.

The documents must be in strict conformity with the packing contents.

The packing specified in these "Packing, Marking and Shipping Instructions" is guaranteed for a twelve (12) months storage period after delivery on site.

VENDOR is responsible for providing storage recommendation adapted to the GOODS. According to this guarantee, VENDOR is held responsible in the event of goods becoming

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useless, damaged or broken, as a result of poor packing and/or stowing, or due to corrosion, subsequent to insufficient or inadequate protection. All direct or indirect costs resulting thereof, will be back-charged to VENDOR.



**BHEL: BAP: RANIPET**  
**Water Business**  
(Qualification Requirement for Dosing system)

**QUALIFICATION REQUIREMENT for Dosing System for Kilwa 1x371.2 MW**

Ref. RWT70530, Rev.01 Dtd.08.07.2017

The Qualification requirements (QR) for participation in the tender for **Dosing System** is detailed below. Bidders should meet the qualification requirement as specified below. Offers of bidders who do not meet qualification requirement will not be considered.

**QUALIFICATION REQUIREMENT**

“Bidder should have supplied the Dosing system as skid including GRP/FRP tanks, agitator & dosing pump (mechanical diaphragm type & auto controlled diaphragm pump) for the purpose of water treatment in power plant or industrial application. Dosing system shall have supplied for the dosing chemicals like HCl, NaOH, NaOCl, Antiscalant, SBS/SMBS, FeCl<sub>3</sub>, polymers, polymer aid, etc.,

Supplied Dosing skid capacity shall not be less than 10 lph cap pump and dosing tank (FRP/GRP) capacity shall not be less than 100 ltr. Dosing skid major equipment's like dosing pumps and tanks shall be sourced from such manufacturer who has supplied the such dosing pump should have been in successful operation for at least one (1) year prior as on technical bid opening date.

Vendors must have supplied equipment for a similar duty and application with proven experience. Manufacturers/ suppliers/ sub-vendors should have received ISO 9000 qualification (Certification of approval) from International Standard Organisation, at least three (3) years old and such qualifications are currently valid. The contractor shall provide evidence to confirm this qualification when requested.

| Sl. No. | Description                                            | Unit | Values   |
|---------|--------------------------------------------------------|------|----------|
| a.      | Dosing skid capacity ( pump -02 nos. & tank – 02 nos.) | Lph  | 10 (min) |

Documentary evidence to be submitted by the bidder (in support of meeting Qualification requirement)

1. Performance certificate from the end user for the successful operation of the reference plant for minimum one year as on technical bid opening date
2. Purchase Order copy for the reference plant (unpriced)
3. Supporting documents clearly indicating capacity of each Dosing skid, make of dosing pump, auto control of the dosing pump & make of FRP/GRP tank.



**BHEL: BAP: RANIPET**  
**Water Business**  
(Qualification Requirement for Dosing system)

**General**

1. Bidder shall furnish documentary evidence listed above in original (or) notarized legible copy as a proof of meeting the qualifying criteria for BHEL review. The certificate shall contain all required information for the satisfactory performance, such as plant capacity, location of the plant with postal address, date of supply & commissioning, design and actual performance parameters, etc. Acceptance of documentary evidence rests with BHEL.
2. Final acceptance of bidder is subject to the approval of BHEL's customer.

**Qualification Datasheet**

**A. Dosing system Details: -**

**Date of Supply :**

**Date of commissioning:**

| Sl. No. | Parameters                           | Unit | Design | Actual |
|---------|--------------------------------------|------|--------|--------|
| 1.      | Dosing skid capacity                 | LPH  |        |        |
| 2.      | Dosing tank capacity                 | Ltr  |        |        |
| 3.      | Dosing pump make                     |      |        |        |
| 4.      | Type of dosing pump                  |      |        |        |
| 5.      | Type of auto control for dosing pump |      |        |        |
| 6.      | End use                              |      |        |        |

**B. Customer details: -**

- a. Name of the organisation :
- b. Designation :
- c. Mobile :
- d. Land line :
- e. Fax :
- f. Email id :
- g. Postal address :

**Signature of the Bidder with seal**