बिड संख्या/Bid Number: GEM/2025/B/6624750

दिनांक /Dated: 29-08-2025

बिड दस्तावेज़ / Bid Document

बिड विवरण/Bid Details	
बिड बंद होने की तारीख/समय /Bid End Date/Time	08-09-2025 17:00:00
बिड खुलने की तारीख/समय /Bid Opening Date/Time	08-09-2025 17:30:00
बिड पेशकश वैधता (बंद होने की तारीख से)/Bid Offer Validity (From End Date)	180 (Days)
मंत्रालय/राज्य का नाम/Ministry/State Name	Ministry Of Heavy Industries And Public Enterprises
विभाग का नाम/Department Name	Department Of Heavy Industry
संगठन का नाम/Organisation Name	Bharat Heavy Electricals Limited (bhel)
कार्यालय का नाम/Office Name	10250020-pem, Noida
कुल मात्रा/Total Quantity	34882
वस्तु श्रेणी /Item Category	MDBFP Foundation , TDBFP Foundation , Frame for pre-stressing, hydraulic jack system,electric pump, high pressure tubes, manifold, lifting hook, packing plates, supporting stool, steel shims etc , Hydraulic jack system and hand operated pump , Travel to site from outstation and return after completion of work , Supervision at site including boarding, lodging, local conveyance etc all complete
GeMARPTS में खोजी गई स्ट्रिंग्स / Searched Strings used in GeMARPTS	VIS, VIBRATION ISOLATION SYSTEM, VIS, VIBRATION ISOLATION SYSTEM

बिड विवरण/Bid Details	
GeMARPTS में खोजा गया परिणाम / Searched Result generated in GeMARPTS	**Searched String**: VIS Lea Symbols Near Vision Card, SPECTROPHOTOMETER, Distance Vision Testing Drum (V2) - RBSK, Illuminated Near Vision Test Drum (V2) - RBSK, UV - Visible Spectrophotometer (FSSAI), Aapos Vision Screening Kit - RBSK, Dope Dyed Polyester Viscose Uniform Cloth (V2) (MHA), night vision device - night vision equipment, Dynamic Visual Acuity (DVA) For Vertigo Clinics, High Visability Reflective Vest **Searched String**: VIBRATION ISOLATION SYSTEM Isolation Transformer, Revolving Chair (V4), Cronobacter Isolation Agar, NavRakshak Isolation Gown, LED Display System, Anti Vibration Table, Bacterial DNA isolation kit, Anti vibration mounting pad, Whole Body Vibration Unit (Machine), Reverse Osmosis based Water Treatment System above 50 LPH Capacity (V2) **Searched String**: VIS Artificial intelligence, Machine Learning, and Deep Learning as a Service, Hiring of Multimedia Creative Consultants - Manpower Based **Searched String**: VIBRATION ISOLATION SYSTEM Domain Name System (DNS), AMC / CMC of Fire Detection, Fire Alarm, Fire Hydrant and Sprinkler System, Annual Maintenance service - EPABX System, INTEGRATED SECURITY SURVEILLANCE SYSTEM SERVICE, Operation And Maintenance Of HVAC System (Heating, Ventilation And Air Conditioning System), ANNUAL MAINTENANCE SERVICE - VIDEO/DATA WALL, Design, Supply, Installation, Commissioning and Maintenance of Grid Connected Roof Top Solar Power Plant Service, ANNUAL MAINTENANCE SERVICE - VIDEO CONFERENCING SYSTEM, ANNUAL MAINTENANCE SERVICE - AUDIO CONFERENCING SYSTEM, AMC of Integrated Security and Surveillance System
अधिसूचना के लिए चयनित प्रासंगिक श्रेणियाँ / Relevant Categories selected for notification	• Anti vibration mounting pad
बीओक्यू शीर्षक /BOQ Title	VIS FOR BFP FOUNDATION FOR RAGHUNATHPUR
एमएसएमई के लिए अनुभव के वर्षों और टर्नओवर से छूट प्रदान की गई है/MSE Exemption for Years of Experience and Turnover	No
स्टार्टअप के लिए अनुभव के वर्षों और टर्नओवर से छूट प्रदान की गई है /Startup Exemption for Years of Experience and Turnover	No
विक्रेता से मांगे गए दस्तावेज़/Document required from seller	Past Performance,Certificate (Requested in ATC),Additional Doc 1 (Requested in ATC),Compliance of BoQ specification and supporting document *In case any bidder is seeking exemption from Experience / Turnover Criteria, the supporting documents to prove his eligibility for exemption must be uploaded for evaluation by the buyer

बिड विवरण/Bid Details	
क्या आप निविदाकारों द्वारा अपलोड किए गए दस्तावेज़ों को निविदा में भाग लेने वाले सभी निविदाकारों को दिखाना चाहते हैं? संदर्भ मेनू है/Do you want to show documents uploaded by bidders to all bidders participated in bid?	No
बिड लगाने की समय-सीमा बढ़ाने के लिए आवश्यक न्यूनतम सहभागी विक्रेताओं की संख्या। / Minimum number of bids required to disable automatic bid extension	2
दिनों की संख्या, जिनके लिए बिड लगाने की समय-सीमा बढ़ाई जाएगी। / Number of days for which Bid would be auto-extended	7
विगत प्रदर्शन /Past Performance	10 %
बिड से रिवर्स नीलामी सक्रिय किया/Bid to RA enabled	Yes
रिवर्स नीलामी योग्यता नियम/RA Qualification Rule	H1-Highest Priced Bid Elimination
बिड का प्रकार/Type of Bid	Two Packet Bid
प्राथमिक उत्पाद श्रेणी/Primary product category	MDBFP Foundation
तकनीकी मूल्यांकन के दौरान तकनीकी स्पष्टीकरण हेतु अनुमत समय /Time allowed for Technical Clarifications during technical evaluation	7 Days
निरीक्षण आवश्यक (सूचीबद्ध निरीक्षण प्राधिकरण /जेम के साथ पूर्व पंजीकृत एजेंसियों द्वारा)/Inspection Required (By Empanelled Inspection Authority / Agencies pre-registered with GeM)	No
Payment Timelines	Payments shall be made to the Seller within **90** days of issue of consignee receipt-cum-acceptance certificate (CRAC) and on-line submission of bills (This is in supersession of 10 days time as provided in clause 12 of GeM GTC)
मूल्यांकन पद्धति/Evaluation Method	Total value wise evaluation
मध्यस्थता खंड/Arbitration Clause	No
सुलह खंड/Mediation Clause	No

ईएमडी विवरण/EMD Detail

आवश्यकता/Required	No

ईपीबीजी विवरण /ePBG Detail

एडवाइजरी बैंक/Advisory Bank	State Bank of India
ईपीबीजी प्रतिशत (%)/ePBG Percentage(%)	5.00

ईपीबीजी की आवश्यक अवधि (माह) /Duration of ePBG required (Months).	28

(a).ईएमडी और संपादन जमानत राशि, जहां यह लागू होती है, लाभार्थी के पक्ष में होनी चाहिए। / EMD & Performance securityshould be in favour of Beneficiary, wherever it is applicable.

लाभार्थी /Beneficiary :

Ifsc Code SBIN0017313, BRANCH-CAG II NEW DELHI
10250020-PEM, Noida, Department of Heavy Industry, Bharat Heavy Electricals Limited (BHEL), Ministry of Heavy Industries and Public Enterprises
(A/c No. 39922687394)

विभाजन/Splitting

बोली विभाजन लागू नहीं किया गया/ Bid splitting not applied.

Reserved for Make In India products

Reserved for Make In India products	Yes

एमएसई खरीद वरीयता/MSE Purchase Preference

एमएसई खरीद वरीयता/MSE Purchase Preference	Yes

1. Bid reserved for Make In India products: : Procurement under this bid is reserved for purchase from Class 1 local supplier as defined in public procurement (Preference to Make in India), Order 2017 as amended from time to time and its subsequent Orders/Notifications issued by concerned Nodal Ministry for specific Goods/Products. However, eligible micro and small enterprises will be allowed to participate. The minimum local content to qualify as a class 1 local supplier is denoted in the bid document. All bidders must upload a certificate from the OEM regarding the percentage of the local content and the details of locations at which the local value addition is made along with their bid, failing which the bid is liable to be rejected. In case the bid value is more than Rs 10 Crore, the declaration relating to percentage of local content shall be certified by the statutory auditor or cost auditor, if the OEM is a company and by a practicing cost accountant or a chartered accountant for OEMs other than companies as per the Public Procurement (preference to Make-in -India) order 2017 dated 04.06.2020 . In case Buyer has selected Purchase preference to Micro and Small Enterprises clause in the bid, the same will get precedence over this clause.
2. Purchase preference will be given to MSEs having valid Udyam Registration and whose credentials are validated online through Udyam Registration portal as defined in Public Procurement Policy for Micro and Small Enterprises (MSEs) Order, 2012 dated 23.03.2012 issued by Ministry of Micro, Small and Medium Enterprises and its subsequent Orders/Notifications issued by concerned Ministry. If the bidder wants to avail themselves of the Purchase preference, the bidder must be the manufacturer / OEM of the offered product on GeM. Traders are excluded from the purview of Public Procurement Policy for Micro and Small Enterprises and hence resellers offering products manufactured by some other OEM are not eligible for any purchase preference. In respect of bid for Services, the bidder must be the Service provider of the offered Service. Relevant documentary evidence in this regard shall be uploaded along with the bid in respect of the offered product or service and Buyer will decide eligibility for purchase preference based on documentary evidence submitted, while evaluating the bid. If L-1 is not an MSE and MSE Seller (s) has / have quoted price within L-1+ 15% (Selected by Buyer) of margin of purchase preference /price band defined in relevant policy, such MSE Seller shall be given opportunity to match L-1 price and contract will be awarded for 100% (selected by Buyer) percentage of total quantity. The buyers are advised to refer the OM No. F.1/4/2021-PPD dated 18.05.2023 OM_No.1_4_2021_PPD_dated_18.05.2023 for compliance of Concurrent application of Public Procurement Policy for Micro and Small Enterprises Order, 2012 and Public Procurement (Preference to Make in India) Order, 2017. Benefits of MSE will be allowed only if seller is validated on-line in GeM profile as well as validated and approved by Buyer after evaluation of documents

submitted.
3. Estimated Bid Value indicated above is being declared solely for the purpose of guidance on EMD amount and for determining the Eligibility Criteria related to Turn Over, Past Performance and Project / Past Experience etc. This has no relevance or bearing on the price to be quoted by the bidders and is also not going to have any impact on bid participation. Also this is not going to be used as a criteria in determining reasonableness of quoted prices which would be determined by the buyer based on its own assessment of reasonableness and based on competitive prices received in Bid / RA process.
4. Past Performance: The Bidder or its OEM {themselves or through re-seller(s)} should have supplied same or similar Category Products for 10% of bid quantity, in at least one of the last three Financial years before the bid opening date to any Central / State Govt Organization / PSU. Copies of relevant contracts (proving supply of cumulative order quantity in any one financial year) to be submitted along with bid in support of quantity supplied in the relevant Financial year. In case of bunch bids, the category related to primary product having highest bid value should meet this criterion.

5. Reverse Auction would be conducted amongst all the technically qualified bidders except the Highest quoting bidder. The technically qualified Highest Quoting bidder will not be allowed to participate in RA. However, H-1 will also be allowed to participate in RA in following cases:

i. If number of technically qualified bidders are only 2 or 3.
ii. If Buyer has chosen to split the bid amongst N sellers, and H1 bid is coming within N.
iii. In case Primary product of only one OEM is left in contention for participation in RA on elimination of H-1.
iv. If L-1 is non-MSE and H-1 is eligible MSE and H-1 price is coming within price band of 15% of Non-MSE L-1
v. If L-1 is non-MII and H-1 is eligible MII and H-1 price is coming within price band of 20% of Non-MII L-1

MDBFP Foundation

(Minimum 50% Local Content required for qualifying as Class 1 Local Supplier)

तकनीकी विशिष्टियाँ /Technical Specifications

Specification Document	View File
BOQ Detail Document	View File

Advisory-Please refer attached BOQ document for detailed consignee list and delivery period.

परेषिती/रिपोर्टिंग अधिकारी तथा मात्रा/Consignees/Reporting Officer and Quantity

क्र.सं./S.No.	परेषिती/रिपोर्टिंग अधिकारी /Consignee Reporting/Officer	पता/Address	मात्रा /Quantity	डिलीवरी के दिन/Delivery Days
1	PRASANNA MONDAL	723133,BHEL Site Office, Raghunathpur SG Island PH-II Project, Village: Raghunathpur, District- Purulia	16000	240

TDBFP Foundation

(Minimum 50% Local Content required for qualifying as Class 1 Local Supplier)

तकनीकी विशिष्टियाँ /Technical Specifications

Specification Document	View File
BOQ Detail Document	View File

Advisory-Please refer attached BOQ document for detailed consignee list and delivery period.

परेषिती/रिपोर्टिंग अधिकारी तथा मात्रा/Consignees/Reporting Officer and Quantity

क्र.सं./S.No.	परेषिती/रिपोर्टिंग अधिकारी /Consignee Reporting/Officer	पता/Address	मात्रा /Quantity	डिलीवरी के दिन/Delivery Days
1	PRASANNA MONDAL	723133,BHEL Site Office, Raghunathpur SG Island PH-II Project, Village: Raghunathpur, District- Purulia	18816	240

Frame For Pre-stressing, Hydraulic Jack System,electric Pump, High Pressure Tubes, Manifold, Lifting Hook, Packing Plates, Supporting Stool, Steel Shims Etc

(Minimum 50% Local Content required for qualifying as Class 1 Local Supplier)

तकनीकी विशिष्टियाँ /Technical Specifications

Specification Document	View File
BOQ Detail Document	View File

Advisory-Please refer attached BOQ document for detailed consignee list and delivery period.

परेषिती/रिपोर्टिंग अधिकारी तथा मात्रा/Consignees/Reporting Officer and Quantity

क्र.सं./S.No.	परेषिती/रिपोर्टिंग अधिकारी /Consignee Reporting/Officer	पता/Address	मात्रा /Quantity	डिलीवरी के दिन/Delivery Days
1	PRASANNA MONDAL	723133,BHEL Site Office, Raghunathpur SG Island PH-II Project, Village: Raghunathpur, District- Purulia	1	240

Hydraulic Jack System And Hand Operated Pump

(Minimum 50% Local Content required for qualifying as Class 1 Local Supplier)

तकनीकी विशिष्टियाँ /Technical Specifications

Specification Document	View File
BOQ Detail Document	View File

Advisory-Please refer attached BOQ document for detailed consignee list and delivery period.

परेषिती/रिपोर्टिंग अधिकारी तथा मात्रा/Consignees/Reporting Officer and Quantity

क्र.सं./S.No.	परेषिती/रिपोर्टिंग अधिकारी /Consignee Reporting/Officer	पता/Address	मात्रा /Quantity	डिलीवरी के दिन/Delivery Days
1	PRASANNA MONDAL	723133,BHEL Site Office, Raghunathpur SG Island PH-II Project, Village: Raghunathpur, District- Purulia	1	240

Travel To Site From Outstation And Return After Completion Of Work

(Minimum 50% Local Content required for qualifying as Class 1 Local Supplier)

तकनीकी विशिष्टियाँ /Technical Specifications

Specification Document	View File
BOQ Detail Document	View File

Advisory-Please refer attached BOQ document for detailed consignee list and delivery period.

परेषिती/रिपोर्टिंग अधिकारी तथा मात्रा/Consignees/Reporting Officer and Quantity

क्र.सं./S.No.	परेषिती/रिपोर्टिंग अधिकारी /Consignee Reporting/Officer	पता/Address	मात्रा /Quantity	डिलीवरी के दिन/Delivery Days
1	PRASANNA MONDAL	723133,BHEL Site Office, Raghunathpur SG Island PH-II Project, Village: Raghunathpur, District- Purulia	16	730

Supervision At Site Including Boarding, Lodging, Local Conveyance Etc All Complete

(Minimum 50% Local Content required for qualifying as Class 1 Local Supplier)

तकनीकी विशिष्टियाँ /Technical Specifications

Specification Document	View File
BOQ Detail Document	View File

Advisory-Please refer attached BOQ document for detailed consignee list and delivery period.

परेषिती/रिपोर्टिंग अधिकारी तथा मात्रा/Consignees/Reporting Officer and Quantity

क्र.सं./S.No.	परेषिती/रिपोर्टिंग अधिकारी /Consignee Reporting/Officer	पता/Address	मात्रा /Quantity	डिलीवरी के दिन/Delivery Days
1	PRASANNA MONDAL	723133,BHEL Site Office, Raghunathpur SG Island PH-II Project, Village: Raghunathpur, District- Purulia	48	730

क्रेता द्वारा जोड़ी गई बिड की विशेष शर्तें/Buyer Added Bid Specific Terms and Conditions

1. **Generic**

   OPTION CLAUSE: The Purchaser reserves the right to increase or decrease the quantity to be ordered up to 25 percent of bid quantity at the time of placement of contract. The purchaser also reserves the right to increase the ordered quantity up to 25% of the contracted quantity during the currency of the contract at the contracted rates. The delivery period of quantity shall commence from the last date of original delivery order and in cases where option clause is exercised during the extended delivery period the additional time shall commence from the last date of extended delivery period. The additional delivery time shall be (Increased quantity ÷ Original quantity) × Original delivery period (in days), subject to minimum of 30 days. If the original delivery period is less than 30 days, the additional time equals the original delivery period. The Purchaser may extend this calculated delivery duration up to the original delivery period while exercising the option clause. Bidders must comply with these terms.

2. **Buyer Added Bid Specific ATC**

   Buyer uploaded ATC document Click here to view the file.

3. **Inspection**

   Nominated Inspection Agency: On behalf of the Buyer organization, any one of the following Inspection Agency would be conducting inspection of stores before acceptance:
   Pre-dispatch Inspection at Seller Premises (applicable only if pre-dispatch inspection clause has been selected in ATC):

   At vendors works

   Post Receipt Inspection at consignee site before acceptance of stores:
   NA

अस्वीकरण/Disclaimer

The additional terms and conditions have been incorporated by the Buyer after approval of the Competent Authority in Buyer Organization, whereby Buyer organization is solely responsible for the impact of these clauses on the bidding process, its outcome, and consequences thereof including any eccentricity / restriction arising in the bidding process due to these ATCs and due to modification of technical specifications and / or terms and conditions governing the bid. If any clause(s) is / are incorporated by the Buyer regarding following, the bid and resultant contracts shall be treated as null and void and such bids may be cancelled by GeM at any stage of bidding process without any notice:-

1. Definition of Class I and Class II suppliers in the bid not in line with the extant Order / Office Memorandum issued by DPIIT in this regard.
2. Seeking EMD submission from bidder(s), including via Additional Terms & Conditions, in contravention to exemption provided to such sellers under GeM GTC.
3. Publishing Custom / BOQ bids for items for which regular GeM categories are available without any Category item bunched with it.
4. Creating BoQ bid for single item.
5. Mentioning specific Brand or Make or Model or Manufacturer or Dealer name.
6. Mandating submission of documents in physical form as a pre-requisite to qualify bidders.
7. Floating / creation of work contracts as Custom Bids in Services.
8. Seeking sample with bid or approval of samples during bid evaluation process. (However, in bids for attached categories, trials are allowed as per approved procurement policy of the buyer nodal Ministries)
9. Mandating foreign / international certifications even in case of existence of Indian Standards without specifying equivalent Indian Certification / standards.
10. Seeking experience from specific organization / department / institute only or from foreign / export experience.
11. Creating bid for items from irrelevant categories.
12. Incorporating any clause against the MSME policy and Preference to Make in India Policy.
13. Reference of conditions published on any external site or reference to external documents/clauses.
14. Asking for any Tender fee / Bid Participation fee / Auction fee in case of Bids / Forward Auction, as the case may be.
15. Buyer added ATC Clauses which are in contravention of clauses defined by buyer in system generated bid template as indicated above in the Bid Details section, EMD Detail, ePBG Detail and MII and MSE Purchase Preference sections of the bid, unless otherwise allowed by GeM GTC.
16. In a category based bid, adding additional items, through buyer added additional scope of work/ additional terms and conditions/or any other document. If buyer needs more items along with the main item, the same must be added through bunching category based items or by bunching custom catalogs or bunching a BoQ with the main category based item, the same must not be done through ATC or Scope of Work.

Further, if any seller has any objection/grievance against these additional clauses or otherwise on any aspect of this bid, they can raise their representation against the same by using the Representation window provided in the bid details field in Seller dashboard after logging in as a seller within 4 days of bid publication on GeM. Buyer is duty bound to reply to all such representations and would not be allowed to open bids if he fails to reply to such representations.

All GeM Sellers / Service Providers are mandated to ensure compliance with all the applicable laws / acts / rules including but not limited to all Labour Laws such as The Minimum Wages Act, 1948, The Payment of Wages Act, 1936, The Payment of Bonus Act, 1965, The Equal Remuneration Act, 1976, The Payment of Gratuity Act, 1972 etc. Any non-compliance will be treated as breach of contract and Buyer may take suitable actions as per GeM Contract.

यह बिड सामान्य शर्तों के अंतर्गत भी शासित है /This Bid is also governed by the General Terms and Conditions

जेम की सामान्य शर्तों के खंड 26 के संदर्भ में भारत के साथ भूमि सीमा साझा करने वाले देश के बिडर से खरीद पर प्रतिबंध के संबंध में भारत के साथ भूमि सीमा साझा करने वाले देश का कोई भी बिडर इस निविदा में बिड देने के लिए तभी पात्र होगा जब वह बिड देने वाला सक्षम प्राधिकारी के पास पंजीकृत हो।बिड में भाग लेते समय बिडर को इसका अनुपालन करना होगा और कोई भी गलत घोषणा किए जाने व इसका अनुपालन न करने पर अनुबंध को तत्काल समाप्त करने और कानून के अनुसार आगे की कानूनी कार्रवाई का आधार होगा।/In terms of GeM GTC clause 26 regarding Restrictions on procurement from a bidder of a country which shares a land border with India, any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority. While participating in bid, Bidder has to undertake compliance of this and any false declaration and non-compliance of this would be a ground for immediate termination of the contract and further legal action in accordance with the laws.

---धन्यवाद/Thank You---

Index of Annexures

GeM Tender Enquiry for VIS for BFP Foundation for 2X660 MW Raghunathpur Project- TG Island
BHEL PEM ENQUIRY NO. 77/25/6116/SHA, Dated 29.08.25

Sl. No.	Description	Annexures
1.	Additional terms and conditions (ATC)- GeM ATC	
2.	BOQ	Annexure I
3.	Technical PQR	-
4.	Technical Specification	-

2024

BHEL PEM
GEM ATC

PROJECT: 2X660 MW Raghunathpur Project- TG Island

PACKAGE: VIS for BFP Foundation

Letter head of Company

Ref……. Date…….

Reference: <Insert GeM Enquiry Here>

1) For above mentioned project/package & GeM tender, we, …….

understand that our standard pre-printed terms and conditions are not valid and we confirm compliance to all terms and conditions of NIT.

2) GST :-

For this tender, GST is as per below :-

Percentage (%) of GST considered on Ex Works :- _____%

(*Detailed Price Break shall be reverse calculated based on GST percentage furnished by bidder.

3) We confirm that we have submitted Duly signed Local Content certificate and land border certificate as per tender format at Pg. no. **3 & 4** resp. of this document.

Yours very truly

……..(authorized signatory of company)

……..(firm name)

Company's Seal/stamp

Annexure-II

2X660 MW Raghunathpur Project- TG Island – VIS for BFP Foundation

GeM Bid No. & Date _____

Letter head of Company

Ref..... Date.....

To,
Bharat Heavy Electricals Limited
PEM, PPEI Building, Plot No 25,
Sector -16A, Noida (U.P)-201301

Subject: - DECLARATION REGARDING LAND BORDER

Dear Sir,
This has reference to: -

1. Our Offer for Supply of subject package for subject project against above mentioned GeM Tender.

2. Order dated 23.02.2023 reg. restriction under rule 144 (xi) of GFR issued by Ministry of Finance, Department of Expenditure Public Procurement Division.

I have read the clause regarding restriction on procurement from a bidder of a country which shares a land border with India. I hereby certify that **M/s .....,** is not from such a country and and is eligible to be considered/participate in tender enquiry for against aforesaid tender enquiry.

Thanking you,

Yours truly

..... ((highest competent authority at your end (i.e. Owner, partner, CMD, Director etc.))

..... (firm name)

Annexure-III

2X660 MW Raghunathpur Project- TG Island – VIS for BFP Foundation

GeM Bid No. & Date _____

Letter head of Company

Ref.....
Date.....

To,
Bharat Heavy Electricals Limited
PEM, PPEI Building, Plot No 25,
Sector -16A, Noida (U.P) -201301

Subject: - CERTIFICATION REGARDING LOCAL CONTENT

Dear Sir,
For subject project/package/tender, we hereby certify that items offered by us meets the requirement in line with the referred GeM bid and Public Procurement (Preference to Make in India), Order 2017 dated-15.06.2017, 28.05.2018 & 29.05.2019, 04.06.20, 16.09.20 & 19.07.2024 and subsequent orders if any.

Minimum Local Content (in percentage) - %

We further confirm that details of location at which the local value addition is made will be our registered works at ..... (complete address of the works)

We hereby certify that local content calculation has been done in line with revised Public procurement order 2017, dated 19.07.2024.

Yours truly
..... (authorized signatory of company)
..... (firm name)

BHEL PEM GEM ATC

TABLE OF CONTENTS

INTRODUCTION

1. This is a Buyer specific document named Additional Terms & Conditions (ATC). This document is applicable for the enquiry issued on Government e-Marketplace (GeM) portal. These terms and conditions must be read in conjunction with GeM-General Terms & Conditions (GTC).

2. In case of any conflict, terms and conditions stipulated in ATC shall supersede those in GTC on GeM.

INSTRUCTIONS TO THE SUPPLIERS

Suppliers are advised to note the following instructions regarding Bid/Offer submission: -

1. To regularly visit GeM portal to access the tender documents and latest updates about the tender.

2. To study all the tender documents carefully. Any submission of tender by the Supplier shall be deemed to have been done after careful study & examination of the tender documents and with full understanding of the implications thereof. Non-compliance with any of the requirements and instructions in the Tender Enquiry shall be treated as an Incomplete Bid/Offer. Suppliers would be liable for actions as per extant policies/guidelines, if they fail to abide by any of the Policies including the terms and conditions stipulated in this document.

3. Ensure submission of their Bid/Offer on or before the latest due date and time indicated in the tender after taking cognizance of all the tender documents including corrigenda (if any) published against this tender.

4. To submit their Bids/Offers on GeM portal only.

5. Not to send copy of Bid/Offer through any other mode i.e. hard copy and or through email etc. In case Bids/Offers are received through any other mode other than GeM portal from any of the Suppliers against this tender, the same shall be ignored.

6. Incomplete Bid/Offer shall be rejected by giving a suitable cut-off date.

ORDER OF PRECEDENCE

In the event of conflicts or discrepancies among the Contract Documents, interpretations will be based on the following order of precedence:

i. Amendments to Order/ Contract Purchase Order
ii. Order/ Contract Purchase Order
iii. Letter of Intent (LOI)/ Letter of Award (LOA)
iv. Clarifications agreed between Buyer and Supplier in regards to the tender or the bidding conditions
v. Corrigenda to NIT, with those of later date having precedence over those of earlier date
vi. Enquiry letter and annexures except documents listed in point no (vii) to (x) below.
vii. Technical Specifications
viii. Additional Terms & Conditions (ATC)
ix. Special Conditions of Contract (SCC), if any
x. GeM General Terms & Conditions (GTC)

DEFINITION OF TERMS

Throughout the Tender Documents including the Enquiry Letter, the following words shall have the meanings assigned to them herein, unless the subject matter or the context requires otherwise: -

1 **Owner** shall mean the **Customer** or **Client** for whose project the enquiry is issued by Buyer and shall include its successors and assignees as well as authorized officer(s)/ representative(s).

2 **Sub-Supplier** shall mean the person/ firm/ company/ organization to whom any part of the work has been sub-contracted by Seller/Supplier, with the written consent of Buyer, and shall include sub-Contractor's heirs, executors, administrators, representatives and assignees as agreed between Seller/Supplier and Buyer (BHEL).

Note - The term Supplier is used for Seller/ Bidder/ Vendor/Manufacturer in this document. The term Sub-Supplier is used for Sub-Contractor/ Sub-Vendor in this document.

3 **Site** shall mean and include the land and place on which the project station related facilities are to be constructed and any adjacent land which may be allocated or used by *Owner, Buyer or Supplier* in performance of the Order/ Contract.

4 **Erection** shall mean include all work required for complete installation, from receiving, unloading, storage, preservation, to fixing & securing the equipment in its space.

5 **Commissioning** shall mean successful/ satisfactory completion of Trial Operation and readiness of the contracted/ ordered package / plant and materials unit wise/ set wise/ individual sub-system etc. including associated stand by for commercial use. This will include all consumables and inputs required for pre-commissioning.

6 **Inspection Agency (IA)** shall mean person(s) authorized by Buyer / Owner to inspect the stores as per Order/ Contract at Supplier's / Sub-Supplier's works. Suppliers to raise inspection call on BHEL - Quality Surveillance System (https://cqir.bhel.in).

7 **Month** shall mean calendar month and **Week** shall mean 7 days.

8 **Services** shall include Engineering, Study, Calibration, Type Test, Supervision of Erection and/or Commissioning, Installation Check, PG Test, Demonstration, Operation & Maintenance (O&M), Annual Maintenance of Contract (AMC), etc.

9 **Performance Guarantee Test** shall mean a test to be conducted by the Supplier at Site and witnessed by Owner/ Buyer, as per procedure submitted by the Supplier and approved by Owner/ Buyer describing the objective of the test, detailed procedures to test the guaranteed parameters, obligations as per the order/ contract, results presentation procedure and verification & acceptance criterion.

TERMS & CONDITIONS

1	**BID SECURITY/ EARNEST MONEY DEPOSIT (EMD)**
1.1	**a) EMD: Not Applicable**
1.2	~~**Modes of Deposit**: EMD shall be accepted only in the following forms:~~ ~~(i) Electronic Fund Transfer credited in BHEL account (before tender opening): BHEL-PEM account details is given at the link https://pem.bhel.com/Documents/VendorSection/BHELBANKER.pdf~~ ~~(ii) Banker's cheque/ Pay order/ Demand draft, in favour of BHEL (along with offer)~~ ~~(iii) Fixed Deposit Receipt (FDR)~~ ~~(iv) Bank Guarantee from any of the Scheduled Banks~~ ~~(v) Insurance Surety Bonds~~ ~~Scanned copy of EMD shall be uploaded by Supplier in the online bid and hard copy of the same (excluding EFT at pt.1.2(i)) shall have to be submitted to the Buyer within 7 (Seven) working days of bid opening, failing which the bid shall be rejected by giving a suitable cut-off date.~~
1.3	~~The EMD shall remain valid for a period of 45 (forty-five) days beyond the final bid/offer validity period. The EMD shall also be extended in case of extension of bid/offer validity.~~
1.4	~~**Forfeiture and Release/Return of EMD:**~~ ~~i) A Supplier's EMD will be forfeited if the Supplier withdraws or amends its/his tender or impairs or derogates from the tender in any respect within the period of validity of the tender or if the successful Supplier fails to furnish the required performance security within the specified period mentioned in the Tender.~~ ~~ii) EMD by the Buyer shall be withheld in case any action on the Supplier is envisaged under the provisions of extant "Guidelines on Suspension of Business Dealings with Suppliers/ Contractors" of BHEL and forfeited/ released based on the action as determined under these guidelines placed at https://www.bhel.com/supplier-registration.~~ ~~iii) Bid securities of the unsuccessful Suppliers shall be returned to them at the earliest after expiry of the final bid validity period and latest by the 30th day after the award of the contract. However, in case of two packet or two stage bidding, Bid securities of unsuccessful Suppliers during first stage i.e. technical evaluation shall be returned within 30 days of declaration of result of first stage i.e. technical evaluation.~~ ~~iv) Bid security shall be refunded to the successful Supplier on conclusion of the Order/ receipt of a performance security (if applicable).~~
1.5	~~EMD shall not carry any interest.~~
2	**PART-II BID OPENING IS SUBJECT TO FOLLOWING CONDITIONS:**
	i) Qualification of Technical and/or ~~Financial~~ PQR as applicable.

	ii) Techno-commercial compliance to the NIT (Bid). iii) Mandatory conformance to applicable Govt. of India rules/ guidelines/ notifications/ circulars as issued or amended time to time. iv) Approval of bidder by Customer: - Approval shall be taken up by BHEL with end customer.
3	**REGISTRATION IN BHEL-PEM**
	It is strongly recommended that suppliers get themselves registered in BHEL-PEM as a "Regular Supplier". Regular Suppliers for the package are informed about the floated tender enquiries by BHEL-PEM. Suppliers to apply online through registration portal available at www.pem.bhel.com - Vendor Section - Online Supplier Registration. All credentials and/or documents duly signed and stamped related to registration can be uploaded & submitted online through the website.
4	**TECHNICAL PQR**
	a) Technical PQR: Applicable **i)** Supplier has to provide the details as per TECHNICAL PQR in its Offer. Supplier to note that bids of only those Supplier(s) shall be evaluated who meet the Pre-Qualifying requirements. **ii)** This item/package /system falls under the list of items defined in para 3 of ministry of finance guideline dated 20.09.16 (Procurement of items related to Public safety, Health, Critical Security operations & Equipment's etc.) & hence criteria of prior experience/Turnover shall be same for all the Suppliers including Start-up/MSME.
5	**FINANCIAL PQR**
	a) Financial PQR: Not Applicable
5A	Above terms of BHEL PQR(s) shall prevail in conflict (if any).
6	**INTEGRITY PACT (IP): NOT APPLICABLE FOR THIS TENDER**
6.1	~~**a) IP**~~
6.2	~~IP is a tool to ensure that activities and transactions between the Company and its Suppliers are handled in a fair, transparent and corruption free manner. A panel of Independent External Monitors (IEMs) have been appointed by BHEL with the approval of CVC.~~ ~~a) Shri Otem Dai, IAS (Retd.) iem1@bhel.in~~ ~~b) Shri Bishwamitra Pandey, IRAS (Retd.) iem2@bhel.in~~ ~~c) Shri Mukesh Mittal, IRS (Retd.) iem3@bhel.in"~~ ~~The IP (format as enclosed) is to be submitted (duly signed by authorized signatory) along with techno-commercial bid. Only those Suppliers 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.~~ ~~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 any of the IEMs mentioned above. All correspondence with the IEMs shall be done through email only.~~ ~~"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 officials whose contact details are provided below."~~

7	**PQR DOCUMENTS VERIFICATION**
	Suppliers to ensure that Third party / Customer issued certificates being submitted as proof of PQR qualification should have verifiable details of document / certificate issuing authority in the format given below. Suppliers to furnish latest verification details for checking veracity of document(s) by the Buyer. In case the same is found not available, Buyer has right to reject such document(s) from evaluation: -

Sl. No.	Project Name	Customer Name, Contact Address, Phone No. & Email ID	Contract/ Order No.	Value of Contract/ Order	Brief of Work	Completion Date

8	**CONFLICT OF INTEREST**
	A Supplier shall not have conflict of interest with other Suppliers. Such conflict of interest can lead to anti-competitive practices to the detriment of Procuring Entity's interests. **The Supplier found to have a conflict of interest shall be disqualified.** A Supplier may be considered to have a conflict of interest with one or more parties in this bidding process, if: a) they have controlling partner (s) in common; **or** b) they receive **or** have received any direct or indirect subsidy/ financial stake from any of them; **or** c) they have the same legal representative/agent for purposes of this bid; **or** d) they have relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the bid of another Supplier, **or** e) Supplier participates in more than one bid in this bidding process. Participation by a Supplier in more than one Bid will result in the disqualification of all bids in which the parties are involved. However, this does not limit the inclusion of the components/ sub-assembly/ Assemblies from. one bidding manufacturer in more than one bid; **or** f) In cases of agents quoting in offshore procurements, on behalf of their principal manufacturers, one agent cannot represent two manufacturers or quote on their behalf in a particular tender enquiry. One manufacturer can also authorise only one agent/dealer. There can be only one bid from the following: f.i. The principal manufacturer directly or through one Indian agent on his behalf; and f.ii. Indian/foreign agent on behalf of only one principal, **or** g) A Supplier or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the contract that is the subject of the Bid, **or** h) In case of a holding company having more than one independently manufacturing units, or more than one unit having common business ownership/management, only one unit should quote. Similar restrictions would apply to closely related sister companies. Suppliers must proactively declare such sister/ common business/ management units in same/ similar line of business.
9	~~**LIMIT FOR SUPERVISION OF E&C CHARGES–**~~ **Not Applicable**

	~~Supervision of E&C charges, if applicable, should not exceed 2% of the Total Contract Value (including Main Supply, E&C, Mandatory Spares, etc.) excluding freight & GST, failing which the quoted amount shall be adjusted (2% of the total contract value) by Buyer at the time of ordering. Payment shall be made as per the adjusted amount.~~
10	**DETAILED PRICE BREAK-UP**
	Suppliers to mention GST and Freight (%) percentage for all the items as part of un-priced bid to be submitted along with their Techno-Commercial offer.
11	**PRICES**
	Prices shall be FIRM / ~~PVC is applicable,~~ for the entire scope of work in line with the tender documents and subsequent clarifications / confirmations till completion of Order / Contract. ~~PVC Formulae :- Enclosed.~~ ~~PVC Limit :- PVC upper limit shall be limited to +20%, & unlimited for lower limit.~~
12	**DELIVERY SCHEDULE & CONTRACT VALIDITY**
12.1	**1. Delivery Schedule- Main Supply: -** To fulfil GEM portal requirement - Delivery period shall be 240 days from the date of PO. For Contractual purpose - Delivery shall be within 06 (Six) months from the date of Cat-I approval of primary drg. /doc. or manufacturing clearance (whichever is later). Submission /resubmission time and other detail shall as per technical specification PE-TS-390-614-C001 (Rev 0). Notes: - (i) The end period specified is for completion of the deliveries. Deliveries to start progressively so as to meet the completion schedule. (ii) The delivery conditions specified are for contractual LD purposes, however BHEL may ask for early deliveries without any compensation thereof. (iii) Primary documents approval means "last primary document". (iv) Delay in submission /resubmission of primary documents shall be considered for delay analysis and LD calculation purpose. **Delivery Schedule- Supervision of E &C –** Vendor to depute its service engineer for respective site activity within 15 days from BHEL's intimation (for deputing service engineer) for such site activity.
12.2	**1. Validity of Contract (PO rates, terms and conditions):** Supplier has to make supply of goods/services as per the delivery time mentioned above. However, due to unavoidable circumstances where there is delay in providing inputs/ clearances from the Buyer (inputs, engineering approvals, deputing inspector for inspection, issuance of MDCC and/or any hold put by the Buyer for whatever reasons during execution of contract etc.) delivery time extension is admissible. In such situation it shall be obligatory on part of the Supplier to execute the contract at PO rates, terms and conditions provided inputs/ clearances have been accorded within validity of contract. Validity period for various activities shall be as defined below: - **1.1 Validity of the contract for Main supply including quantity variation:**

	Contract shall be valid for 730 days from the PO date. However, delay at Supplier's end (if any) shall be added to the validity period and contract validity shall get extended by the delay period at Supplier's end. **1.2 Validity of the contract for Supply of Services (Supervision of E &C) applicable in the contract:** Validity of contract for supply of ~~mandatory spares~~/ services applicable in the contract shall be one year over and above contractual validity period for main supply including quantity variation as specified at point no. 1.1 above. ~~**1.3 Validity of contract for Performance Guarantee (PG) test:** Validity of contract for PG test shall be till completion of the PG Test.~~ **2.** Main supply including quantity variation, ~~mandatory spares~~/ services applicable in the contract released/ cleared for manufacturing within contractual validity period, to be supplied by Supplier at PO rates, terms and conditions. **3.** Execution of the contract quantities released beyond contract validity period shall be decided on mutual consent basis at PO rates, terms and conditions.
12.3	**Drawing/Document schedule: -** As per technical specification PE-TS-390-614-C001 (Rev 0)
13	**TERMS OF DELIVERY AND INSURANCE**
	13.1 Terms of delivery shall be F.O.R. dispatch station. All dispatches shall be through Road Carriers on Freight Pre-Paid basis. E-way Bill will be arranged by Supplier as per GST law. 13.2 Unloading of items at delivery point shall be in the scope of Buyer. 13.3 Transit Insurance shall be in the Supplier's account.
14	**DOCUMENTS FOR DISPATCH**
	Supplier to submit copy of following documents by e-mail immediately on completion of Supply: - i) Tax Invoice/ e-Invoice (as applicable), ii) LR iii) Packing List, iv) Insurance Intimation, v) E-way bill (as applicable), vi) Copy of BHEL MDCC
15	**PAYMENT TERMS**
	15.1 Payment of Main Supply: 100% Payment shall be released against Consignee Receipt-cum-Acceptance Certificate (CRAC)/MRC (Material Receipt Certificate) on submission of bills. **15.2 Payment of Service(s) Charges:** 100% payment shall be released after successful completion of the activity on pro rata basis against CRAC/ certification by Buyer's Site or Engineering (as applicable) on submission of bills. **15.3 Documents for Payment:** **a) <u>For Supply</u>:**

i) Original Tax Invoice/e-Invoice (as applicable),
ii) Packing List,
iii) LR/Receipted LR,
iv) CRAC/MRC (issued by project site engineer of Buyer/Owner),
v) Guarantee Certificate,
vi) E-way bill (as applicable),
vii) Copy of valid Insurance document and Intimation,
viii) Proof for submission of Performance Security (if applicable),
ix) Copy of BHEL MDCC,
x) PVC Calculation & copy of all applicable indices (if PVC is applicable)

b) <u>For Services:</u>

i) Original Tax Invoice/e-Invoice (as applicable) &
ii) CRAC/certification by Buyer's Site or Engineering (as applicable)

15.4 Payments to Supplier's shall be released only after:

a) Supplier has declared such invoice in GSTR-1as per the relevant GST Act.
b) The tax component charged by the Supplier in the invoice matches with the details uploaded by the Supplier in GSTR-1and GST liability is discharged through GSTR 3B.

In case, any GST credit is delayed/denied to the Buyer due to non/delayed receipt of goods and/or tax invoice or expiry to timeline prescribed in the relevant GST Act for availing such ITC, or any other reasons not attributable to the Buyer, tax amount shall be recovered from the Supplier along with interest levied/ leviable on the Buyer.

15.5 RXIL is an initiative instituted by Govt. of India for MSMEs. PEM strongly advise all the MSME suppliers to get themselves registered on RXIL(TreDs) for faster payments.

15.6 **Time line for Payment:** Payment shall be made within timeline as mentioned below from the date of Completion of Services certified by Buyer's Site/Engineering.

a) Within 45 days for Supplier qualified and registered as Micro or small enterprises as per MSMED Act
b) Within 60 days for Supplier qualified and registered as Medium enterprises as per MSMED Act
c) Within 90 days for suppliers other than (a) & (b) above

The supplier shall ensure submission of complete documents along with the bill. In case of incomplete documents, the bill shall be rejected, and next due date shall start from the date of closure of discrepancy by the Supplier.

Provision of payment outside GeM shall be utilized.

15.7 Notwithstanding anything to the contrary contained in any other document comprising the contract, no interest shall be payable by the Buyer to the Supplier on any money or balances including but not limited to the security amount, Performance Security amount, bank guarantee amount, EMD, retention money, any bills or any amount withheld which may become due owing to difference or misunderstanding or any dispute between the Buyer and the Supplier, or any delay on the part of Buyer in making periodical or final payment or any other aspects incidental thereto.

16	**PERFORMANCE SECURITY**
16.1	~~**a) Performance Security: Not Applicable**~~ **b) Performance Security: Applicable** Supplier may opt any of the following for submission of Performance Security: - **16.1.1**: Initially 10% of the contract value (Total Order value excluding PVC). 5% of the contract value (excluding PVC) will be released after completion of Main Supply based on certification by PG. However, balance 5% of the contract value (excluding PVC) will be released on completion of all contractual obligations, including guarantee/warranty obligations based on certification by PG. Or **16.1.2:** 5% of the contract value (total Order value excluding PVC). Additional 5% of the contract value (excluding PVC) will be deducted & retained from first bill & subsequent bill(s) of the same contract (in case the value of first bill is less than 5% of the contract value). The retention amount will be released after completion of Main Supply based on certification by PG. However, balance 5% of the contract value (excluding PVC) will be released on completion of all contractual obligations, including guarantee/warranty obligations based on certification by PG. **This percentage supersedes the GeM enquiry SD/Performance Security percentage.**
16.2	**Modes of Deposit**: Supplier has to furnish Performance Security in the following forms: (i) Local cheques of Scheduled Banks (subject to realization)/ Pay Order/ Demand Draft/ Electronic Fund Transfer in favour of BHEL. (ii) Bank Guarantee from Scheduled Banks / Public Financial Institutions as defined in the Companies Act. The Bank Guarantee format should have the approval of BHEL. (iii) Fixed Deposit Receipt issued by Scheduled Banks / Public Financial Institutions as defined in the Companies Act (FDR should be in the name of the Contractor, a/c BHEL). (iv) Securities available from Indian Post offices such as National Savings Certificates, Kisan Vikas Patras etc. (held in the name of Contractor furnishing the security and duly endorsed/ hypothecated/ pledged, as applicable, in favour of BHEL). (v) Insurance Surety Bond. BHEL will not be liable or responsible in any manner for the collection of interest or renewal of the documents or in any other matter connected therewith.
16.3	Performance Security is to be furnished within 14 days from the date of PO/LOA and it should remain valid for a period of 60 (sixty) days beyond the date of completion of all contractual obligations of the supplier, including warranty obligations. Initial validity of Performance Security shall be as per GeM Bid

16.4	Performance Security value can be proportionately reduced after completion of Guarantee Period Unit-wise/ Stage-wise/Set-wise/Scope wise (Main Supply/Mandatory spares/Services excluding PG test) subject to the units/sets/stages/Scope (Main Supply/Mandatory spares) being explicitly specified in delivery terms in the contract. However, Performance Security for the last unit/set/stage will be released only after completion of all contractual liability or guarantee period, whichever is later.
16.5	**Forfeiture and Release/Return of Performance Security**: i) The Performance Security will be forfeited and credited to BHEL's account in the event of a breach of contract by the Supplier. ii) Performance Security shall be refunded to the Supplier without interest, after he duly performs and completes the contract in all respects but not later than 60 (Sixty) days of completion of all such obligations including guarantee/warranty under the contract. iii) If Performance Guarantee (PG)/ Demonstration Test and handing over of the system/ package (if applicable), as per Order/ Contract is not conducted up to 36 months from supply completion for reasons not attributable to the Supplier then Performance Security for total contract shall be released on submission of undertaking by the Supplier that Performance Guarantee (PG)/ Demonstration Test and handing over of the system/ package shall be conducted as and when required by Buyer.
16.6	The Performance Security shall not carry any interest.
17	**LIQUIDATED DAMAGES (LD):**
	Timely dispatch/delivery and completion of other schedules as stipulated in Order/Contract shall be the essence of Order/Contract. If the Supplier fails to complete the dispatch/delivery and other schedules within the time period stipulated in Order/Contract, or within any extension of time granted by the Buyer, it shall be lawful for Buyer to recover damages for breach of Order/Contract and hereunder. **17.1** Buyer reserves the right to recover from the Supplier, as agreed liquidated damages and not by way of penalty, a sum equivalent to half (½) percent of the total contract value excluding GST per week or part thereof, subject to a maximum of ten (10) percent of the total contract price excluding GST **on undelivered portion of the order/contract**. **17.2** LD on service portion where delivery for services are defined separately in the Order/Contract. LD shall be applicable @ ½ percent, of the total service contract value excluding GST per week or part thereof. However, total LD (main supply and services) shall be limiting to 10% of cumulative total contract value (main supply +services) excluding GST. **17.3** ~~LD on mandatory spares portion where delivery for mandatory spares is defined separately in the Order/Contract. LD shall be applicable @ ½ percent, of the total of mandatory spares contract value excluding GST per week or part thereof, limiting to 10% of total contract value of mandatory spares excluding GST.~~ **17.4** In case of any amendment/ revision, LD shall be linked to the amended/ revised contract value and delivery date(s).

	17.5 LR/RR date for indigenous supplies shall be treated as the date of dispatch for levying LD. **17.6** If Order/ Contract involves two or more Units/ Sets/ Stages, then Liquidated Damages shall be levied on order/ contract value excluding GST of the delayed Unit/ Set/ Stage, provided delivery stipulated in the Order/ Contract is Unit/ Set/ Stage wise and total LD amount shall be limited to 10% of total Order/ amended Order value excluding GST of delayed Unit/ Set/ Stage. **17.7** The sum specified above is not a penalty but a genuine pre-estimate of the loss/ damage which will be incurred by the Buyer directly or indirectly on account of delay in delivery of material/equipment/services on the part of the Supplier and the said amount will be deductible without proof of actual loss or damage caused by such delay. "Supplier to essentially quote prices against each line item of the BOQ in the respective columns. 'NIL', 'Free of Cost', 'Zero' etc. shall not be mentioned for any line item of the BOQ. In such case, Liquidated Damages shall be levied on the Total order/ contract value instead of undelivered portion of the Order/ contract. Also, if price of any line item (X) is mentioned 'Included' in any other line item (Y), then in case of delay in delivery of item (X), LD shall be applicable on value of item (Y)."
18	**GUARANTEE TERMS**
	18.1 The successful bidder shall guarantee the performance of the steel helical springs and viscous dampers for 24 months from the date of commissioning of each machine which shall be termed as "Guarantee Period". **18.2** All Shortages/damages in sound cases shall be replenished free of cost by the Supplier, as early as possible however, not exceeding more than 45 days from the time of reporting the shortage/damage. **18.3** For shortages/damages during transit, Supplier shall supply replacements free of cost as early as possible, within 45 days from the time of reporting the defect/ loss/ rejection etc. by the Buyer/ Owner/ Site. **18.4** For shortages/damages during handling at site, Supplier shall supply replacements, as early as possible, at the old contractual rates upon intimation to Supplier within 45 days from the time of reporting the defect/ loss/ rejection etc. **18.5** All replacements and repairs during the guarantee period shall be delivered and completed promptly and satisfactorily within a period of 45 days from the time of reporting the defect/ loss/ rejection etc. Damaged items/parts can be taken back by Supplier on his own cost with the permission of Owner. **18.6** All the replaced and replenished plant/ equipment/ stores shall also be guaranteed as per PO terms.
19	**INSPECTION**
	19.1 Buyer and/or Buyer's nominated Inspection Agency shall have at all reasonable times access to Supplier's premises or works and shall have the power at all reasonable times to inspect drawings of any portion of the work or examine the materials and workmanship of the plant/ equipment/ stores during their manufacture, and if part of the plant/ equipment/ stores is manufactured at

	other premises, the Supplier shall arrange for inspection, examination and testing by the Inspection Agency as if the plant/ equipment/ stores is manufactured on the Supplier's premises. Procedure for approval of works shall be as per the procedure given on https://cqir.bhel.in/Cqir/jsp/Masters/Help_File_for_suppliers.pdf Inspection calls should be raised by the Supplier on BHEL - Quality Surveillance System (https://cqir.bhel.in). Such inspection, examination and testing by itself shall not relieve the Supplier from any obligation under the Order/ Contract. **19.2** Supplier shall give Inspection Agency reasonable notice of 15 days of any material being ready for testing and the Inspection Agency shall (unless the inspection of tests is voluntarily waived) attend at the Supplier's premises within seven (7) days of the date on which the material is notified as being ready. Tests are to be performed as per Buyer approved QAP (if applicable). **19.3** In case of delay in witnessing of inspection beyond stipulated time (i.e. 7 days from the proposed date of inspection as notified by the Supplier through e-mail/call raised on BHEL - Quality Surveillance System (https://cqir.bhel.in) by the Buyer arising due to reasons not attributable to Supplier, Buyer will extend the delivery period for such delay in witnessing inspection. If the Buyer is not able to witness inspection up to 15 days then in addition to delay beyond stipulated period, 7 days' additional time shall also be given to the Supplier to facilitate for arranging fresh inspection. ~~**19.4**~~ Where the Order/ Contract provides for tests/ inspections at the premises or works of the Supplier or any Sub-Contractor, the Supplier, except specified otherwise, shall provide free of charge such assistance, labour, materials, electricity, fuel, water, stores, apparatus, measuring instruments and test equipment including any other facilities as may be reasonably required to carry out such tests efficiently.
20	**MATERIAL DISPATCH CLEARANCE CERTIFICATE (MDCC)**
	20.1 When the tests have been satisfactorily completed at Supplier's works, the Inspection Agency shall issue an inspection report that effect within seven (07) days after completion of the tests, but if the tests were not witnessed by the Inspection Agency or his representative, the material acceptance report would be issued within seven (07) days after receipt of the test certificates by the Buyer. **20.2** Buyer will issue MDCC to the Supplier within 7 days based on inspection report/ test certificates/Certificate of Conformance as applicable. In case of delay in issuance of MDCC beyond 7 days stipulated time (i.e. from the date of receipt of Inspection Report/Test certificates), by the Buyer due to reasons not attributable to the Supplier, Buyer shall extend the delivery period for such delay in issuing MDCC. If the Buyer is not able to issue MDCC up to 15 days then in addition to delay beyond stipulated period, 7 days' additional time shall also be given to the Supplier to facilitate for arranging logistics arrangements. **20.3** Supplier shall not dispatch any material before issue of MDCC by the Buyer.
21	**PACKING LIST**

	Packing shall be in conformity with specifications and shall be such as to ensure prevention of damages, corrosion, deterioration, shortages, pilferage and loss in transit or storage. Suppliers to submit Packing List along with advance set of documents for claiming payment which must indicate: i. No. of boxes ii. Packing size. iii. Gross weight and net weight of each package. iv. Contents of the package with cross reference to BoM item code no. or item serial no. v. Quantity of each item separately. The Packing list must cover all the BoM items and supplier to give the following undertaking in the Packing List: "The Packing List provided herewith is as per the BoM approved under Contract No.-……..…dated- …….."
22	**DELIVERY EXTENSION: EXTENSION OF CONTRACTUAL DELIVERY TIME**
	Delivery time mentioned in the NIT includes full scope as mentioned in specification. Due diligence is to be observed by the Supplier to ensure timely completion of services as per specification. During the execution of the contract, time loss occurred owing to the reason attributable to the Buyer besides force majeure shall be considered for delivery time extension to the Supplier as given below: i) Any Delay in providing Engineering input from buyer. ii) Delay in deputing inspector for inspection and delay in release of MDCC in line with clause no. 20 above. iii) Any hold put by Buyer for whatever reasons during execution of contract (within contract validity period), time extension equivalent to hold period shall be admissible. However, in the event hold period continues for more than 30 days then, an additional 15 days for the purposes of mobilization and demobilization of resources shall also be admissible. Supplier to note that Extension in delivery period if any with or without imposition of LD shall be considered after detailed delay analysis based on provisions given above. Supplier to provide dates of drg./doc. submission & re-submission (if any) within 7 days of Cat-I approval. However, no delay analysis will be applicable if supply/service is completed within delivery schedule as specified in Order/ Contract.
23	**BREACH OF CONTRACT, REMEDIES AND TERMINATION**
	In case of Breach of Contract, BHEL shall recover 10% of the contract value from the Supplier using following instruments: (i) encashment of security instruments like EMD, Performance Security with PEM against the said contract. (ii) balance amount (if value of security instruments is less than 10% of the contract value) from other financial remedies i.e. available bills of the Supplier, retention amount etc. with PEM. (iii) balance amount from security instruments like EMD, Performance Security and other financial remedies i.e. available bills of the Supplier, retention amount etc. with other units of BHEL. (iv) Any other mode as deemed fit by the Buyer at its sole discretion. (v) if recovery is not possible then legal remedies shall be pursued.

	However, Supplier shall continue performance of the Order/ Contract, under all circumstances, to the extent not cancelled.
24	**SUSPENSION OF BUSINESS DEALINGS**
	The "Guidelines on Suspension of Business Dealings with Suppliers/ Contractors" is placed at https://www.bhel.com/supplier-registration and, same shall prevail over Incident Management Policy of GeM.
25	**SUPPLIER PERFORMANCE MONITORING AND RATING SYSTEM**
	Supplier's performance will be evaluated as per Supplier Performance Monitoring and Rating System of BHEL. Please refer BHEL website www.bhel.com for details.
26	**CONFIDENTIALITY**
	Supplier shall, at all times, undertake to maintain complete confidentiality of all data, information, software, drawings & documents, etc. belonging to the Buyer and also of systems, procedures, reports, input documents, manuals, results and any other company documents discussed and/ or finalized during the course of execution of Order/ Contract. i.e. Supplier shall in no way share or use such intellectual property of Buyer to promote his own business with others. Buyer reserves the right to claim damages from the Supplier, or take appropriate penal action as deemed fit against the Supplier, for any infringement of the provisions contained herein.
27	**INTELLECTUAL PROPERTY & LICENSES**
	If any patent, design, trademark, trade secret or any other intellectual property rights apply to the delivery or accompanying documentation/drawings, Buyer or its customer shall be entitled to the legal use thereof free of charge by means of a non-exclusive, assignable, transferrable, sub-licensable, worldwide, perpetual license. All intellectual property rights that arise due to the execution of the delivery by the Supplier and by its employees or third parties involved by the Supplier for the performance of the contract shall be promptly notified by the Supplier to the Buyer and shall be deemed to belong to the Buyer. The Supplier shall be obligated to cooperate with the Buyer and do everything necessary to obtain or perfect the above-mentioned rights in favour of the Buyer. The Supplier represents and guarantees that the delivery does not infringe on any of the intellectual property rights of third parties. In the event a third party makes a claim, the Supplier shall also be obligated to do everything necessary to obtain or establish the alternate acceptable arrangement pending resolution of any (alleged) claims by third parties. The Supplier agrees to indemnify, defend and hold harmless the Buyer, its officers, employees, agents, representatives, successors, assignees or any of the Buyer's customers buying or using the goods or services specified herein, against any actual or alleged infringement of such intellectual property interests, claims by third parties in this regard and shall pay to the Buyer merely on demand without demur and without requiring the Buyer to furnish any proof of such claim, such sum as indicated in the demand towards any liabilities, damages, penalties, injuries, claims, demands, actions, cost and expenses etc. suffered as a result thereof. The Supplier agrees that its liability under this clause shall be unlimited.
28	**QUANTITY VARIATION:** Quantity Variation of +/-25% of GeM GTC shall be utilized.

29.	**Additional Instructions to Bidder: -** a) Bidders to inform GST percentage for all the items as part of un-priced bid to be submitted along with their Techno-Commercial offer. However, negotiation/PBO shall be on Total Evaluation (FOR as per GeM) price only as per GeM logics. For Order Placement, detailed Price Break up shall be reverse calculated based on GST percentage furnished by bidder. b) In course of evaluation, if more than one bidder happens to occupy L-1 status, effective L-1 will be decided by soliciting discounts from the respective bidders. In case more than one bidder happens to occupy L-1 status even after soliciting discounts, the L1 bidder shall be decided by a toss / draw of lots, in the presence of respective bidder(s) or their representative(s). Ranking will be done accordingly. BHEL's decision in such situation shall be final and binding. c) Bidders to, • Ensure compliance of Ministry of Finance (MoF) Order (Public Procurement No. 4) F. No. 7/10/2021(1) PPD dt. 23.02.23. to submit "Model Certificate for Tenders" as per Annexure-III of Ministry of Finance (MoF) Order (Public Procurement No. 4), dt:- 23/02/23 Note: Subsequent orders/circulars to be checked and to be complied. d) The Bidder declares that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s). This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process. In case, the bidder is found having indulged in above activities, suitable action shall be taken by BHEL as per extant policies/guideline. e) "For this procurement, the local content to categorize a supplier as a Class I local supplier/ Class II local Supplier/ Non-local supplier and purchase preference to Class I local supplier, is as defined in Public Procurement (Preference to Make in India), Order 2017 dated 19.07.2024 issued by DPIIT. In case of subsequent orders issued by the nodal ministry, changing the definition of local content for the items of the NIT, the same shall be applicable even if issued after issue of this NIT, but before opening of Part-II bids against this NIT" **For this tender Only class – I bidder are eligible to participate and local content requirement is minimum 50%.** f) In case of joint bidding, bidders to furnish scope matrix which should be clearly defined between them along with the offer for the complete scope. g) "**Grievance Redressal Mechanism: -** To promote transparency and ensure fair treatment of all bidders, a structured Grievance Redressal Mechanism is in place to address any concerns or issues arising during the tendering process or in subsequent business dealings with the company. Suppliers/Contractors are requested to follow the below escalation process for grievance resolution: 1. First Level: Any grievance should initially be addressed to the designated Dealing Officer, whose contact details are provided in the Notice Inviting Tender (NIT)/Contract. 2. Second Level: If the issue remains unresolved, it may be escalated by lodging a formal grievance through the SUVIDHA Portal: https://suvidha.bhel.in/suvidha/. Responses will be provided in accordance with the defined escalation matrix."

30.	All correspondence thereof, shall be addressed to the following: -

Mr. Shamik Gupta/Engr./PG-I M/s Bharat Heavy Electricals Ltd., Project Engineering Management, PPEI Building, HRD & ESI Complex, Plot No 25, Sector-16 A, Noida-201301 E-MAIL: shamikgupta@bhel.in Ph. No. 97163366332	Mr. Shree Prakash Yadav/Sr. Mgr./PG -I M/s Bharat Heavy Electricals Ltd., Project Engineering Management, PPEI Building, HRD & ESI Complex, Plot No 25, Sector-16 A, Noida-201301 E-MAIL: spyadav@bhel.in Ph. No. 9911775641

31.	Prices quoted over GeM shall be FOR prices inclusive of all taxes and duties. Bidders to take due diligence in quoting prices over GeM.
32.	Being non- divisible package, MSE preference shall be given in line with extant guidelines in vogue.
33.	All other terms & conditions shall be as per GeM bid, above GeM Additional Terms & Condition and GTC on GeM 4.0 (version 1.25 dated 14.07.25)

2X660 MW RAGHUNATHPUR TPP PHASE-II (STG PACKAGE)		Spec. No.	PE-TS-390-614-C001		
		PREP BY	CHD BY	APPD BY	Date: 08/07/2025
BOQ FOR VIBRATION ISOLATION SYSTEM (VIS) FOR FOUNDATIONS		KN	AD	SP	
ST NO	**Item Description**	**Unit**	**Quantity (A)**	**UNIT EX-WORKS PRICE (INR) (B)**	**TOTAL EX-WORKS PRICE (INR) (C)=(A)x(B)**
1	Supplying Vibration Isolation System (VIS) consisting of Steel helical spring units and viscous dampers with required load carrying capacities for atleast 90% isolation of dynamic loads including providing adhesive pads, templates, painting, packing, transportation, necessary manuals etc. all complete as per specification and drawing for the following (Quantity specified is the total vertical load carrying capacity of the VIS which shall be measured for the payment).				
(a)	MDBFP Foundation	kN	16000		
(b)	TDBFP Foundation	kN	18816		
2	Supplying associated auxiliaries etc. all complete for installation and commissioning of VIS for foundations specified in ST NO. 1 as per specification, drawing and as directed by engineering-in-charge.				
(a)	Frame for pre-stressing, hydraulic jack system,electric pump, high pressure tubes, manifold, lifting hook, packing plates, supporting stool, steel shims etc.	Lumpsum	1		
(b)	Hydraulic jack system and hand operated pump.	Lumpsum	1		
3	Supervision during installation and commissioning of VIS as per the specification and as directed by engineer-in-charge comprising the following:				
(a)	Travel to site from outstation and return after completion of work.	Each	16		
(b)	Supervision at site including boarding, lodging, local conveyance etc. all complete.	Day	48		
GRAND TOTAL					

Project: 2 x 660 MW Raghunathpur TPP, Ph-II

Enq. No: 77/25/6116/SHA, Dated 29.08.25

Package: VIS for TD/MD BFP Foundation

S. no.	Description	UOM	Required Load carrying Capacity (kN) for each foundation	Unit Ex Works Price (Rs.)	Total Ex-works (Rs.)	FREIGHT % IN W.R.T TOTAL EX-WORKS (IN %)	FREIGHT AMOUNT (Rs.)	TOTAL PRICE (EXWORKS + FREIGHT) (Rs.)	GST@18% ON EX-WORKS + FREIGHT (Rs.)	TOTAL FOR SITE PRICE (Rs.)
	Supply									
A	**Supplying Vibration Isolation System (VIS) consisting of Steel helical spring units and viscous dampers with required load carrying capacities for atleast 90% isolation of dynamic loads including providing adhesive pads, templates, painting, packing, transportation, necessary manuals etc. all complete as per specification and drawing for the following (Quantity specified is the total vertical load carrying capacity of the VIS which shall be measured for the payment).**									
A1.1	VIS FOR MD BFP Foundation	kN	16000							
A1.2	VIS FOR TD BFP Foundation	kN	18816							
B	**Supplying associated auxiliaries etc. all complete for installation and commissioning of VIS for foundations specified in Sl NO. 1 as per specification, drawing and as directed by engineering-in-charge.**									
B1	Frame for pre-stressing, hydraulic jack system,electric pump, high pressure tubes, manifold, lifting hook, packing plates, supporting stool, steel shims etc.	Lumpsum	1							
B2	Hydraulic jack system and hand operated pump.	Lumpsum	1							
	Total Cost of Supply									
C	**Supervision of Erection & Commissioing-Supervision during installation and commissioning of VIS as per the specification and as directed by engineer-in-charge comprising the following:**									
C1	Travel to site from outstation and return after completion of work.	Each	16							
C2	Supervision at site including boarding, lodging, local conveyance etc. all complete	Day	48							
	Total Cost of Supervision									
D	**Total Cost of package (Supply + Supervision)**									

FORM NO. PEM 6100-0

	PRE - QUALIFYING REQUIREMENTS	DOCUMENT NO: PE-TS-390-614-C002
		REVISION NO: 0 DATE: 07-07-2025
		SHEET: 1 of 1

ENQUIRY NO: Dated:

PROJECT: RAGHUNATHPUR THERMAL POWER PROJECT PHASE-II (2X660MW)

PACKAGE: VIBRATION ISOLATION SYSTEM (VIS) FOR MDBFP FOUNDATION & TDBFP FOUNDATION

PRE-QUALIFYING REQUIREMENT CRITERIA FOR EVALUATION (TECHNICAL / ~~FINANCIAL~~):

Bidder should have successfully executed the following in last ten (10) years as on the due date of bid submission: -

- Bidder should have supplied and commissioned/supervised during commissioning, Steel Helical Spring and Viscous damper based Vibration Isolation System (VIS) for foundation of rotary type machine viz fan/blower/pump/turbine having minimum machine weight of 200 kN and operating frequency of at least 8 Hz in a power plant or in any other industry including civil design engineering of RCC deck supported on the VIS for at least two (2) projects and the VIS should be in successful operation for at least one year since commissioning of the machine.

The documentary proof in support of the above requirements shall be submitted by the bidder along with the bid.

Note: -

In case supplier is not original equipment manufacturer (OEM), offer shall be evaluated as per point 1. of "General PQR" available at https://pem.bhel.com/PMD/PQR%20Document/C%20and%20IT/GENERAL%20PQR.pdf

PREPARED BY:	REVIEWED BY:	APPROVED BY:
NAME: Keshav Negi DESIGNATION: SR. Manager DEPT.: Civil	NAME: Animesh Das DESIGNATION: SR. DGM DEPT.: Civil	NAME: Sachin Pandit DESIGNATION: AGM DEPT.: Civil

FORM NO. PEM 6100-0

	PRE - QUALIFYING REQUIREMENTS	DOCUMENT NO: PE-TS-390-614-C002
		REVISION NO: 0 DATE: 07-07-2025
		SHEET: 1 of 1

ENQUIRY NO: Dated:

PROJECT: RAGHUNATHPUR THERMAL POWER PROJECT PHASE-II (2X660MW)

PACKAGE: VIBRATION ISOLATION SYSTEM (VIS) FOR MDBFP FOUNDATION & TDBFP FOUNDATION

PRE-QUALIFYING REQUIREMENT CRITERIA FOR EVALUATION (TECHNICAL / ~~FINANCIAL~~):

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The documentary proof in support of the above requirements shall be submitted by the bidder along with the bid.

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PREPARED BY:	REVIEWED BY:	APPROVED BY:
NAME: Keshav Negi DESIGNATION: SR. Manager DEPT.: Civil	NAME: Animesh Das DESIGNATION: SR. DGM DEPT.: Civil	NAME: Sachin Pandit DESIGNATION: AGM DEPT.: Civil

RAGHUNATHPUR THERMAL POWER PROJECT
PHASE-II (2X660 MW)
STEAM TURBINE & GENERATOR PACKAGE

TECHNICAL SPECIFICATION
FOR
VIBRATION ISOLATION SYSTEM
FOR
MDBFP FOUNDATION (4 NOS)
TDBFP FOUNDATION (4 NOS)

SPECIFICATION NO.: PE-TS-390-614-C001 (Rev 0)

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA-201301

CONTENTS

This Technical Specification consists of two Sections:

SECTION-I

SPECIFIC TECHNICAL REQUIREMENTS

1.0 GENERAL

1.01 This specification consists of Section-I and Section-II.

In the event of Contradictions between Section-I and Section-II, the requirements mentioned in the Section-I shall prevail.

1.02 Applicable input drawings of the equipment to be supported on the foundation are as listed in Table-1.

Table-1

Sl. No.	TITLE	DRAWING NO.
1	GENERAL ARRANGEMENT OF TDBFP SET (SHEET 1OF2)	HY-DG-1-180-00-57592 (R0)
2	GENERAL ARRANGEMENT OF TDBFP SET (SHEET 2OF2)	HY-DG-1-180-00-57592 (R0)
3	FOUNDATION ARRANGEMENT FOR BFP & DRIVE TURBINE (SHEET 1OF3)	HY-DG-1-31301-06335 (R1)
4	FOUNDATION ARRANGEMENT FOR BFP & DRIVE TURBINE (SHEET 2OF3)	HY-DG-1-31301-06335 (R1)
5	FOUNDATION ARRANGEMENT FOR BFP & DRIVE TURBINE (SHEET 3OF3)	HY-DG-1-31301-06335 (R1)
6	GENERAL ARRANGEMENT OF MDBFP SET (SHEET 1OF1)	HY-DG-1-180-00-57591 (R0)
7	FOUNDATION ARRANGEMENT OF MDBFP SET (SHEET 1OF2)	HY-DG-1-180-00-57593 (R0)
8	FOUNDATION ARRANGEMENT OF MDBFP SET (SHEET 2OF2)	HY-DG-1-180-00-57593 (R0)

1.03 Bidder shall furnish the information about the entire range of spring units, damper units and spring-cum-damper units, manufactured/supplied by the bidder along with the offer. The information to be furnished should include the load carrying capacity, stiffness (vertical & horizontal), damping resistance, dimension of spring and damper units as well as the quality plan.

1.04 Customer shall select springs and dampers (nos. and type) based on the information furnished by bidder in Cl. no. 1.03 of this specification during detailed engineering and the bidder shall be required to supply the springs finally selected by customer.

1.05 General Project Information is furnished in the Table-2 below: -

Table-2

1.	Owner	DAMODAR VALLEY CORPORATION (DVC)
2.	Project	2X660 MW RAGHUNATHPUR TPP PHASE -II (STG PKG)
3.	No. of Units	2 (Two)
4.	Consultant	NTPC Ltd.
5.	Location	Raghunath Sub-division of Purulia District, West Bengal
6.	District	Purulia- 38 KM
7.	Nearest Major Town	Raghunathpur- 7 KM
8.	Nearest Railway Station	Sanka R.S. on Adra-Bhajudih Broad Gauge line of S.E. Railway – 11KM
9.	Approach Road	Neamatpur- Purulia State Highway – 7 KM

2.0 SCOPE

2.01 SUPPLY OF VIBRATION ISOLATION SYSTEM (VIS):

Supply of Vibration Isolation System shall consist of steel helical spring units and viscous dampers with required load carrying capacities for at least 90% isolation of dynamic loads including providing templates and adhesive pads for the following: -

- 4 Nos. of MDBFP foundation
- 4 Nos. of TDBFP foundation

Bidder shall provide the manuals for installation strategy of the VIS and maintenance indicating equipment, procedures etc. required for installation and replacement of vibration isolation system mentioning the required downtime involved.

2.02 SUPPLY OF ASSOCIATED AUXILIARIES FOR INSTALLATION AND COMMISSIONING OF VIBRATION ISOLATION SYSTEM: -

Associated auxiliaries for installation and commissioning of vibration isolation system shall include the following:

- Frames for pre-stressing of spring elements.

- Suitable hydraulic jack system including electric pumps, high pressure tubes, manifold, lifting hook, packing plates, supporting stool, steel shims or any other minor tools as required for the pre-stressing, erection, release of pre-stress, alignment, commissioning and any other misc. works etc.
- One additional set of hydraulic jack and hand operated pump.

Supply shall include painting, packing and transportation as well.

2.03 SUPERVISION OF INSTALLATION AND COMMISSIONING OF THE VIBRATION ISOLATION SYSTEM

Bidder shall deploy experienced manpower for supervision during installation and commissioning of the vibration isolation system including pre-stressing of elements, placing of elements in position, checking clearances on the shuttering of the RCC top deck, releasing of pre-stress in spring elements, making final adjustments and alignments etc.

Bidder shall provide the details of readiness to be ensured by BHEL at site prior to deploying the bidder's manpower to site for supervision. Bidder shall deploy the manpower to site for supervision after receiving invitation from BHEL.

2.04 CIVIL DESIGN ENGINEERING OF RCC DECK SUPPORTED ON VIBRATION ISOLATION SYSTEM (Excluded from Bidder's scope)

The design of supporting arrangement for the equipment supported on steel helical springs and viscous dampers shall be done by the Employer/Customer. The supporting arrangement shall consist of an RCC deck supported on steel helical springs units and viscous dampers which in turn shall be supported on Steel structure. The RCC deck and substructure shall be provided by the Employer/Customer.

~~Civil Design engineering shall consist of the following:~~

~~**i) Selection of Vibration Isolation System:**~~

~~The selection of vibration isolation system shall be done by the bidder, such that the amplitude at bearing locations are within permissible limits, as per machine supplier recommendation or as per ISO 10816, whichever is stringent.~~

~~**ii) Dynamic analysis as per codes, manufacturer guidelines and specification:**~~

~~The dynamic analysis shall consist of free vibration analysis and forced vibration analysis. The fundamental natural frequency shall be sufficiently above or below the frequency corresponding to operating speed of the machine. Transient analysis shall be carried out for the short circuit / blade failure condition with an appropriate force function, if required by the machine supplier.~~

~~**iii) Static analysis as per codes, manufacturer guidelines and specification:**~~

~~The static analysis shall include the~~

- ~~Dead weights of machine stationary parts~~

- Dead weights of machine rotary parts
- Loads due to machine power torque
- Loads due to maximum allowable unbalance
- Temperature loads
- Loads due to blade unbalance/short circuit
- Erection loads
- Seismic loads
- Any other loads given by the machine supplier.

Various load combinations must be investigated to obtain the most severe loads for foundation design purpose as per relevant IS codes or as per machine supplier recommendation, whichever is more critical.

iv) Check for Shaft Misalignment

Foundation deck must be adequately stiff to withstand all operating load combinations without excessively upsetting the rotor shaft alignment. The structural design must carefully be analysed for relative deflection of the members supporting machine shaft to satisfy the limits as given by machine supplier, if any.

v) Design of RCC Deck supported on vibration isolation system

Bidder shall provide General arrangement drawing of deck showing location and supporting detail of vibration isolation system, all embedment and their details as per the machine supplier drawing.

RCC design shall be done by working stress method for all machine foundations. Minimum reinforcement shall be governed by IS: 2974 and IS:456.
All documentation shall be in English language and all RCC/structural design shall be conforming to the relevant Indian Standard Code of practice.

Following calculations and details shall also be furnished by bidder: -

- Calculation of loads on substructure (below vibration isolation system) along with their points of application and deflection limitations.

vi) Documentation

All documents shall be in English language and SI unit of measurement shall be followed.

Bidder shall furnish following documents for approval of BHEL/ BHEL's customer:

- Bill of materials of various elements included in the supply along with detailed specifications of system and various items including list of standards (local or international) to which they conform. In case bidder uses codes, which are not in English, English translated copy shall be furnished by the bidder.

- General Arrangement (GA) drawing showing location and supporting details of vibration isolation system. (Excluded from Bidder's scope)

- ~~GA and reinforced concrete details drawings for RCC deck (supported on vibration isolation system) including bar bending schedule~~. (Excluded from Bidder's scope)
- ~~Embedment drawings showing location of all embedment and their details pertaining to RCC deck (supported on vibration isolation system).~~ (Excluded from Bidder's scope)
- ~~Analysis and Design document.~~ (Excluded from Bidder's scope)
- Methodology of providing the shuttering and its removal as well as concreting of RCC deck (supported on vibration isolation system), installation of vibration isolation system and sequence of above operation.
- Painting scheme for VIS to be submitted for approval including item codification / description of all coats of paints for manufacturer's, from whom the paint is intended to be procured.

3.0 DOCUMENTS TO BE SUBMITTED BY BIDDER

Document submission schedule after the award of contract shall be as below:

BHEL DRG NO	DRG TITLE	Drg Submission schedule
Primary Documents - affecting Manufacturing/ Delivery Directly		
PE-V0-390-614-C201	Data sheet of VIS for MDBFP/TDBFP Foundation	First submission within two (02) weeks from LOI/PO or receipt of inputs (whichever is later) & subsequent revisions within 10 days of comments received from BHEL/ Customer.
PE-V0-390-614-C202	QAP of VIS for MDBFP/TDBFP Foundation	
PE-V0-390-614-C203	Painting Scheme of VIS for MDBFP/TDBFP Foundation	
Secondary Documents - NOT affecting Manufacturing / Delivery Directly		
PE-V0-390-614-C204	Test certificate of VIS for MDBFP/TDBFP Foundation	After inspection

The documents shall be submitted as mentioned below:

i. Soft copy of all documents/drawings shall be furnished in soft (PDF) format.
ii. Hard copies shall be submitted.
iii. Submission of drawings/documents shall be as mentioned in the Table-3.

Table-3

	Drawing	Document
For Approval	Soft copy + 02 nos. hard copies	Soft copy + 02 nos. hard copies
~~For RFC~~	~~Soft copy + 10 nos. hard copies~~	~~Soft copy + 04 nos. hard copies~~

4.0 SEISMIC LOADING:

Seismic loading shall be calculated adopting the site-specific seismic information as specified in **ANNEXURE-EQ.**

5.0 WIND LOADING:

Basic wind speed at project site is 44 m/sec. as per IS:875(Part-3, Latest revision) upto a height of 10 metres above mean ground level.

Terrain Category-2 shall be considered for all structures.

Risk coefficient (k1) shall be considered as 1.07.

Notwithstanding the design wind forces calculated based on above parameters, the structures shall not be designed with a wind pressure less than 1.5 KN/ sq. m.

6.0 RCC DECK (SUPPORTED ON VIBRATION ISOLATION SYSTEM) (Exclude from Bidder's scope)

~~Minimum grade of concrete: M30.~~

~~Reinforcing bars will be TMT bars of grade Fe500 conforming to IS-1786.~~

7.0 ADDITIONAL REQUIREMENTS

- ~~Natural frequencies of structures and components shall be away from the running speed of equipment by at least 20% generally but for important ones it shall be away by at least 30%. However, frequency separation criteria and amplitude criteria as laid down in IS:2974 and/or DIN 4024 and/or VDI 2056 and/or as required by the machine manufacturer, whichever is more stringent shall also be satisfied. A fatigue factor of 2.0 shall be considered for dynamic forces/due~~

~~to normal unbalance. For design of foundation of large fans etc. provision shall be kept in the foundation for addition of mass/area for retuning of the foundations, if required at a later date.~~ (Excluded from Bidder's scope)

- ~~In case of machines supported on VIS with springs and viscous dampers it shall be ensured that not more than 5% of the dynamic loads are transmitted to the substructure. Necessary provisions of DIN 4024 shall be adhered to while designing the substructure. Substructure shall be designed for static loads.~~ (Excluded from Bidder's scope)

- The vibration isolation system shall consist of helical spring units and viscous dampers supporting the RCC inertia block which support the machine. The spring units shall conform to DIN 2089 and DIN2096.

- ~~For all equipment foundations supported on VIS, the stiffness of the supporting substructure shall be at least ten (10) times that of spring elements as per DIN 4024.~~ (Excluded from Bidder's scope)

- All steel surfaces shall be provided with self-curing Inorganic Zinc Silicate Primer Coat (Solid by volume minimum 60%) of minimum 75-micron DFT applied over blast cleaned surface to near white metal conforming to Sa2-1/2 finish of Swedish standard SIS-05-5900. The Primer Coat shall be applied in Shop immediately after blast cleaning by Airless Spray technique.

- Primer Coat shall be followed with the application of Intermediate Coat of Polyamide Cured pigmented Titanium Dioxide (TiO2) or Micaceous Iron Oxide (MIO) Epoxy based Paint (Solid by Volume Minimum 60%) of Minimum 75 Micron DFT. This Coat shall be applied in Shop after an interval of Minimum overnight (after the application of Primer Coat) by Airless spray technique.

- Intermediate Coat shall be followed with the application of Finish Coat of Polyamide Cured colour pigmented Epoxy based Paint (Solid by Volume Minimum 60%) of Minimum 75 Micron DFT. This Coat shall be applied after an interval of Minimum overnight and maximum indefinite (after the application of Intermediate Coat) either before Erection by Airless spray technique or after Erection by brush and / or spray. Colour and shade of the Coat shall be as approved by the Employer. The Finish Coat thickness of 75 Micron can be built up either in Single application at Shop or in two applications one at Shop and the other at Site.

- Finish Coat shall be followed with the application of Final Finish Coat of Polyurethane based colour pigmented Paint (Solid by Volume Minimum 40%) of Minimum 25 Micron DFT. This Coat shall be applied within Seven (7) days (after the completion of Finish Coat), after Erection by brush and/or spray. Colour and shade of the Coat shall be as approved by the Employer.

8.0 GENERAL REQUIREMENT

Steel helical springs and viscous dampers shall be provided for equipment requiring foundations with vibration isolation system by the supplier with requisite experience and proven track record.

8.01 Material

- The objective of designing the supporting arrangement for any rotating equipment shall be so that the vibration level is maintained as minimum as possible under all operating conditions. Accordingly, respective rotating equipment shall be supported on RCC deck slab which in turn shall rest on vibration isolation unit consisting of steel helical springs and viscous dampers, which in turn shall be supported on RCC supporting structure

- The spring units shall have definite stiffness in both vertical and horizontal directions with the horizontal stiffness not less than 50% of vertical stiffness. The stiffness shall be such that the vertical natural frequency of any spring unit at its rated load carrying capacity is not more than 3 Hz.

- The damper units or spring-cum-damper units shall be of viscous type offering velocity proportional damping. The damper units shall be suitable for temperatures ranging from 0 to 50 deg. C. The damping resistance of individual damper units shall be such that the designed damping is provided using reasonable number of units. Damper shall have damping resistance ranging from 40 kN sec/m to 750 kN sec/m.

- The size of the spring units, damper units and spring-cum-damper units shall be such that groups of such units can be accommodated on column heads in case of elevated foundations and on pedestals/walls in case of foundations at ground level.

- The steel helical springs and viscous dampers shall be designed for minimum operating life of 30 years.

8.02 Manufacturing & Testing

- Complete manufacturing and testing of the steel helical springs and viscous dampers shall be done at the manufacturing shop of the approved sub-vendor/supplier. For this purpose, the successful bidder/sub vendor shall submit the detail program for approval of engineer and take up the manufacturing/testing after approval of such program. The program shall include:
  - i Manufacturing schedule and quality check exercised during manufacturing
  - ii Detail of tests to be carried out at the manufacturing shop with their schedule.
  - iii Special requirements, if any, regarding concreting of top deck.
  - iv Complete step-by-step procedure covering the installation and commissioning of the spring system.
  - v Manuals for erection, commissioning, testing and maintenance of the steel helical springs and viscous dampers.
  - vi A checklist for confirming the readiness of the civil fronts for erection of steel helical springs and viscous dampers.
  - vii Checklist for equipment required at each stage of erection.
  - viii Bill of materials (data sheet) of various elements such as spring units, viscous dampers, with their rating, stiffness etc. included in the supply.
  - ix Bill of materials (data sheet) for frames for pre stressing, hydraulic jack including electric pump, high pressure tubes, hand operated pump etc. with their rating and numbers.
  - x Any other details which may be necessary to facilitate design and construction of the foundations/structures.

- The springs shall conform to codes DIN 2089 and DIN 2096. The quality assurance and inspection procedures shall be finalized on the basis of the above codes and the quality plans be drawn accordingly.

8.03 Erection, Commissioning and Supervision

- Complete erection and commissioning of the steel helical springs and viscous dampers including pre-stressing of elements, placing of elements in position, checking clearances on the shuttering of the RCC top deck, releasing of pre-stress in spring elements, making final adjustments and alignments etc. all shall be done by a specialist supervisor of supplier/sub vendor trained for this purpose.
- The scope of work shall be deemed to include all activities, which may not have been explicitly mentioned but are reasonably implied for the successful commissioning of steel helical springs and viscous dampers.
- The successful bidder shall guarantee the performance of the steel helical springs and viscous dampers for 24 months from the date of commissioning of each machine which shall be termed as “Guarantee Period”.
- If any realignment of the steel helical springs and viscous dampers is required to be done for aligning the shaft or for any other reasons during the first one year of operation from the date of commissioning of the machine, the same shall be done by the bidder.

8.04 Acceptance Criteria

Stiffness values shall be checked. The permissible deviations shall be as per DIN 2096. Following acceptance criteria shall be followed:

- General workmanship shall be good in line with the recommendation of the manufacturer and as approved by the Engineer.
- Tolerances are within the specified limit.
- Material test certificate (MTC) is in compliance with the applicable codes/standards.
- Bought out material is from the approved manufacturer/vendor.
- Bought out material is matching with the approved sample.

8.05 Codes and Standards

Latest revision of following codes shall be used for the design of the spring supported foundation:

IS: 456	Code of practice for plain and reinforced concrete.
IS: 2974	Code of practice for design and construction of machine foundations.
IS:1893	Criteria for earthquake resistant design of structures
DIN:4024	Machine foundation; Flexible supporting structures for machine with rotating masses
DIN: 2089	Helical compression springs out of round wire and rod: calculation & design
DIN: 2096	Helical compression springs out of round wire and rod: quality requirements for hot formed compression springs.
VDI: 2056	Criteria for assessing mechanical vibrations of machine.
VDI: 2060	Criteria for assessing the state of balance of rotating rigid bodies.

SECTION-II

STANDARD TECHNICAL SPECIFICATION

1. GENERAL REQUIREMENTS

a. The total number of springs in a vibration isolation system module should be even.

b. The ratio of actual spring supported weight to the nominal spring capacity shall not be more than 0.8.

c. The vibration isolation system module should be structurally stable. Stability of the module in all direction needs to be ensured under maximum loads.

d. The springs shall conform to latest version of codes DIN EN 13906-1 and DIN 2096 or equivalent.

e. The damper units or spring cum damper units should be of viscous type offering velocity proportional damping.

f. The damper units shall be suitable for temperatures ranging from 0 to 50^0 C.

g. The damping resistance of the individual damper units shall be such that the designed damping can be provided using reasonable number of units.

h. The size of the spring units, damper units, spring cum damper units should be such that groups of such units can be accommodated on column heads in case of elevated foundations and on pedestals/walls in case of foundations at ground level.

i. The vibration isolation system module in the same foundation should have same deflection under its rated load carrying capacity. The height of all the modules to be used in a foundation must be same.

j. Bidder shall furnish manufacturer's test certificate for the bought out items.

k. The steel helical springs and viscous dampers shall be designed for a minimum operating life of 30 years.

l. The material specification requirement has been mentioned in the reference Quality plan attached in this specification.

m. The system shall be capable of withstanding seismic/ wind forces.

2. MANUFACTURING & TESTING

2.1 The bidder shall submit the detailed programme for approval of BHEL/BHEL's customer and take up the manufacturing / testing after approval of such programme. The programme / quality plan shall include:

i. Manufacturing schedule and quality check exercised during manufacturing.

ii. Detail of tests to be carried out at the manufacturing shop with its schedule.

iii. Special requirements, if any, regarding concreting of RCC deck (supported on vibration isolation system).

iv. Complete step- by- step procedure covering the installation and commissioning of the spring system.

v. Manuals for installation, commissioning, testing and maintenance of the steel helical springs and viscous dampers.

vi. A checklist for confirming the readiness of the civil fronts for erection of steel helical springs and viscous dampers.

vii. Checklist for equipment/auxiliaries required at each stage of erection.

viii. Bill of materials (data sheet) of various elements such as spring units, viscous dampers, with their rating, stiffness etc. included in the supply.

ix. Bill of material (data sheet) for frames for pre-stressing, hydraulic jack including electric pump, high pressure tubes, hand operated pump etc. with their rating and numbers.

x. Any other details which may be necessary to facilitate design and construction of the foundations / structures.

2.2 The springs shall conform to codes DIN EN 13906-1 and DIN 2096. The quality assurance and inspection procedure shall be finalised on the basis of the above codes and the quality plans be drawn accordingly.

3. QUALITY PLAN AND INSPECTION REQUIREMENTS

3.1 Bidder shall furnish the quality plan and Test certificate for the material in their scope of supply. The quality plan shall be reviewed by BHEL/BHEL's Customer wherein the inspection and hold points shall be indicated. Bidder shall submit test certificate based on approved quality plan.

3.2 Quality requirements shall be as per quality plan attached in the specification. Quality plan shall be subject to approval during detail engineering. No additional price implication shall be admissible for conducting any additional tests as per Quality plan approved by BHEL/BHEL's Customer.

3.3 Quality plan will be subject to BHEL/BHEL's Customer approval & customer hold points for inspection/ testing shall be marked in the Quality plan at the contract stage. Inspection/ testing shall be witnessed as per same apart from review of various test certificates/ Inspection records etc.

3.4 Inspection for imported item shall be done by third party inspection agency (approved by BHEL) and certificate shall be submitted for review of BHEL. The charges for 3rd party inspection at foreign location for imported components shall be included by the bidder in the rate quoted for the VIS.

4. PACKING AND TRANSPORTATION

4.1 All supply items shall be suitably protected, coated, covered, boxed and crated to prevent damage or deterioration during transit and handling.

4.2 The bidder shall be responsible for any loss or damage during transportation, handling at site.

4.3 The packing and transportation of supply items shall be done as per the BHEL Corporate standard no. AA0490010. Packing shall be of type “CQ” as per BHEL corporate standard or equivalent. In case transportation involves sea route, the BHEL standard no. AA0490004 shall be followed for sea worthy packing and transportation.

5. ENVIRONMENTAL PROTECTION

Vibration isolation system shall be suitably protected against environmental damages viz. abrasion, discolouration, corrosion, oily water etc. to give a prolonged service matching the plant life.

6. PERFORMANCE GUARANTEE

Bidder shall guarantee the performance of the vibration isolation system for 24 months from the date of commissioning of machine which shall be termed as “Guarantee Period”.

7. CODES AND STANDARDS

Latest revision of following codes or equivalent international standard shall be used for the design of the spring-supported foundations:

1) IS: 456	Codes practice for plain and reinforced concrete.
2) IS: 2974	Code of practice for design and construction of machine foundations.
3) IS: 1893	Criteria for earthquake resistant design of structures.
4) DIN: 4024	Machine foundations; Flexible supporting structures for machine with rotating masses
5) DIN EN 13906-1:	Helical compression springs out of round wire and rod: calculation & design.
6) DIN: 2096	Helical compression springs out of round wire and rod: Quality requirements for hot formed compression springs.
7) ISO 10816 (Part 1 to7)	Mechanical vibration – Evaluation of machine vibration by measurements on non-rotating parts.

ANNEXURE – EQ

ANNEXURE-EQ

CRITERIA FOR EARTHQUAKE RESISTANT DESIGN OF STRUCTURES AND EQUIPMENT

All structures and equipment shall be designed for seismic forces adopting the site specific seismic information provided in this document and using the other provisions in accordance with IS:1893 (Part 1):2002 and IS:1893 (Part 4):2005. Pending finalisation of Parts 2, 3 and 5 of IS:1893, provisions of part 1 shall be read along with the relevant clauses of IS:1893:1984, for structures other than the buildings and industrial structures including stack-like structures.

A site specific seismic study has been conducted for the project site. The peak ground horizontal acceleration for the project site, the site specific acceleration spectral coefficients (in units of gravity acceleration 'g') in the horizontal direction for the various damping values and the multiplying factor (to be used over the spectral coefficients) for evaluating the design acceleration spectra are as given at **Annexure-I**.

Vertical acceleration spectral values shall be taken as 2/3rd of the corresponding horizontal values.

The site specific design acceleration spectra shall be used in place of the response acceleration spectra, given at figure-2 in IS:1893 (Part 1) and Annex B of IS:1893 (Part 4). The site specific acceleration spectra along with multiplying factors specified in **Appendix-I** includes the effect of the seismic environment of the site, the importance factor related to the structures and the response reduction factor. Hence, the design spectra do not require any further consideration of the zone factor (Z), the importance factor (I) and response reduction factor (R) as used in the IS:1893 (Part 1 and Part 4).

Damping in Structures

The damping factor (as a percentage of critical damping) to be adopted shall not be more than as indicated below for:

a)	Steel structures	:	2%
b)	Reinforced Concrete structures	:	5%
c)	Reinforced Concrete Stacks	:	3%
d)	Steel stacks	:	2%

Method of Analysis

Since most structures in a power plant are irregular in shape and have irregular distribution of mass and stiffness, dynamic analysis for obtaining the design seismic forces shall be carried out using the response spectrum method. The number of vibration modes used in the analysis should be such that the sum total of modal masses of all modes considered is at least 90 percent of the total seismic mass and shall also meet requirements of IS:1893 (Part 1). Modal combination of the peak response quantities shall be performed as per Complete Quadratic Combination (CQC) method or by an acceptable alternative as per IS:1893 (Part 1).

In general, seismic analysis shall be performed for the three orthogonal (two principal horizontal and one vertical) components of earthquake motion. The seismic response from the three components shall be combined as specified in IS:1893 (Part 1).

For buildings, if the design base shear (V_B) obtained from modal combination is less than the base shear ($\bar{V}_B$) computed using the approximate fundamental period (T_a) given in IS:1893:Part 1 and using site specific acceleration spectra with appropriate multiplying factor, the response quantities (e.g. member forces, displacements, storey forces, storey shears and base reactions) shall be enhanced in the ratio of $\bar{V}_B / V_B$. However, no reduction is permitted if $\bar{V}_B$ is less than V_B.

For regular buildings less than 12m in height, design seismic base shear and its distribution to different floor levels along the height of the building may be carried out as specified under clause 7.5, 7.6 & 7.7 of IS:1893 (Part 1) and using site specific design acceleration spectra. The design horizontal acceleration spectrum value (Ah) shall be computed for the fundamental natural period as per clause 7.6 of IS:1893 (Part 1) using site specific spectral acceleration coefficients with appropriate multiplying factor given in **Annexure-I**. Further, the spectral acceleration coefficient shall get restricted to the peak spectral value if the fundamental natural period of the building falls to the left of the peak in the spectral acceleration curve.

Design/Detailing for Ductility for Structures

The site specific design acceleration spectra is a reduced spectra and has an in-built allowance for ductility. Structures shall be engineered and detailed in accordance with relevant Indian/International standards to achieve ductility.

ANNEXURE – I

SITE SPECIFIC SEISMIC PARAMETERS FOR DESIGN OF STRUCTURES AND EQUIPMENT

The various site specific seismic parameters for the project site shall be as follows:

1)	Peak ground horizontal acceleration (MCE)	: 0.17g
2)	Multiplying factor to be applied to the site specific horizontal acceleration spectral coefficients (in units of gravity acceleration 'g') to obtain the design acceleration spectra	
a)	for moment resisting steel frames designed and detailed as per IS:800 and moment resisting RC frames designed and detailed as per IS:456	: 0.057
b)	for braced steel frames designed and detailed as per IS:800	: 0.043
c)	for moment resisting RC frames designed and detailed as per IS:456 and IS:13920	: 0.034
d)	for design of structures not covered under 2 (a) to 2 (c) above and under 3 below	: 0.057
3)	Multiplying factor to be applied to the site specific horizontal acceleration spectral coefficients (in units of gravity acceleration 'g') for design of equipment and structures where inelastic action is not relevant or not permitted	: 0.113

Note: g = Acceleration due to gravity

The horizontal seismic acceleration spectral coefficients are furnished in subsequent pages.

APPENDIX – I

HORIZONTAL SEISMIC ACCELERATION SPECTRAL COEFFICIENTS
(In units of 'g')

Time Period (Sec)	Damping Factor (As a percentage of Critical Damping)							
	0.800	1.000	1.600	2.000	3.000	5.000	7.000	10.000
0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
0.030	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
0.050	1.840	1.881	1.793	1.696	1.579	1.430	1.341	1.257
0.100	4.210	4.434	3.960	3.473	2.934	2.323	1.998	1.715
0.108	4.616	4.877	4.343	3.760	3.143	2.451	2.089	1.775
0.110	4.718	4.981	4.343	3.832	3.195	2.483	2.111	1.790
0.115	4.975	4.981	4.343	4.024	3.324	2.562	2.165	1.826
0.119	5.182	4.981	4.343	4.024	3.436	2.624	2.208	1.854
0.121	5.269	4.981	4.343	4.024	3.436	2.654	2.230	1.868
0.122	5.269	4.981	4.343	4.024	3.436	2.670	2.240	1.875
0.125	5.269	4.981	4.343	4.024	3.436	2.716	2.272	1.895
0.127	5.269	4.981	4.343	4.024	3.436	2.751	2.293	1.909
0.129	5.269	4.981	4.343	4.024	3.436	2.751	2.313	1.922
0.132	5.269	4.981	4.343	4.024	3.436	2.751	2.338	1.942
0.133	5.269	4.981	4.343	4.024	3.436	2.751	2.338	1.949
0.134	5.269	4.981	4.343	4.024	3.436	2.751	2.338	1.951
0.150	5.269	4.981	4.343	4.024	3.436	2.751	2.338	1.951
0.200	5.269	4.981	4.343	4.024	3.436	2.751	2.338	1.951
0.250	5.269	4.981	4.343	4.024	3.436	2.751	2.338	1.951
0.300	5.269	4.981	4.343	4.024	3.436	2.751	2.338	1.951
0.350	5.269	4.981	4.343	4.024	3.436	2.751	2.338	1.951
0.400	5.269	4.981	4.343	4.024	3.436	2.751	2.338	1.951
0.450	5.269	4.981	4.343	4.024	3.436	2.751	2.338	1.951
0.500	5.269	4.981	4.343	4.024	3.436	2.751	2.338	1.951
0.525	5.269	4.981	4.343	4.024	3.436	2.751	2.338	1.951
0.542	5.269	4.981	4.343	4.024	3.436	2.751	2.338	1.951
0.550	5.269	4.981	4.284	4.024	3.436	2.751	2.338	1.951
0.576	5.269	4.752	4.090	4.024	3.436	2.751	2.338	1.951
0.597	5.269	4.585	3.946	3.886	3.436	2.751	2.338	1.951
0.603	5.269	4.539	3.907	3.847	3.400	2.751	2.338	1.951
0.637	4.987	4.297	3.699	3.642	3.218	2.751	2.338	1.951

APPENDIX – I

HORIZONTAL SEISMIC ACCELERATION SPECTRAL COEFFICIENTS
(In units of 'g')

Time Period (Sec)	Damping Factor (As a percentage of Critical Damping)							
	0.800	1.000	1.600	2.000	3.000	5.000	7.000	10.000
0.645	4.926	4.243	3.653	3.597	3.178	2.716	2.338	1.951
0.650	4.888	4.211	3.625	3.569	3.154	2.695	2.338	1.951
0.658	4.828	4.160	3.581	3.526	3.116	2.663	2.338	1.951
0.667	4.763	4.103	3.532	3.478	3.073	2.627	2.306	1.951
0.700	4.539	3.910	3.366	3.314	2.929	2.503	2.197	1.859
0.750	4.236	3.649	3.141	3.093	2.733	2.336	2.051	1.735
0.800	3.971	3.421	2.945	2.900	2.563	2.190	1.923	1.626
0.850	3.738	3.220	2.772	2.729	2.412	2.061	1.809	1.531
0.900	3.530	3.041	2.618	2.578	2.278	1.947	1.709	1.446
0.950	3.344	2.881	2.480	2.442	2.158	1.844	1.619	1.369
1.000	3.177	2.737	2.356	2.320	2.050	1.752	1.538	1.301
1.050	3.026	2.607	2.244	2.210	1.952	1.669	1.465	1.239
1.100	2.888	2.488	2.142	2.109	1.864	1.593	1.398	1.183
1.150	2.763	2.380	2.049	2.017	1.783	1.523	1.337	1.131
1.200	2.648	2.281	1.963	1.933	1.708	1.460	1.282	1.084
1.250	2.542	2.190	1.885	1.856	1.640	1.402	1.230	1.041
1.300	2.444	2.105	1.812	1.785	1.577	1.348	1.183	1.001
1.350	2.353	2.027	1.745	1.719	1.519	1.298	1.139	0.964
1.400	2.269	1.955	1.683	1.657	1.464	1.251	1.099	0.929
1.450	2.191	1.888	1.625	1.600	1.414	1.208	1.061	0.897
1.500	2.118	1.825	1.571	1.547	1.367	1.168	1.025	0.867
1.550	2.050	1.766	1.520	1.497	1.323	1.130	0.992	0.839
1.600	1.986	1.711	1.473	1.450	1.281	1.095	0.961	0.813
1.650	1.925	1.659	1.428	1.406	1.242	1.062	0.932	0.788
1.700	1.869	1.610	1.386	1.365	1.206	1.031	0.905	0.765
1.750	1.815	1.564	1.346	1.326	1.171	1.001	0.879	0.743
1.800	1.765	1.521	1.309	1.289	1.139	0.973	0.854	0.723
1.850	1.717	1.479	1.274	1.254	1.108	0.947	0.831	0.703
1.900	1.672	1.441	1.240	1.221	1.079	0.922	0.809	0.685
1.950	1.629	1.404	1.208	1.190	1.051	0.898	0.789	0.667
2.000	1.589	1.369	1.178	1.160	1.025	0.876	0.769	0.651
2.050	1.550	1.335	1.149	1.132	1.000	0.855	0.750	0.635

APPENDIX – I

HORIZONTAL SEISMIC ACCELERATION SPECTRAL COEFFICIENTS
(In units of 'g')

Time Period (Sec)	Damping Factor (As a percentage of Critical Damping)							
	0.800	1.000	1.600	2.000	3.000	5.000	7.000	10.000
2.100	1.513	1.303	1.122	1.105	0.976	0.834	0.732	0.620
2.150	1.478	1.273	1.096	1.079	0.953	0.815	0.715	0.605
2.200	1.444	1.244	1.071	1.055	0.932	0.796	0.699	0.591
2.250	1.412	1.216	1.047	1.031	0.911	0.779	0.684	0.578
2.300	1.381	1.190	1.024	1.009	0.891	0.762	0.669	0.566
2.350	1.352	1.165	1.003	0.987	0.872	0.746	0.654	0.554
2.400	1.324	1.140	0.982	0.967	0.854	0.730	0.641	0.542
2.450	1.297	1.117	0.962	0.947	0.837	0.715	0.628	0.531
2.500	1.271	1.095	0.942	0.928	0.820	0.701	0.615	0.520
2.550	1.246	1.073	0.924	0.910	0.804	0.687	0.603	0.510
2.600	1.222	1.053	0.906	0.892	0.788	0.674	0.592	0.500
2.650	1.199	1.033	0.889	0.875	0.774	0.661	0.580	0.491
2.700	1.177	1.014	0.873	0.859	0.759	0.649	0.570	0.482
2.750	1.155	0.995	0.857	0.844	0.745	0.637	0.559	0.473
2.800	1.135	0.978	0.841	0.829	0.732	0.626	0.549	0.465
2.850	1.115	0.960	0.827	0.814	0.719	0.615	0.540	0.456
2.900	1.096	0.944	0.812	0.800	0.707	0.604	0.530	0.449
2.950	1.077	0.928	0.799	0.786	0.695	0.594	0.521	0.441
3.000	1.059	0.912	0.785	0.773	0.683	0.584	0.513	0.434
3.050	1.042	0.897	0.772	0.761	0.672	0.574	0.504	0.427
3.100	1.025	0.883	0.760	0.748	0.661	0.565	0.496	0.420
3.150	1.009	0.869	0.748	0.737	0.651	0.556	0.488	0.413
3.200	0.993	0.855	0.736	0.725	0.641	0.548	0.481	0.407
3.250	0.978	0.842	0.725	0.714	0.631	0.539	0.473	0.400
3.300	0.963	0.829	0.714	0.703	0.621	0.531	0.466	0.394
3.350	0.948	0.817	0.703	0.693	0.612	0.523	0.459	0.388
3.400	0.934	0.805	0.693	0.682	0.603	0.515	0.452	0.383
3.450	0.921	0.793	0.683	0.672	0.594	0.508	0.446	0.377
3.500	0.908	0.782	0.673	0.663	0.586	0.501	0.439	0.372
3.550	0.895	0.771	0.664	0.654	0.577	0.494	0.433	0.366
3.600	0.883	0.760	0.654	0.644	0.569	0.487	0.427	0.361
3.650	0.870	0.750	0.645	0.636	0.562	0.480	0.421	0.356

APPENDIX – I

HORIZONTAL SEISMIC ACCELERATION SPECTRAL COEFFICIENTS (In units of 'g')

Time Period (Sec)	Damping Factor (As a percentage of Critical Damping)							
	0.800	1.000	1.600	2.000	3.000	5.000	7.000	10.000
3.700	0.859	0.740	0.637	0.627	0.554	0.474	0.416	0.352
3.750	0.847	0.730	0.628	0.619	0.547	0.467	0.410	0.347
3.800	0.836	0.720	0.620	0.611	0.539	0.461	0.405	0.342
3.850	0.825	0.711	0.612	0.603	0.532	0.455	0.399	0.338
3.900	0.815	0.702	0.604	0.595	0.526	0.449	0.394	0.334
3.950	0.804	0.693	0.596	0.587	0.519	0.444	0.389	0.329
4.000	0.794	0.684	0.589	0.580	0.513	0.438	0.385	0.325

	TITLE : **TECHNICAL SPECIFICATION FOR VIBRATION ISOLATION SYSTEM FOR MDBFP FOUNDATION (4 NOS) AND TDBFP FOUNDATION (4 NOS)**	**SPECIFICATION NO. PE-TS-390-614-C001**	
		REFERENCE QUALITY PLAN	
		REV. NO. 0	**DATE 08.07.2025**

REFERENCE QUALITY PLAN

MANUFACTURER / SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO : PE-TS-999-600-C026	DATE: 18-05-2023
	CUSTOMER : -NA-		QP NO.: PE-QP-999-618-C202 (Rev-)	DATE: 26-02-2024
	PROJECT: -NA-		PO NO.: -NA-	DATE: -NA-
	ITEM: VIBRATION ISOLATION SYSTEM	SYSTEM: VIS for BFP, FAN & MILL Foundation	INSPECTION CATEGORY:- -NA-	SHEET 1 of 4

SL NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9		10**			11
					M	C/N				*D	M			
1.0	**Materials**													
1.1	For boxes of VIS module	Chemical/Mechanical	MA	Verify	One / Heat	-	IS 2062 / DIN EN 10025 or Equivalent	Same as column "7"	Certificate	√	P	V	-	
1.2	For Springs	a) Chemical	MA	Verify	One / Heat	-	51CrV4 as per EN10089 or equivalent	Same as column "7"	Certificate	√	P	V	-	
		b) Grain Size	MA	Verify	One / Heat	-	IS 4748 / ASTM E 112	Grain size ASTM 6 or finer	Certificate	√	P	V	-	
		c) NMI (Non-metallic inclusions)	MA	Verify	One / Heat	-	IS 4163/ DIN EN 10247 or Equivalent	As per IS 4163 / EN 10089 or equivalent	Certificate	√	P	V	-	
2.0	**Component**													
2.1	Springs (at Manufacturers end)	a) Hardness	MA	Test	One/Lot	-	IS 1500	ASTM A125 / EN10089	Certificate	√	P	V	-	Refer Note-7
		b) Decarburization	MA	Test	One/Lot	-	IS6396	Max. depth 0.5% bar dia-partial	Certificate	√	P	V	-	
		c) NDE (Non-destructive examination) after compression (MPI i.e. Magnetic particle inspection)	MA	Test	100%	-	IS3703	No cracks	Certificate	√	P	V	-	
		d) Micro structure	MA	Verification	One/Lot	-	-	Tempered Martensite (Predominant)	Certificate	√	P	V	-	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	27.2.24	Anil Khandelwal	Checked by:	27.02.24	Suman Nakwal
Reviewed by:	27.2.24	Abhay Kumar	Reviewed by:	27.02.24	Harish Kumar

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

MANUFACTURER / SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO : PE-TS-999-600-C026	DATE: 18-05-2023
	CUSTOMER : -NA-		QP NO.: PE-QP-999-618-C202 (Rev-)	DATE: 26-02-2024
	PROJECT: -NA-		PO NO.: -NA-	DATE: -NA-
	ITEM: VIBRATION ISOLATION SYSTEM	SYSTEM: VIS for BFP, FAN & MILL Foundation	INSPECTION CATEGORY :- -NA-	SHEET 2 of 4

2.1.1	Springs (at Supplier end)	Spring Rate	MA	Test	AQL 4.0 of Table 7.1	-	DIN 2096	Same as column "7"	Certificate	√	P	V	-	
2.2	Viscoliquid (For visco damper)	Viscosity/Penetration Speed	MA	Test	One/ Lot	-	DIN 53019 or equivalent	Same as column "7"	Certificate	√	P	V	-	
2.2	Studs & Nuts	Chemical/Mechanical	MI	Verify	One/Lot	-	IS1367	As per Data sheet	Certificate	√	P	V	-	
		Dimensions(mm)	MI	Measure	10%	-	IS 4218 (Tolerance Class 6G & 6H)	Same as column "7	Internal Record	√	P	V	-	
3	**In Process Inspection**													
3.1	Welding	Visual/Surface exam	MA	Visual/ Measure	10% on welds	-	DIN EN 25817/D or BS EN ISO 5817 or Equivalent	Same as column "7	Certificate	√	P	V	-	
		NDE (Non-destructive examination)	MA	DPT	10% Random	-	ASTM E 165	Same as column "7	Certificate	√	P	V	-	
3.2	Boxes	Dimensions	MA	Measure	10%	-	Datasheet (data & dimensions)	EN ISO 13920 C	Internal Record	√	P	V	-	
3.3	Adhesive pads, Steel shims	Dimensions	MI	Measure/ Visual	10%	-	Datasheet (data & dimensions)	DIN 7168 Sg/ ISO 2768-1 v	Internal Record	√	P	V	-	
4	**Final Inspection**													
4.1	Shot Blasting	Surface preparation	MA	Compare	10%	-	EN ISO 12944-4	As per Datasheet	Certificate	√	P	V	-	
4.2	Painting	Thickness	MA	Measure	10%	-	EN ISO 12944-5	As per Datasheet	Certificate	√	P	V	-	
4.3	Spring Unit	Dimensions (Except Height at nominal load & max pre-stressed	MI	Measure	10%	10%	Data Sheet	EN ISO 13920 C	Internal Record	√	P	W	W	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	26/02/24	Anil Khandelwal	Checked by:	27.02.24	Suman Nakwal
Reviewed by:	27.2.24	Abhay Kumar	Reviewed by:	27.02.24	Harish Kumar

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No			
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Reviewed by			
Approved by			

MANUFACTURER / SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO : PE-TS-999-600-C026	DATE: 18-05-2023
	CUSTOMER : -NA-		QP NO.: PE-QP-999-618-C202 (Rev-)	DATE: 26-02-2024
	PROJECT: -NA-		PO NO.: -NA-	DATE: -NA-
	ITEM: VIBRATION ISOLATION SYSTEM	SYSTEM: VIS for BFP, FAN & MILL Foundation	INSPECTION CATEGORY:- -NA-	SHEET 3 of 4

4.4	Constant of Spring Units (Vertical)	Load Vs Displacement (kN/mm)	CR	Test	10%	10%	DIN 2096	Datasheet (data & dimensions)	Certificate	√	P	W	W	
4.5	Document Control	Verification of above documents (TC/IR)	MA	Compare	All	-	This MQP	Application rows tick marked under col. 'D'	Certificate	√	P	V	-	
4.6	Packing / Marking	Visual	MA	Visual/ Compare	100%	-	As per supplier's standard or BHEL Corporate standard	Same as column '7	Certificate	√	P	✓	-	

LEGENDS:

*RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.

** **M**: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, **C**: BHEL/ THIRD PARTY INSPECTION AGENCY, **N**: BHEL'S CUSTOMER.

P: PERFORM, **W**: WITNESS, **V**: VERIFICATION, AS APPROPRIATE

MA: MAJOR, **MI**: MINOR, **CR**: CRITICAL

Notes:

1. Material shall be packed suitably in order to avoid damage during transit and also during storage at site in tropical climate condition.
2. Latest revision/ year of issue of all the standards (IS/ ASME/ IEC/**EN** etc.) Indicated in QP shall be referred.
3. Hardness value shall be 399-476 BHN.

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	26/02/24	Anil Khandelwal	Checked by:	27.02.24	Suman Nakwal
Reviewed by:	27-02-24	Abhay Kumar	Reviewed by:	27.02.24	Harish Kumar

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

SEAWORTHY PACKING
(PACKING INSTRUCTIONS FOR GENERAL COMPONENTS / ASSEMBLIES / EQUIPMENT)

1 GENERAL

This standard lays down packing instructions for seaworthy packing of Components /Assemblies/ Equipment to be dispatched against Customer's contracts, for which there are no special instructions issued by the Engineering Departments.

The Components/Assemblies need to be packed suitably to avoid physical damage & corrosion during transit for storage. For specific applications the concerned engineering department shall issue a product standard. Reference of this standard, must appear in the Shipping list/Packing List.

2 SCOPE

This procedure gives minimum guidelines for seaworthy packing to be complied with for packing of Components /Assemblies / Equipment. This packing shall be suitable for different handling operations and for the adverse conditions during transportation and during indoor / outdoor storage for periods more than one year.

3 CROSS REFERRED SPECIFICATION

– Multi-layered cross laminated plastic film : AA51420
– Packing Wood : AA51401
– Silica gel : AA55619
– Thermocole : AA51416
– Packing slip holders : AA7240901
– Corrugated Fibre Board : AA51414
– Rubber sheet : AA59001
– VCI paper : AA51406
– High quality full glossy out door finishing paint : AA56126
– Polyethylene air bubble film : IS 12787
– Structural steel - standard quality (plates, sections, strips flats & bars) : AA10108
– International Standards For Phytosanitary Measures No. 15 : ISPM-15:2009

4 WOOD SPECIFICATION FOR PACKING

The wood shall conform to specification AA51401.

For export packing wood in addition to the above the following has to be met:

The standard requires the use of debarked wood in the construction of compliant wood packaging material. Debarked wood is defined in the ISPM 5.

5 TYPE OF PACKING

The following 5 types of packings have been standardized for packing of General Components /Assemblies.

– 'OP' - Open Type
– 'PP' - Partially Packed
– 'CP' - Crate Packing - Components/Equipment requiring physical protection
– 'CQ' - Case Packing - Small medium Components/ Assemblies/ Equipment which require corrosion & physical protection
– 'CR' - Case Packing - Electrical Components/Assemblies which require special packing viz. Water Proof, Shock Proof, etc.

6 DESCRIPTION OF TYPES OF PACKING

The various types of packing, as standardized above, are described below.

6.1 'OP' - Open Type

In case, of components which are not affected by water & dust & do not require special protection &, are generally not machined, shall be sent as open packages. However these components may be sent in crates, wherever necessary.

6.2 'PP' - Partially Packed

Components which need special protection, at selected portions only, shall be dispatched partially packed. Machined surfaces should not be allowed to come directly in contact with the wood. Such surfaces after application of TRP should be protected with Multi-layered cross laminated plastic film to AA51420.

6.3 'CP' - Crate Packing – General

Assemblies/Components which need only physical protection from the point of view of handling shall be dispatched duly packed in crates.

6.4 'CQ' - Case Packing - Machined Components/Assemblies/Equipment

a) Small & Medium sized components/assemblies/equipment due to size/weight & to avoid handling, and pilferage, problems shall be packed in Case/Containers.

b) Wherever required adequate quantity of silica gel to AA55619 or VCI Powder/ Tablets, packed in thin muslin cloth cotton bags shall be suitably placed.

c) Small machines/components of less weight shall be provided with suitable cushioning. Wood Wool/Expanded Polyethylene Foam Sheet, if used, shall be sandwiched between polyethylene sheets and sealed.

d) The components inside the case shall be entirely covered with Multi-layered cross laminated plastic film to AA51420, where-ever required.

6.5 'CR' - Case Packing - Electrical & Electronic Components/Assemblies

Delicate components likely to be damaged e.g. Gauges, Instruments etc. are to be wrapped in waxed paper or polyethylene air bubble film and packed in cartons.

a) Adequate quantity of Silica gel to AA55619 packed in cotton bags, of 100 grams each are to be suitably placed in the cartons. The cartons shall be entirely covered with Multi-layered cross laminated plastic film to AA51420, before being packed in the cases.

b) VCI Powder/Tablets can be used as an alternative to Silica Gel to AA55619.

c) Empty space in the cartons shall be filled with small chips of Expanded Polystyrene (Thermocole), Wood Wool etc. Polyethylene air bubble film shall conform to IS 12787/AA51420 Expanded polystyrene (Thermocole) shall conform to AA51416.

d) The cartons shall be manufactured from corrugated Fibre Board, meeting requirements of AA51414.

6.6 Special Packing

Components requiring special packing (as per customer/contractual/ engineering requirements) not included in this specification shall be covered by product standards.

7 PREPARATION OF PACKING CASE

1) Cases and crates with gross weight up to 1,000 kgs. shall be provided with bottom cleats of min. 40 mm thicknesses to ensure clearance for handling by forklift. Cases and crates exceeding gross weight of 1,000 kgs. shall be provided with skid runners, number and size according to weight of package.
2) The base of the case shall be made of wooden batons for planks giving necessary reinforcement, such that the bottom of the equipment is at a height of 100 to 200 mm from the ground level depending upon size & weight of equipment. However for packing cases of smaller size equipment can be at a height of 40 mm from the ground level.
3) In case of 'CR1 - Packing Viz. Electrical & Electronic components for instruments/assemblies, a rubber sheet, Self-expanded polyethene foam sheet, preferably 10 mm thick, shall be fixed on to the base to act as cushioning to the equipment.
4) The four sides, shall be lined, from inside with multi-layered cross-laminated polyethylene sheet of 90GSM as per AA51420 and tacked at suitable places.

   Whenever specified the top cover will have a layer of multi-layered cross laminated polyethylene sheet of 90 GSM over the cover. This should project about 100 - 250mm on all sides.

   It is preferable to have a single piece of the above Multi-layered cross laminated polyethylene sheet fixed on the four sides. In case jointing is unavoidable, it should be done by overlapping of approximately 100mm.
5) Place the Components/cartons with corrosion inhibitors duly applied wherever necessary for place suitably, thin muslin cloths bags containing 100 grams (approx.) of activated Blue Silica Gel to AA55619, wherever necessary. Alternatively VCI Powder or Tablet may be used.
6) In case, depression is formed, at the top, after the equipment is lowered, provide ply board/wooden batons.
7) Cover the whole equipment with polyethylene sheet of at least 100 micron thickness, on all sides preferably by a single piece.
8) For indoor panels/equipment, provide suitable packing batons with covering of Thermocole/expanded soft polyethylene foam/polyethylene air bubble film wrapped with suitable cords, to avoid cutting of the polyethylene sheet so that finished surface is not damaged.
9) Empty space in the box shall be filled with adequate cushioning material e.g. Thermocole Chips, Wood Wool etc. to avoid movement for shocks. Alternatively put wooden blocks/batons wherever necessary.
10) The inner side of the top cover shall be lined with polyethylene sheet, of at least
11) 100 micron thickness, which shall project approximately 25 to 150 mm depending upon the size of the case on all sides of the top cover shall be provided below the top cover. This projection, after nailing the top cover, shall be folded over, on the sides of the crates & tacked, to, prevent ingress of water from the top.
12) For specific requirement of packing the cases are to be provided with Tongue and Groove joints.

8 STEEL CONTAINERS

Steel containers for packing can be used in case of repeated supplies of the same equipment. Empty steel containers are to be returned back from customer's end and to be reused for the next supplies.

The containers are to be made of structural steel as per AA10108 with proper reinforcement with I, C and T Sections.

Following precautions are to be taken during packing:

– Put the Components/Assemblies/Equipment in the steel container properly. Cover the Components/Assemblies/Equipment with polythene.

– To arrest the movement in the steel container necessary wooden Blocks/Batons may be put.

– Put cover on steel, container and Bolt Properly.

9 SEALED PACKING

Components sub-assemblies and assemblies sensitive to climatic conditions shall be packed seal tight. All the openings of the sensitive components, sub-assemblies and assemblies shall be blanketed to prevent the ingress of dust and moisture.

The components sub-assemblies and assemblies are completely covered with 2 layers of polyethylene sheet. All sharp corners and edges are to be protected by rubber mats to prevent the polyethylene sheet from damage. Top surface of the case shall be free from dents to prevent rain water pockets.

10 SLING PLATE

Sling plate shall be provided to prevent damage to the packing box during lifting. Size of the sling plate shall be selected depending upon the net weight of the consignment.

11 PACKING SLIP HOLDERS

Two nos. steel packing slip holders, specification no. AA7240901 containing the packing list, sealed in thick polyethylene film, shall be fixed one inside and the other outside the packing box.

12 Volatile Corrosion Inhibitor (VCI) Paper

a) Un-protected surfaces of steel and cast iron components, tools bearing, shaft seals etc. are covered with VCI paper. VCI paper has been impregnated with corrosion inhibitors which by evaporation and chemical conversion protect metals in an enclosed area against corrosion.

b) 7 m^3 VCI paper is necessary for 1 m^3 of packed item approximately as per AA51406.

Application Limitation:

VCI paper shall not be used for components made of aluminium, aluminium alloys as well as Zinc, copper, brass, cadmium and silver.

VCI powder is sprinkled inside the piping components ends shall be protected with end cover as specified in plant standards, drawings.

13 Moisture Absorber

Silica gel is used for this purpose to protect the contents over sufficiently long time from corrosion. At the time of use, silica gel should be so dried that its colour becomes dark blue. These shall be filled in small cotton bags. Before sealing the equipment, the silica gel bags should be kept inside the polyethylene film cover at different locations. The quantity of silica gel should not be less than 1.0 kg per cubic metre volume of the packing box

14 GENERAL PRECAUTIONS

a) While fixing nails during packing, necessary care shall be taken to ensure that materials used for protection inside the case e.g. paper, polyethylene sheet, coir etc. do not get damaged.

b) Sling protection brackets to be provided on cases wherever required.

c) It shall be ensured that all stencil marks external, front & rear sides of the casing shall be of water proof Material to prevent obliteration in transit.

d) The various caution signs shall be marked with stencil on both sides of the packing box.

e) Do not pack any other Mechanical items with this case (do not use any other non-permitted packing materials).

THE FOLLOWING DETAILS ARE TO BE MARKED ON THE PACKING CASES.

a) Address of consignee.

b) Purchase Order No./ SO No/WO No.

c) Description of item or title of packing list.

d) Case identification Number/ Packing List No.

e) Net Weight.

f) Gross Weight.

g) Dimensions of box

h) Marking showing upright position.

i) Marking showing sling position.

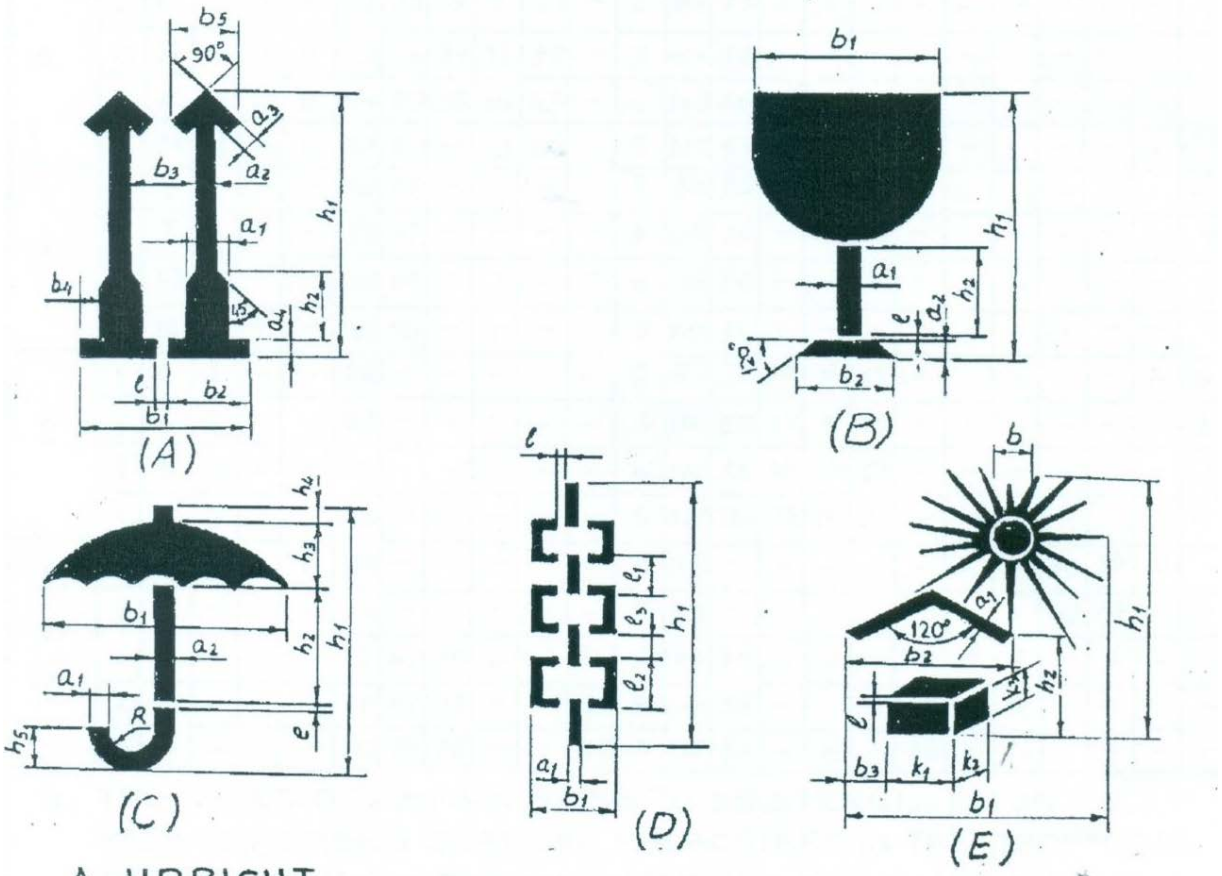
j) Marking showing umbrella (i.e. for machines/components to be stored under covered storage.

k) Loading and unloading precautions

CORPORATE STANDARD

MARKINGS ON PACKING CASES

1. THIS PLANT STANDARD PRESCRIBES THE VARIOUS CAUTION SIGNS AND OTHER MARKINGS ON PACKING CASES.
2. DIMENSIONS IN THE TABLE 1 SHALL BE USED FOR MAKING STENCILS ONLY.



A. UPRIGHT
B. FRAGILE
C. PROTECTION FROM FALLING OR CONDENSING MOISTURE.
D. SLINGING POSITION
E. PROTECTION FROM DIRECT RADIATIONS.

Figure 1

CENTER OF GRAVITY

Figure 2

Table 1

DESIGNATION		DIMENSIONS IN mm.																						
		a_1	a_2	a_3	a_4	b_1	b_2	b_3	b_4	b_5	b	ℓ	h_1	h_2	h_3	h_4	h_5	K_1	K_2	K_3	ℓ_1	ℓ_2	ℓ_3	R
A	1	12	5	5	4	52	25	19	8	21	–	2	84	23	–	–	–	–	–	–	–	–	–	–
	2	17	7	7	6	75	36	29	11	30	–	3	119	33	–	–	–	–	–	–	–	–	–	–
	3	24	10	10	8	104	50	38	16	42	–	4	168	46	–	–	–	–	–	–	–	–	–	–
	4	34	14	14	11	147	71	59	23	60	–	5	239	65	–	–	–	–	–	–	–	–	–	–
B	1	5	5	–	–	50	33	–	–	–	–	2	84	25	–	–	–	–	–	–	–	–	–	–
	2	7	7	–	–	71	47	–	–	–	–	3	119	36	–	–	–	–	–	–	–	–	–	–
	3	10	10	–	–	100	66	–	–	–	–	4	168	50	–	–	–	–	–	–	–	–	–	–
	4	14	14	–	–	142	94	–	–	–	–	5	239	71	–	–	–	–	–	–	–	–	–	–
C	1	4	3	–	–	66	–	–	–	–	–	2	80	39	19	5	11	–	–	–	–	–	–	6
	2	6	4	–	–	85	–	–	–	–	–	3	114	55	27	7	16	–	–	–	–	–	–	9
	3	8	6	–	–	120	–	–	–	–	–	4	160	78	38	10	22	–	–	–	–	–	–	12
	4	11	9	–	–	170	–	–	–	–	–	5	227	110	54	14	31	–	–	–	–	–	–	17
D	1	6	–	–	–	30	–	–	–	–	–	4	148	–	–	–	–	–	–	–	30	30	10	–
	2	9	–	–	–	42	–	–	–	–	–	5	209	–	–	–	–	–	–	–	42	42	14	–
E	1	3	–	–	–	69	47	10	–	–	16	2	91	26	–	–	–	17	8	11	–	–	–	–
	2	4	–	–	–	98	67	15	–	–	23	3	128	33	–	–	–	24	11	16	–	–	–	–
	3	6	–	–	–	138	94	20	–	–	32	4	182	62	–	–	–	34	16	22	–	–	–	–

Black and Red Marking Ink to IS: 1234 "Ink, Stencil, Oil Base, For Marking Porous Surfaces" or duplicating ink stencilling, oil base for marking porous surfaces.

All cases containing fragile items are to be stencilled with red marking and stencilling paint/ink.

"HANDLE WITH CARE", "FRAGILE DO NOT TURN OVER".

Besides the caution signs the product information shall be stencilled of letters with 13mm to 50mm height.

In case of consignment consists of more than one package, each package shall carry its Package No. as given in shipping list. All caution signs shall be stencilled in higher quality full glossy out door finishing paint red in colour (AA56126). All other markings shall be carried out in black enamel (AA56126).

Caution signs & other markings shall be stencilled on both the end shooks & the side shooks. Caution sign (for slinging) shall be stencilled only on side shooks at the appropriate place.

Note: In case the size of package is small for using the stencils, then hand written letters/figures shall be allowed.

15 PROCEDURE FOR HANDLING OF COMPONENTS

The purpose of this procedure is to protect the quality of the components/equipment while handling in various stages of manufacturing packing & despatching.

15.1 Adequate care shall be taken in handling the material, and components to avoid damage during receipts, storage issue manufacture & despatch operations.

15.2 Appropriate material handling equipment like fork lifters, cranes etc. Shall be used where needed.

15.3 Lifting by crane and transportation by trolley of critical items and large components like rotors castings etc. Shall be done carefully.

15.4 For critical items, where specified, special handling fixtures shall be used for lifting.

15.5 Slings and shackles used for lifting the components/equipment shall be checked for fitness and suitability before use.

15.6 Slings used on machined surfaces shall be suitably padded. No slings shall be used on journal surfaces.

15.7 Precision machined components like blades, catches, rollers etc. Shall be lifted using suitable wooden pallets.

15.8 HANDLING OF COMPONENTS ON RECEIPT/DESPATCH:

Before loading/unloading a packing case from the carrier look for the following shipping instructions painted on the packing case.

– The markings showing the upright position.

– The markings showing the sling position

– Markings showing the fragile contents.

– Other required markings as per Clause No. 12

15.8.1 Appropriate cranes and slings should be used for different components/ cases. Slings should normally make an angle as minimum as possible (width wise) but in no case more than 15º.

15.8.2 Handling and lifting should be done without jerks or impacts.

15.8.3 Immediately after receipt of the goods, the packing should be examined all-round for any sign of damage. If necessary, lift the cover or a number of boards of the case so as to make the contents visible. In the event of sealed packing being used the plastic sheeting should not be damaged. It is imperative that the packing material is restored in original condition after the inspection.

15.8.4 On receipt of the equipment it should be checked with the shipping list and missing or damage if any should be reported immediately. It is important to arrange for immediate examination to determine the extent of the damage, the cause of the damage and where applicable the person or persons responsible for the damage. According to general practice when transporting by railway or by road vehicle the carrier concerned should be immediately called upon (within specified periods) for jointly establishing a statement of the damage. This is essential as a basis for a subsequent claim and possible damage report to the insurance company.

15.8.5 Protective coating applied on machined surfaces should not be disturbed. The plastic covering should be put back carefully so that it prevents ingress of dust and moisture. Some packing may have vapour phase inhibitor (VPI) paper enclosed inside the packing cases. This should be restored to its original place as far as possible.

15.8.6 Silica gel and such other chemicals kept in the box as desiccants and indicators should also be left in the box itself.

16 GI SHEET

The packing cases are covered with GI sheet on outside for sides and top; inside for bottom as per the Figure-3 (GI sheet covering is applicable for all closed type of wooden packing).

17 Treatment of Wood & Application and use of the mark

For seaworthy export packing, treatment of wood has to be carried out as below subject to BHEL Engg & QC approval.

As per customer requirement for export packing, wood to be treated as applicable should be done as per International Standards for Phytosanitary Measures ISPM: 15 to control the growth stages viz. egg to adult of structural insects (beetles, borers, bugs, fleas, flies, lice, moths, roaches, termites) and other pests (mice, rats, spiders) etc. in stored products.

The specified marks applied to wood packaging material treated in accordance with ISPM 15 must conform to the requirements described in Annex 2 of ISPM 15.

17.1 Heat treatment using a conventional steam or dry kiln heat chamber (treatment code for the mark: HT)

When using conventional heat chamber technology, the fundamental requirement is to achieve a minimum temperature of 56 °C for a minimum duration of 30 continuous minutes throughout the entire profile of the wood (including its core).

This temperature can be measured by inserting temperature sensors in the core of the wood. Alternatively, when using kiln-drying heat chambers or other heat treatment chambers, treatment schedules may be developed based on a series of test treatments during which the core temperature of the wood at various locations inside the heat chamber has been measured and correlated with chamber air temperature, taking into account the moisture content of the wood and other substantial parameters (such as species and thickness of the wood, air flow rate and humidity). The test series must demonstrate that a minimum temperature of 56 °C is maintained for a minimum duration of 30 continuous minutes throughout the entire profile of the wood.

Treatment schedules should be specified or approved by the National Plant Protection Organisation (NPPO). Treatment providers should be approved by the NPPO.

17.2 Heat treatment using dielectric heating (treatment code for the mark: DH)

Where dielectric heating is used (e.g. microwave), wood packaging material composed of wood not exceeding 20 cm when measured across the smallest dimension of the piece or the stack must be heated to achieve a minimum temperature of 60 °C for 1 continuous minute throughout the entire profile of the wood (including its surface). The prescribed temperature must be reached within 30 minutes from the start of the treatment.

Treatment schedules should be specified or approved by the NPPO.

17.3 Methyl bromide treatment (treatment code for the mark: MB)

Wood packaging material containing a piece of wood exceeding 20 cm in cross-section at its smallest dimension must not be treated with methyl bromide.

The fumigation of wood packaging material with methyl bromide must be in accordance with a schedule specified or approved by the NPPO (National Plant Protection Organisation) that achieves the minimum concentration-time product (CT) over 24 hours at the temperature and final residual concentration specified in Table 1. This CT must be achieved throughout the profile of the wood, including its core, although the concentrations would be measured in the ambient atmosphere. The minimum temperature of the wood and its surrounding atmosphere must not be less than 10 °C and the minimum exposure time must not be less than 24 hours. Monitoring of gas concentrations must be carried out at a minimum at 2, 4 and 24 hours from the beginning of the treatment. In the case of longer exposure times and weaker concentrations, additional measurement of the gas concentrations should be recorded at the end of fumigation.

If the CT is not achieved over 24 hours, corrective action needs to be taken to ensure the CT is reached; for example, the treatment is restarted or the treatment time extended for a maximum of 2 hours without adding more methyl bromide to achieve the required CT (see the footnote to Table 2).

Table 2 – Minimum CT over 24 hours for wood packaging material fumigated with methyl bromide

Temperature (°C)	CT (g·h/m^3) over 24 h	Minimum final concentration (g/m^3) after 24 h#
21.0 or above	650	24
16.0 – 20.9	800	28
10.0 – 15.9	900	32

In circumstances when the minimum final concentration is not achieved after 24 hours, a deviation in the concentration of ~5% is permitted provided additional treatment time is added to the end of the treatment to achieve the prescribed CT.

One example of a schedule that may be used for achieving the specified requirements is shown in Table 3.

Table 3 – Example of a treatment schedule that achieves the minimum required CT for wood packaging material treated with methyl bromide (initial doses may need to be higher in conditions of high sorption or leakage)

Temperature (°C)	Dosage (g/m^3)	Minimum concentration (g/m^3) at:		
		2 h	4 h	24 h
21.0 or above	48	36	31	24
16.0 – 20.9	56	42	36	28
10.0 – 15.9	64	48	42	32

Treatment providers should be approved by the NPPO.

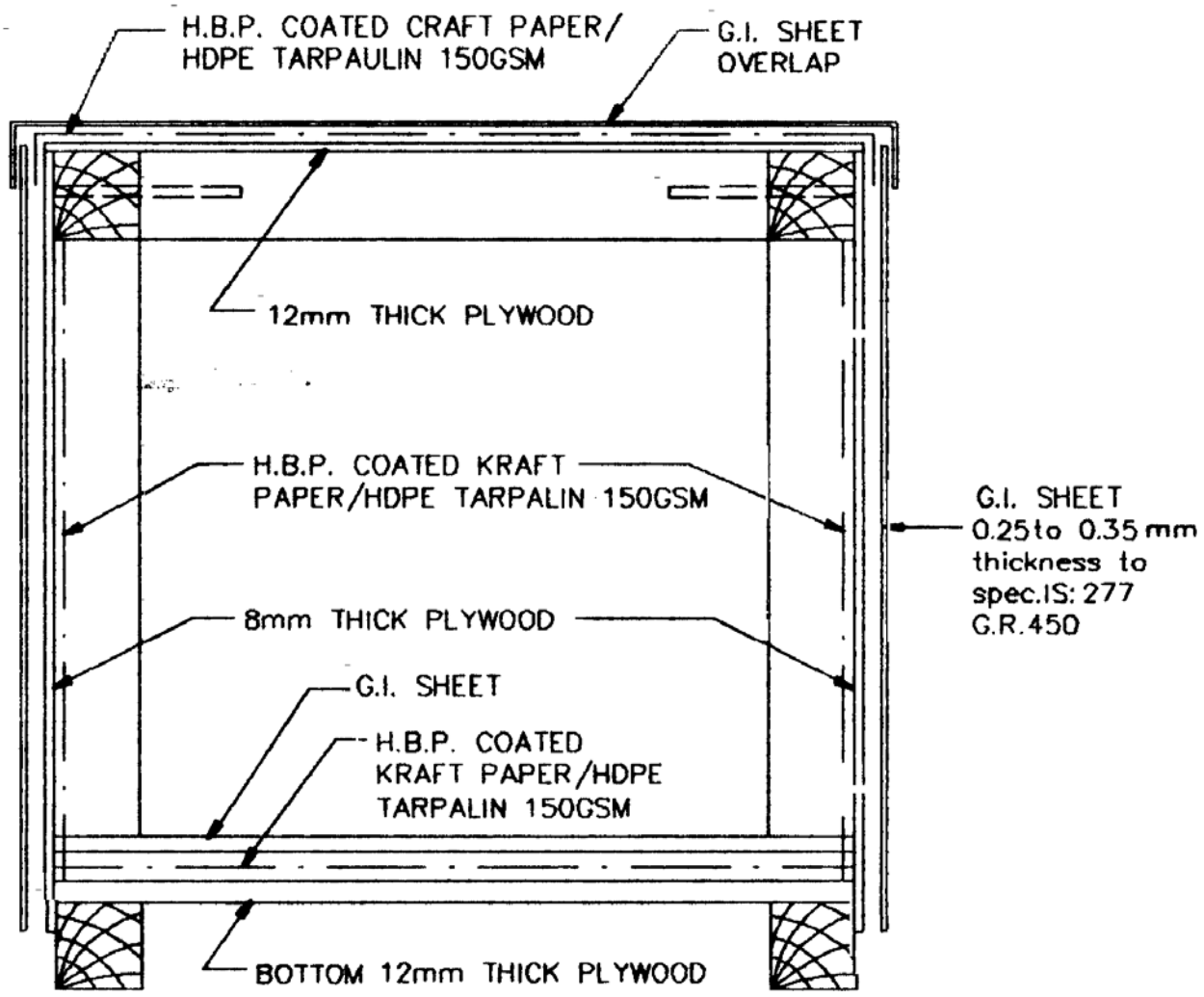
17.4 Marking

The specified marks applied to wood packaging material treated in accordance with ISPM 15 must conform to the requirements described in ISPM 15.

18 PROVISION FOR INSPECTION

This clause is applicable only where contractual requirement of customer is there. For other packings this is not applicable.

Each transportable packing's shall have provision for inspection by customer authority etc. during transport from origin of dispatched till destination. This inspection may require opening of the package and subsequently closing it again. For this purpose suitable designed opening with bolted cover shall be provided. Such an opening shall be clearly marked as "OPENING" with clear instruction for opening & closing written on this cover. For large consignment the size of the opening shall be suitable to facilitate entry of personnel.



CLOSED PACKING CASE WITH
G.I.SHEET SHOWING LAYERS
OF PACKING MATERIALS

Figure 3

DOMESTIC PACKING

COMMON GUIDELINES

1 GENERAL:

This standard lays down packing instructions for domestic packing of Components/ Assemblies/ Equipment to be despatched against Customer's contracts, for which there are no special instructions issued by the Engineering Departments. For Seaworthy Packing refer standard AA0490004 wherever applicable.

The Components/Assemblies need to be packed suitably to avoid physical damage & corrosion during transit & storage. For specific applications the concerned engineering department shall issue a product standard. Reference of this product standard, must appear in the Shipping list/Packing List.

2 SCOPE:

This procedure gives minimum guidelines to be complied with for domestic packing of Components /Assemblies/ Equipment. This domestic packing shall be suitable for different handling operations and for the adverse conditions during transportation and during indoor / outdoor storage of materials.

3 WOOD SPECIFICATION

Based on availability, the wood shall conform to specification AA51401 or AA51402.

4 TYPES OF PACKING:

The following 5 types of packing have been standardized for packing of General Components/ Assemblies.

1) '**OP**' - Open Type.
2) **'PP**' - Partially Packed.
3) '**CP**' – Crate/Box Packing - Components/Equipment requiring physical protection.
4) '**CQ**' - Case Packing – Machined components-Small & Medium Components/ Assemblies/ Equipment which require corrosion & physical protection.
5) '**CR**' - Case Packing – Electrical/Electronic Components/ Assemblies, which require special packing viz. Water Proof, Shock Proof etc…

5 DESCRIPTION OF TYPES OF PACKING:

The various types of packing, as standardized above, are described below.

5.1 'OP' - Open Type

In case, of components which are not affected by water & dust and do not require special protection, are generally not machined, shall be sent as open packages. However, these components may be sent in crates, wherever necessary.

5.2 'PP' - Partially Packed

Components which need special protection at selected portions only shall be despatched partially packed. Machined surfaces should not be allowed to come directly in contact with the wood. Such surfaces should be protected with 100GSM(Colourless) Multi Layered Cross Laminated Polyethylene

Film to Specification No. AA51420. All sharp corners and edges shall be protected by rubber mats to prevent damage to the polyethylene film

5.3 'CP' - Crate Packing

Assemblies/Components which need only physical protection from the point of view of handling shall be despatched duly packed in crates.

5.4 'CQ' - Case Packing - Machined Components/Assemblies/Equipment

Small and medium sized components/assemblies/equipment due to size/weight and to avoid handling and pilferage problems shall be packed in Case/Containers. Wherever required adequate quantity of silica gel to AA55619 or VCI Powder/Tablets, packed in thin muslin cloth cotton bags shall be suitably placed. Small machines/components of less weight shall be provided with suitable cushioning by Rubberised coir. The components inside the case shall be entirely covered with 100GSM(Colourless) Multi Layered Cross Laminated Polyethylene Film Specification No. AA51420, wherever required. This may be prescribed for electronic parts/critical machined components/surfaces.

For mechanical product like valves where motors are separately securely wrapped in polyethylene, the requirement of individual component wrapping shall be exempted.

5.5 'CR' - Case Packing - Electrical & Electronic Components/Assemblies

Delicate components likely to be damaged e.g. Gauges, Instruments etc. are to be wrapped in waxed paper or polyethylene air bubble film and packed in cartons. Adequate quantity of Silica gel to AA55619 packed in cotton bags of 100grams each are to be suitably placed in the cartons. The cartons shall be entirely covered with 100GSM(Colourless) Multi Layered Cross Laminated Polyethylene Film Specification No. AA51420 before being packed in the cases. VCI Powder/Tablets can be used as an alternative to Silica Gel to AA55619.

Empty space in the cartons shall be filled with rubberized coir to get proper cushioning effect. The cartons shall be manufactured from corrugated Fiber Board, meeting requirements of AA51414.

6 PREPARATION OF PACKING CASES

6.1 DIMENSIONS:

a) Thickness of planks for Front, rear, top and bottom sides and binding, jointing battens shall be 25/20mm +2/-3 mm as per applicable drawings of the respective units.

b) Width of all planks including the tongue shall be more than 125mm and after plaining it shall be minimum 100mm.

c) Minimum number of planks shall be used for a shook.

d) Horizontal, vertical, diagonal planks shall be given for binding (number of such planks depend on the dimension of panel.

e) Width of binding planks shall be minimum 100mm.

f) Distance between any 2 binding planks shall be less than 750mm.

g) diagonal planks shall be used in between vertical binding planks when distance between inner to inner of vertical planks is more than 750mm

h) Distance of the outer edges of these planks from the edge of case shall be less than 250mm.

i) Diagonal planks are not required for top planks and width side, if the width of pallet is less than 750mm.

6.2 JOINTING OF PLANKS

Single length planks shall be used for cubicles whose overall length is less than 2400mm. For cubicles of length more than 2400mm, jointing is permitted. The jointing shall be done with one single or maximum of 2 planks of wood same as other planks of width 250 mm (minimum) with two rows of nails on either side of the joint in zigzag manner. From the joint along height side, it shall be of lap joint with overlap of at least the width of plank.

6.3 TONGUE AND GROOVE JOINTS

Two consecutive planks shall be joined by tongue and groove joint. Depth of tongue shall be 12+1 mm, thickness of tongue shall be 8 +1 mm. The groove dimensions shall be such that the tongue fits tightly into the groove to make a good joint. This type of joint can be done based on the product requirement wherever required.

6.4 PERMISSIBLE DEFECTS

Wood shall be free from knots, bows, visible sign of infection and any kind of decay caused by insects, fungus, etc.

End splits: Longest end splits at each end shall be measured and lengths added together. The added length shall not exceed 60mm per meter run of shook's. Wood pins shall be used to prevent further development of split.

Surface cracks: Surface cracks with a maximum depth of 3mm are permissible. A continuous crack of any depth all along the length is not allowed.

6.5 OTHER MATERIALS

6.5.1 NAILS

The dia. of the nails shall be 3.15mm. The length of the nails shall be 65mm wherever two planks of 25mm thickness are joined and 75mm wherever a 25mm planks is joined to a 50mm plank.

6.5.2 BLUE NAILS

These are used for nailing bituminized Kraft paper/hessian cloth to the planks. The length of the nails shall be 16mm.

6.5.3 HOOP IRON STRIPS

These are used for strapping the boxes. The width of the strips shall be 19+1mm and thickness 0.6+0.01mm. The material shall be free from rust.If sufficient nailing is done for bigger boxes, strapping need not be done.

6.5.4 CLIPS

These shall be used for strapping the hoop iron strips on the boxes.

6.5.5 BRACKETS

These brackets are used for nailing to the corners of cubicle boxes. The brackets shall be of mild steel of thickness min 2mm and width 25+1mm. The brackets shall be of "L" shape, the length of each side being 100+2mm. Two holes shall be provided towards the end of each side for screwing /nailing.

6.5.6 FASTENERS

Bolts, double nuts, spring washers will have to be used for packing of some special items like transformers, reactors, breakers, etc., to hold the job to the bottom plank of the box. The bolts, nuts, washers will be provided by the vendor. Drilling of holes will have to be done using contractor's tools.

6.5.7 MULTI LAYERED CROSS LAMINATED POLYTHELENE FILM

100GSM (Colourless) Multi Layered Cross Laminated Polythelene Film Specification No: AA51420 are used to make covers to the jobs individually. The cross lamination gives qualities of extra toughness, together with flexibility and lightness coupled with good weather resistance to ultra violet rays.

6.5.8 RUBBERISED COIR:

The rubberized coir is used as cushioning material. For the packing of loose items, items are to be arrested by using rubberized coir. For the packing of cubicles rubberized coir of thickness 25mm and width 75mm shall be used.

6.5.9 FOAM RUBBER / 'U' FOAM:

This is used for covering the delicate items. This material is provided by the vendor.

6.5.10 MARKING PLATE:

This shall be of anodized aluminium sheet. Size of the marking plate shall be maintained minimum of size as per the details specified in the Figure 4.

6.5.11 PACKING SLIP HOLDER:

This shall be of galvanized iron tinned sheet /Aluminium sheet

6.5.12 SILICA GEL:

This shall be of indicating type to conform to IS: 3401/AA55619.Silical gel shall be used for such products only where moisture needs to be avoided.

6.5.13 COTTON BAGS:

These are used for holding silica gel. The bags shall have the following matter indicated on them:

BHEL-UNIT NAME	PLACE-PINCODE
SILICA GEL	INDICATING TYPE
BLUE :	ACTIVE
ROSE :	REDUCED ACTIVITY
WHITE :	NO ACTIVITY. TO BE REPLACED WITH FRESH SILICA GEL

6.5.14 COTTON/ PLASTIC TAPE:

This is used for tying small items. And also to prevent vibrations of moving parts within the cubicles.

6.5.15 MARKING INK:

The ink used normally is black in color. In some special cases other color also will have to be used. The ink shall be non-fading/indelible and non-washable by water.

6.5.16 POLYETHYLENE BAGS:

These are to be used for keeping the Packing slips. The bag shall be of size 70mm X 100mm (minimum).

6.5.17 Hessian cloth, twine thread, paint will have to be used in packing certain items.

6.5.18 Mechanical Latching clamps:

For CLW Railway panels and similar Panels self-locking clamps can also be used on need basis in conjunction with or apart from regular bolt and nut fixing arrangement. For reusable boxes, these clamps provide easy locking and unlocking arrangement. These clamps will be made available from BHEL in some cases.

6.5.19 STICKERS

The following stickers to be put by the vendor on cubicles/Boxes after packing.

1) Case No sticker: 2 nos. Size 25.Cm x 0.45Cm
2) BHEL Monogram sticker: 1 no. Size 1.75Cm x 2.3Cm
3) Address sticker: 2 nos. Size 3.8Cm x 3.0Cm
4) Direction sticker “Front” & “Back” - 4 nos. Size 2.0Cm x 0.75Cm
5) Chain Mark Sticker: 4 Nos. Size – 3.0Cm x 0.75Cm
6) "Fragile” sticker: 2 Nos. Size. 2.1Cm x 1.5Cm
7) "DO NOT STACK” sticker - 2 Nos. Size 3.0Cm x 2.2Cm

In place of stickers, writing all the details legibly with paint shall be allowed & respective units may take decision accordingly.

7 PACKING OF CUBICLES:

7.1 The packing is to be done as per clause 5 in all respects.

7.2 The cubicles are already fixed on wooden pallets. Hence the contractor need not arrange the bottom pallets normally.

7.3 The cubicles will be of different sizes both width wise and lengthwise. The cubicles may be made up of single suite, 2 Suite, 3 Suite, 4 Suite, etc., The width of the cubicles generally varies from 400 mm to 1650mm.The length of the cubicle, generally varies from 1500 mm to 4800 mm. The height is normally 2430 mm. In some cases, the height may be less/more.

7.4 MULTI LAYER CROSS LAMINATED POLY FILM

The inner surface of 4 sides of shook's shall be nailed with Multi-layer cross laminated poly film (as per 6.5.7) using blue nails (as per 6.5.2) wherever 2 pieces of Cross laminated poly film are used, the joint shall have an overlap of minimum 20mm.

The inner surface of top cover shall be nailed with Multi-layer cross laminated poly film (as per 6.5.7). This sheet shall project outside on 4 sides by at least 100mm and shall be nailed properly on sides. Joining of sheets should have overlap of minimum 20mm.

The cubicles shall be covered with Multi-layer cross laminated poly film (as per 6.5.7).

7.5 SILICA GEL:

Silica gel (as per 6.5.12) packed in cotton bags shall be kept at different places inside the cubicle as per BHEL-Unit directions. Each suit of cubicle shall be provided with 1 kg of Silica gel (for a 4 suit cubicle 4 kgs of Silica Gel to be used. The bag containing silica gel to be as per 6.5.13).

7.6 LOOSE PARTS:

Any loose parts in the cubicles shall be tied using cotton/ plastic tape. Wooden battens shall be provided wherever necessary.

7.7 WOODEN BATTENS:

In case of cubicle which are not rectangular in shape like control desks, sufficient number of wooden rafters/battens of proper size shall be provided to give strength to the package.

7.8 RUBBERISED COIR:

Gap between the cubicle and the case shall be filled with rubberized coir (as per 6.5.8) with distance between consecutive layers less than 500mm.

7.9 CLAMPING:

Packing shall be bound at edges by nailing M.S. Clamps / Brackets (as per 6.5.5). Each vertical edge shall have minimum 3 clamps. Top horizontal edges will have one clamp for every meter length of package. However, minimum 4 clamps shall be nailed at the top for any cubicle.

7.10 PACKING SLIP:

Packing slip kept in the polyethylene bag (As per 6.5.16) shall be placed in the box at appropriate place. In addition, one more packing slip covered in polyethylene cover and packing slip holder (as per 6.5.11) shall be nailed to front / rear of case.

7.11 MARKING PLATE:

One no. (As per 6.5.10) shall be nailed to the front side of the case.

7.12 CASE MOUNTING:

After complete packing, stencil marking of various details and marking of symbols shall be done as per BHEL instructions using indelible / non washable marking ink.

7.13 Different types (Typical) of Cubicles with sizes for Packing

1. Single suite cubicle - 900 x 950 x2500
2. Two suite cubicle - 1650 x 950 x 2500
3. Three suite cubicle - 2400 x 950 x2500
4. Four suite cubicle - 3150 x 950 x 2500
5. Regulation cub - 1300 x 1350 x 2500
6. Thy cub - 2870 x 1350 x 2500
7. VFD Cub - 3800 x 1550 x 2500

7.14 PACKING OF CUBICLES FOR EXPORT

Refer Corporate Standard AA0490009.

8 PACKING OF LOOSE ITEMS/SPARES

1) Shape of cases shall be square, rectangular with single gabled roof or with double gabled roof depending on the nature of the job to be packed. Construction shall be as per drawings enclosed. Only gable will be additional as required.
2) Wood shall conform to specification AA51401 or AA51402 with Tongue and Groove joint as per clause 6.3.
3) Width of planks shall be at least 100 mm. Width of binding planks (battens) shall be at least 75mm.
4) External surface of planks on front and rear shall be plane 100% (except bottom plank).
5) Inner surfaces of all 6 sides shall be lined with Multi Layered Cross Laminated Polythelene Film (as per clause 6.5.7) using blue nails.
6) Rubberized coir of minimum 25mm thickness and 100 mm width shall be nailed to inner surfaces of bottom and 4 sides of box.
7) Internal packing: Items that go into the box shall be packed using 100GSM, (Colourless) Multi Layered Cross Laminated Polyethylene Film Specification No: AA51420. Any space left between the job and the sides and the top of the box shall be filled with rubberized coir to get proper cushioning effect.
8) Certain items like transformers, reactors, breakers, etc., shall be bolted to the bottom of the box using bolts, nuts and washers.
9) Silica gel as per clause 6.5.12 held in cotton bags as per clause 6.5.13 shall be kept at proper places in the box.
10) Packing slip kept in polyethylene bag (clause 6.5.16) shall be placed in the box.
11) Marking plate as per clause 6.5.10 shall be nailed to side of the box.
12) Two numbers of hoop iron strips as per clause 6.5.3 shall be strapped tightly on the case using clips.
13) Stencil marking of various details and marking of various symbols shall be done as per BHEL instructions using indelible/non-washable marking ink.
14) Loose items to be kept inside the cubicle

- The components which are removed from cubicle for shipping purpose only, such as meters shall be kept inside the cubicle individually, kept in wooden box and tied firmly in bottom of Cubicle.

- Other items which are given loose in addition to cubicle shall be packed in separate boxes.

9 BOX SIZES

9.1 BOX SIZES

Table 1 – SPARES WOODEN BOX DETAILS

SNO	BOX TYPE	BOX SIZE (in mm)	BOX Wt (in KG)	Carrying Capacity
1	A	800 X 200 X 200	15	
2	B	1500 X 200 X 200	22	
3	C	2000 X 200 X 200	27	
4	D	1100 X 200 X 200	15	
5	E	200 X 200 X 200	5	
6	F	320 X 250 X 260	13	
7	G	320 X 250 X 430	16	
8	H	430 X 370 X 430	23	
9	I	1100 X 400 X 400	45	
10	J	1500 X 500 X 400	65	
11	K	2000 X 500 X 400	93	
12	L	2500 X 500 X 400	88	
13	M	900 X 600 X 600	100	
14	N	3000 X 400 X 400	60	
15	P	600 X 500 X 400	35	
16	Q	710 X 630 X 600	90	
17	R	850 X 630 X 670	102	
18	S	1000 X 770 X 670	140	
19	T	2500 X 850 X 800	180	
20	U	1500 X 700 X 700	120	
21	W	1200X900X600	120	
22	Y	450 X 200 X 200	10	

Table 2 – WOODEN BOX DETAILS

BOX TYPE	**BOX SIZE (in MM)**	**BOX Wt (in KG)**	**Carrying Capacity**
1	320X250X260	10	
2	320X250X430	15	
3	430X370X430	25	
4	670X670X470	65	
5	720X630X600	75	
6	1000X770X660	100	
7	1100X430X670	80	
8	1200X1200X900	80	
9	1300X770X1050	155	
10	2500X850X800	225	
11	2000X1500X1200	305	
12	1850X1050X1250	260	
13	2000X800X800	180	
14	2600X1500X1600	470	
15	250X250X600	20	
16	250X250X880	30	
17	300X300X700	25	
18	380X380X880	45	
19	510X510X1400	60	
20	570X570X1400	80	
21	575X575X1875	105	
22	3600X1100X1100	390	
23	900X500X800	110	
24	2000X950X740	225	
25	1600X1120X700	220	
26	2500X2000X1200	490	
27	2900X1900X1400	525	
28	3000X1000X900	370	
29	3200X2200X950	450	
30	2150X1100X750	325	
31	2000X2000X700	130	
32	700X1200X1325	130	

Table 3 – STEEL BOXES

SL NO	TYPE	DIMENSION IN MM			WEIGHT	CARRYING CAPACITY (KGS)
		LENGTH	BREADTH	HEIGHT		
1	I	2480	1680	1500	339	4500
2	II	1200	900	600	061	2000
3	IIB	1800	850	950	115	2500
4	III	900	600	600	029	1000
5	IV	600	450	500	019	750
6	V	400	350	300	011	500

TYPICAL PATTERN OF WOODEN BOX

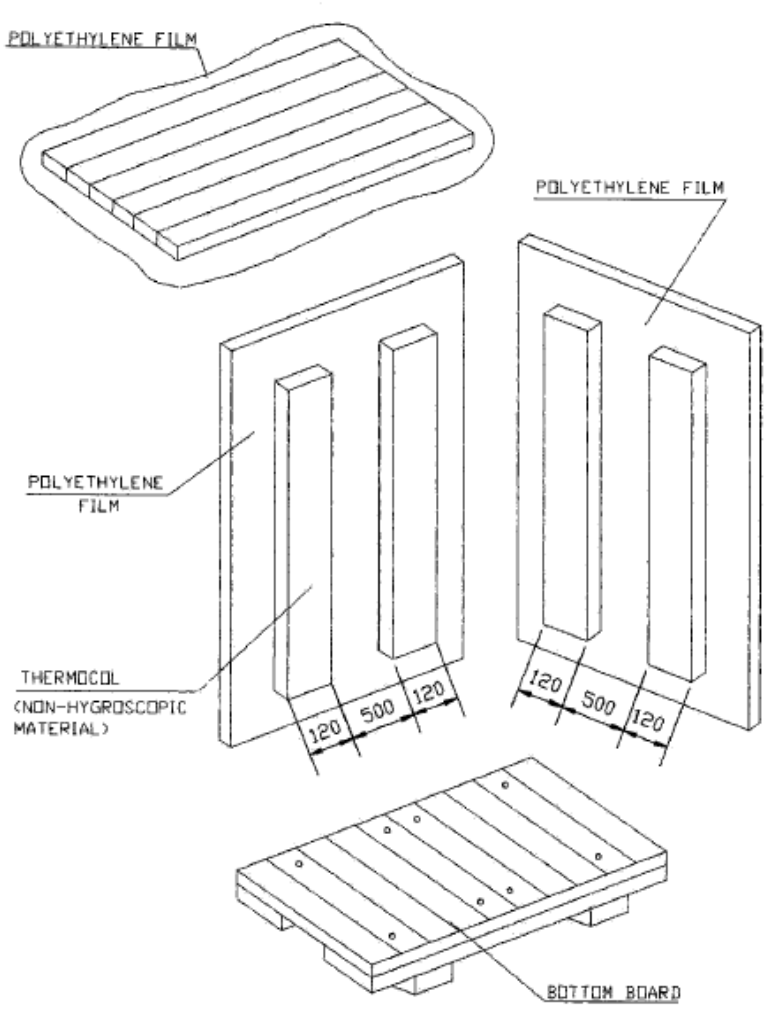


Figure 1

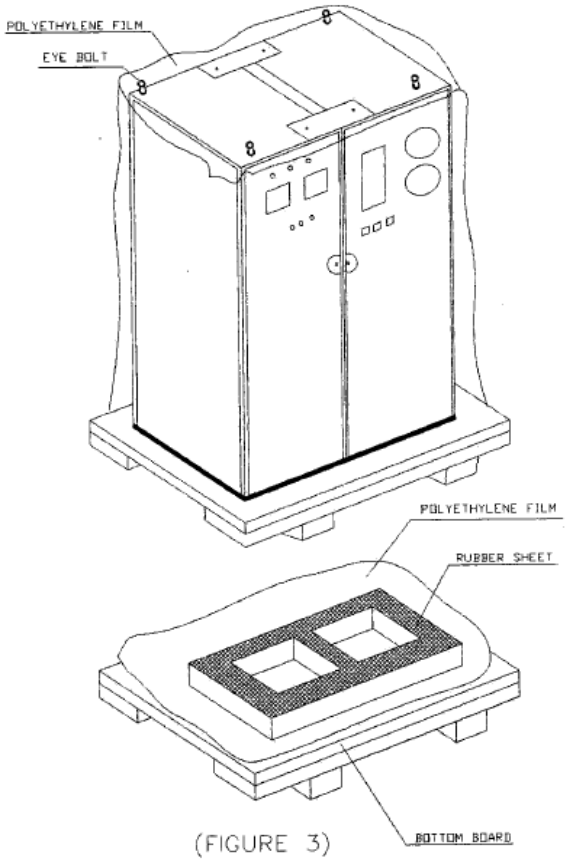


Figure 2

9.2 STEEL CONTAINERS:

Steel containers for packing can be used in case of repeated supplies of the same equipment. Empty steel containers are to be returned back from customer's end and to be reused for the next supplies. The containers are to be made of structural steel as per AA10108 with proper reinforcement with I, C and T Sections. Depends on the availability of resources & requirements units may be allowed to use standard cargo containers also instead of fabricated steel boxes.

a) Following precautions are to be taken during packing: -

b) Put the machine in the steel container properly,

c) Cover the machine with polythene.

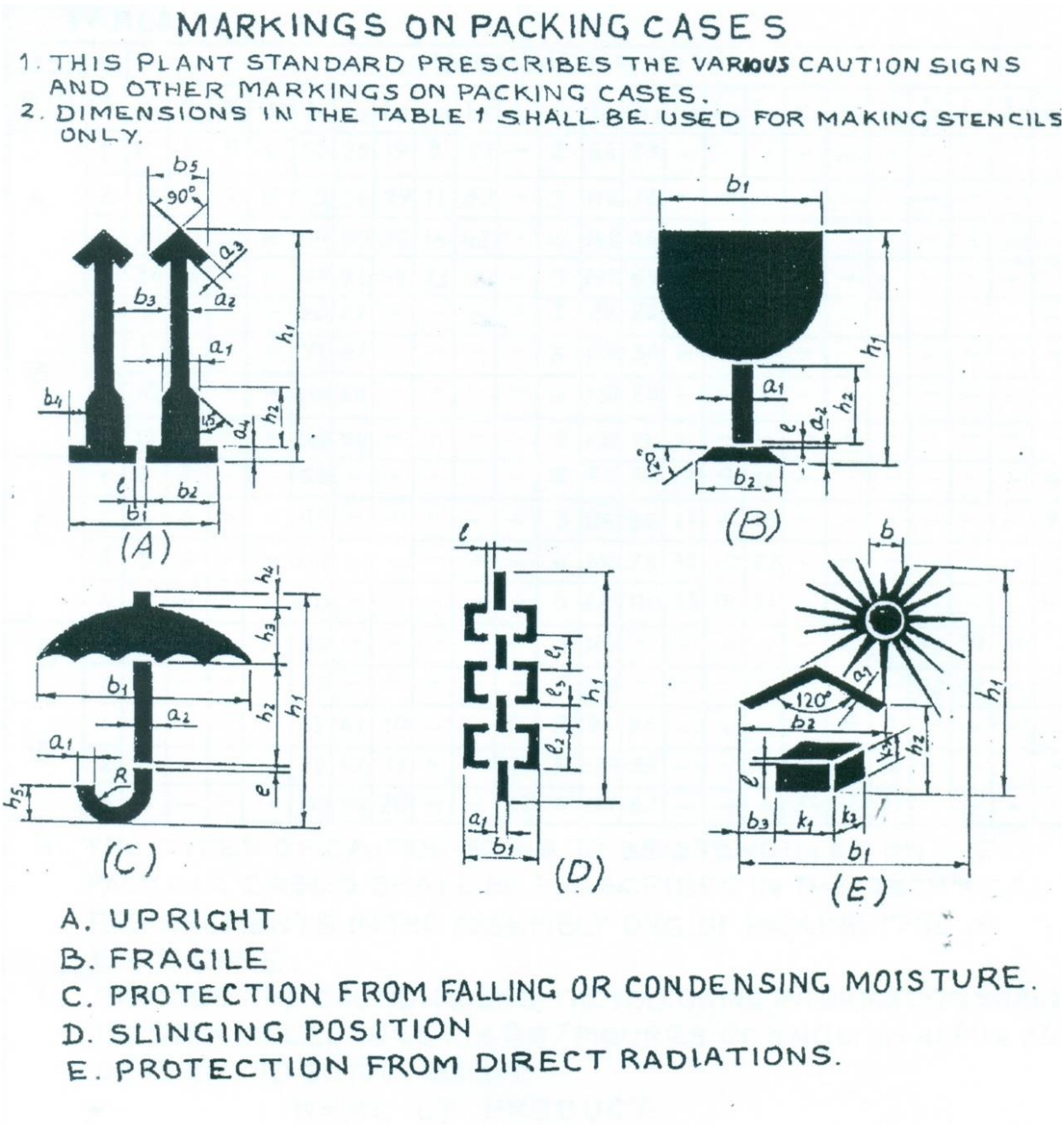
d) To arrest the movement in the steel container necessary wooden Blocks/Battons may be put.

e) Put cover on steel, container and Bolt Properly

9.3 SEALED PACKING:

Components sub-assemblies and assemblies sensitive to climatic conditions shall be packed seal tight. All the openings of the sensitive components, sub-assemblies and assemblies shall be blanketed to prevent the ingress of dust and moisture. The components sub-assemblies and assemblies are completely covered with 2 layers of polyethylene sheet. All sharp corners and edges are to be protected by rubber mats to prevent the polyethylene sheet from damage. Top surface of the case shall be free from dents to prevent rain water pockets.

10 MARKINGS/STENCILINGS



Center of Gravity

Figure 3

DESIGN-ATION		DIMENSION IN MM																						
		a1	a2	a3	a4	b1	b2	b3	b4	b5	b	l	h1	h2	h3	h4	h5	k1	k2	k3	l1	l2	l3	R
A	1	12	5	5	4	52	25	19	8	21		2	84	23										
	2	17	7	7	6	75	36	29	11	30		3	119	33										
	3	24	10	10	8	104	50	38	16	42		4	168	46										
	4	34	14	14	11	147	71	59	23	60		5	239	65										
B	1	5	5			50	33					2	84	25										
	2	7	7			71	47					3	119	36										
	3	10	10			100	66					4	168	50										
	4	14	14			142	94					5	239	71										
C	1	4	3			66						2	80	39	19	5	11							6
	2	6	4			85						3	114	55	27	7	16							9
	3	8	6			120						4	160	78	38	10	22							12
	4	11	9			170						5	227	110	54	14	31							17
D	1	6				30						4	148								30	30	10	
	2	9				42						5	209								42	42	14	
E	1	3				69	47	10			16	2	91	26				17	8	11				
	2	4				98	67	15			23	3	128	33				24	11	16				
	3	6				138	94	20			32	4	182	62				34	16	22				

Table 4

Black and Red Marking Ink to IS:1234 "Ink, Stencil, Oil Base, For Marking Porous Surfaces" or duplicating ink stencilling, oil base for marking porous surfaces.

All cases containing fragile items are to be stencilled with red marking and stencilling paint/ink

"HANDLE WITH CARE", "FRAGILE DO NOT TURN OVER".

Besides the caution signs the product information's shall be stencilled of letters with 13mm to 50mm height.

In case of consignment consists of more than one package, each package shall carry its package no as given in shipping list. All caution signs shall be stencilled in high quality full glossy out door finishing paint red in colour (AA56126). All other markings shall be carried out in black enamel(AA56126).

Caution signs & other markings shall be stencilled on both the end shooks & the side shooks.

Caution sign (for slinging) shall be stencilled only on side shooks at the appropriate place.

Note: Incase the size of package is small for using the stencils, then hand written letters/figures shall be allowed.

	BHEL – <unit> - <location> - <pin>				
CONSIGNEE					
MATERIAL					
CUSTOMER REF.			MO. NO.		
DESPATCH ADVICE NOTE NO			CASE NO		
DIMENSIONS(MM) L x B x H				NET WT –KGS	GROSS WT –KGS
SPECIAL INSTRUCTIONS	HANDLE WITH CARE - KEEP DRY DO NOT DROP - DO NOT TILT				

Figure 4 – TYPICAL MARKING PLATE (225 X 170)

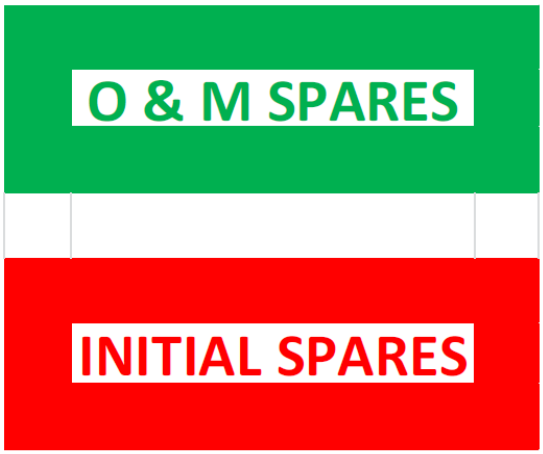


Figure 5

Easy spares [Initial and O&M] Traceability and Identification at units and as well as at sites:

11 RECYCLING OF INCOMING WOODEN PACKING CASES

OBJECTIVES

– To utilize useable wood of incoming packing cases, for manufacturing of new packing boxes.
– To recycle incoming wooden packing cases, as such, wherever possible.

1) All incoming wooden packing cases received from suppliers /customers will be opened carefully, with the intention of reusing them, by Shop.
2) After carefully taking out the contents, the empty wooden packing cases will be shifted by Shop to the specified locations i.e. bin / nearly spaces, already earmarked in stores.
3) Material shifting contractor engaged by store, will collect all such wooden packing cases and scrap wood from specified points, on a regular basis.
4) After collecting / loading the empty packing cases/ scrap wood, contractor will take the carrier first to Weighment Bridge for weighment, thereafter; he will go to Carpentry, where Carpentry representative will identify the packing cases which can be used by Carpentry for manufacturing of New Packing Boxes. All such identified packing boxes will be unloaded and handed over to Carpentry by contractor.
5) These packing boxes will be made re-useable after necessary rectification and additional work.
6) Contractor will again take the carrier for weighment and this second reading will also be recorded on the same “Weighment Slip”.
7) Weight of empty packing cases / scrap wood taken will be calculated on the basis of 1st and 2nd weighment readings recorded on the “Weighment Slip”. A copy of“Weighment Slip” (where both the weighment readings are recorded) will be given by the contractor to the carpentry representative. Based on this “Weighment Slip”, carpentry will maintain a register in which details of quantity received will be recorded.
8) All “Weighment Slips” will invariably be signed by carpentry representative (even when no boxes have been unloaded by carpentry). Store will accept the scrap wood only if “Weighment Slips” are signed by carpentry representative.
9) Balance empty packing cases / scrap wood will be handed over by contractor to Store, for storing in scrap yard.
10) A separate area in Scrap yard will be provided, for executing the work of denailing of wooden packing cases, under supervision of carpentry.
11) Carpentry contractor will identify packing cases / scrap wood for denailing, which will behanded over to him by Store, at Scrap yard, for denailing and further operation.
12) Quality and Carpentry will jointly inspect the wood generated by de-nailing process and will prepare “INSPECTION CUM RECEIPT REPORT OF USEABLE WOOD RECEIVED FROM TPS – STORE BY CARPENTRY”.
13) After acceptance of the wood by Quality and Carpentry, the same will be shifted to carpentry for receipt and its record will be maintained by carpentry.
14) This will be a Permanent Productivity Project executed by carpentry. “Productivity Savings “duly verified at the current Purchase Order rate of wood, will be sent every month to Resource Management Department, for highlighting it in their monthly progress report.

12 STANDARD METHOD OF PACKING

Table 5 - Standard Method of Packing

DESCRIPTION	CASE	CRATE	SKID	BUNDLE	BARE	DRUM	METAL DRUM	FIBRE DRUM
PRESSUE VESSELS								
TOWERS					O			
TANKS					O			
VESSELS					O			
GASKETS	O							
FASTENERS	O							
COVERS		O						
EXCHANGERS								

CORPORATE STANDARD

DESCRIPTION	CASE	CRATE	SKID	BUNDLE	BARE	DRUM	METAL DRUM	FIBRE DRUM
HEAT EXCHANGERS					O			
TUBE BUNDLE	O							
SHELL					O			
AIR FIN COOLERS					O			
COLOUMNS, MOTOR SUSPENSIONS, PLENUM CHAMBERS, SCREEN GUARDS, ETC					O			
BEARING BLOCKS	O							
FANS	O	O						
MOTORS	O							
GASKETS	O							
FASTENERS	O							
TEST FLANGES			O					
TEST RINGS			O					
COVERS			O					
CRYOGENIC VESSELS								
COLD CONVERTERS					O			
HORIZONTAL STORAGE TANKS					O			
TRANSPORTATION TANK					O			
COLD BOX					O			
DRYING UNIT					O			
DRYING BOTTLES					O			
MOISTURE SEPARATORS					O			
SILENCERS					O			
ONGC SKIDS					O			
VAPORISER		O						
SPECIAL PRODUCTS								
SI/VI PIPING		O						
CRO BIO CONTAINERS	O							
AIR BOTTLES	O							
TITANIUM BOTTLE	O							
WAR HEAD CONTAINER	O							
MISSILE CONTAINER	O							
FUEL CONTAINER	O							
AIR LOCK ASSEMBLY	O							
BOILER DRUMS					O			
BOILER ITEMS								
COILS			O					
PANELS					O			
HEADERS			O		O			
FEEDERS								
MACHINED ITEMS								
SHELL SEGMENTS					O			

DESCRIPTION	CASE	CRATE	SKID	BUNDLE	BARE	DRUM	METAL DRUM	FIBRE DRUM
SHELL SEGMENTS IN STACKS					O			
SPHERE PETALS								
COLOUMNS, BASE PLATES, TIERCOS, PIPES, NOZZLE E1, F1, INTERNAL PIPES, PADS ETC.					O			
ROLLERS	O							
VALVE TRAYS								
VALVE TRAY COMPONENTS	O							
LATTICE GIRDERS		O						
FASTENERS	O							
GASKETS	O							
SUB CONTRACTS								
FAB STRUCTURALS					O			
SUPPORTING STRUCTURALS					O			
STRUCTURE SUB ASSEMBLY					O			
FAB PIPES					O			
GRATINGS					O			
STAIR CASES					O			
HANDRAILS/ PLATFORMS					O			
BOUGHT OUT COMPONENTS								
IRON & STEEL (LIKE PLATES, BEAMS, ANGLES, CHANNELS ETC.)					O			
PIPE FITTINGS								
CS PIPES, TUBES					O			
SS PIPES, TUBES					O			
FIN TUBES	O							
ELBOWS		O			O			
FLANGES	O	O						
VALVES	O							
GAUGES	O							
DEMISTERS		O						
ABSCRBANTS (LIKE MOLECULAR SIEVES, ACTIVATED ALUMINA, MOBILE SORBID)						O		
PAINT TINS		O						
PAINT DRUMS						O		
IGNITORS	O							
SPRAY NOZZLES	O							
ELECTRICAL INSTRUMENTATION								
MOTORS, PUMPS, COMPRESSORS, TURBINES	O							
SWITCH BOARDS, DISTRIBUTION BOARDS, STARTERS, JUNCTION BOXES		O						
INDICATORS, VIBRATOR SWITCHES	O							

DESCRIPTION	CASE	CRATE	SKID	BUNDLE	BARE	DRUM	METAL DRUM	FIBRE DRUM
CABLE BUNDLES, CABLE DRUMS					O			
CABLE TRAYS, CABLE RACKS, EARTHING MATERIAL		O						
OPERATIONAL SPARES	O							

13 PROCEDURE FOR HANDLING OF COMPONENTS

The purpose of this procedure is to protect the quality of the components/equipment while handling in various stages of manufacturing packing & despatching.

13.1 Adequate care shall be taken in handling the material, and components to avoid damage during receipts, storage issue manufacture & despatch operations.

13.2 Appropriate material handling equipment like fork lifters, cranes etc. shall be used where needed.

13.3 Lifting by crane and transportation by trolley of critical items and large components like rotors castings etc. shall be done carefully.

13.4 For critical items, where specified, special handling fixtures shall be used for lifting.

13.5 Slings and shackles used for lifting the components/equipment shall be checked for fitness and suitability before use.

13.6 Slings used on machined surfaces shall be suitably padded. No slings shall be used on journal surfaces.

13.7 Precision machined components like blades, catches, rollers etc. shall be lifted using suitable wooden pallets.

13.8 HANDLING OF COMPONENTS ON RECEIPT/DESPATCH

Before loading/unloading a packing case from the carrier look for the following shipping instructions painted on the packing case.

a) The markings showing the upright position.

b) The markings showing the sling position

c) Markings showing the fragile contents.

d) Other required markings as per clause no.10

13.8.1 Appropriate cranes and slings should be used for different components/ cases. Slings should normally make an angle as minimum as possible (width wise) but in no case more than 15º.

13.8.2 Handling and lifting should be done without jerks or impacts.

13.8.3 Immediately after receipt of the goods, the packing should be examined all-round for any sign of damage. If necessary, lift the cover or a number of boards of the case so as to make the contents visible. In the event of sealed packing being used the plastic sheeting should not be damaged. It is imperative that the packing material is restored in original condition after the inspection.

13.8.4 On receipt of the equipment it should be checked with the shipping list and missing or damage if any should be reported immediately. It is important to arrange for immediate examination to determine the extent of the damage, the cause of the damage and where applicable the person or persons responsible for the damage. According to general practice when transporting by railway or by road vehicle the carrier concerned should be immediately called upon (within specified periods) for jointly establishing a statement of the damage. This is essential as a basis for a subsequent claim and possible damage report to the insurance company.

13.8.5 Protective coating applied on machined surfaces should not be disturbed. The plastic covering should be put back carefully so that it prevents ingress of dust and moisture. Some packing may have vapour phase inhibitor (VPI) paper enclosed inside the packing cases. This should be restored to its original place as far as possible.

13.8.6 Silica gel and such other chemicals kept in the box as desiccants and indicators should also be left in the box itself.

14 GENERAL GUIDELINES FOR ODC TRANSPORTATION/DESPATCH

Based on the Dimensions/Weight indicated in the Transportation Sketch, the type of Trailer is decided and indicated in the Tender Enquiry.

14.1 TRANSPORTATION:

1. LOW BED TRAILERS (LB 8):
   - Well Bed Length : 10000mm
   - Over Gooseneck : 13000mm
   - Width : 3000mm
   - Carrying Capacity : 40MT

2. LOW BED TRAILERS (LB 16):
   - Well Bed Length : 12000mm
   - Over Gooseneck : 16000mm
   - Width : 3000mm
   - Carrying Capacity : 75MT

3. TOW TYPE TRAILERS (WITH FRONT DOLLEY 16 TYRES): 12000MM length
   (for Exceptional equipment length: 30000mm and above)

   Bigger Dia equipment are loaded in the Well with overhanging.

   Smaller Dia equipment with excess length are loaded over Gooseneck with rear hanging.
   The Vehicle Dimensions are defined above are only guidelines for selection based on actual Dimensions/ Weight of the Consignment

14.2 PACKING:

For all ODCs, Wooden Saddles are cut to the diameter of equipment as per the Transportation Sketch.

Wooden Saddles	For Diameter up to 4000mm	For Diameter above 4000mm
Length:	1836/2743mm (6'0"/9'0")	3353mm (11'0")
Width:	300mm (1'0")	300mm (1'0")
Height:	Saddle + one/two wedges a top	Saddle + three/four wedges a top

Number of Saddles:	
Minimum	3 in case of Loading inside Well +1 when loaded on Gooseneck
Maximum:	4 in case of Loading inside Well +2 when loaded on Gooseneck

For Securing the equipment firmly on the Trailer, 19mm (3/4"), wire rope with 25mm (1") Heavy Duty Turn Buckles / BD Clamps are used as Lashing for the equipment.

14.3 NUMBER OF LASHINGS:

	CONSIGNMENT LOADED INSIDE WELL BED	CONSIGNMENT LOADED OVER GOOSENECK
a) up to 40MT	4 (2 Single Line lashing 2 Double Line Lashing)	5 (3 Single Line Lashing 2 Double Line Lashing)
b) 40MT to 60MT	5 (3 Single Line Lashing 2 Double Line Lashing)	5 (Single Line Lashing 3Double Line Lashing)
c) 60MT and above	5 (2 Single Line Lashing 3 Double Line Lashing)	6 (3 Single Line Lashing 3 Double Line Lashing)

15 GUIDELINES FOR HANDLING/LOADING/LASHING

15.1 HANDLING

Figure 6

Before unloading the jobs Completely painted and neatly stencilled will be checked.

Pipes with split type end cover will be checked

Figure 7

All Coil Tubes to be provided with End Caps.

Figure 8

Neatly stacked Coil Assemblies.

Figure 9

Columns to be lifted with Nylon belts. This protect painting, edges and attachments.

Figure 10

15.2 LOADING

All the components to be transported by putting inside the properly fabricated Crating

Figure 11

Small components may fall down while transporting without closed crating and there are chances of missing of small parts. Hence, it is always better to transport small components in closed containers/crating. Loose to be being shipped in a closed crating.

Figure 12

No component loaded over the crating.

Figure 13

Headers supported with wooden V blocks at 3 meters interval.

Figure 14

Spacers in between each coil assembly.

Figure 15

Goose pipe to be provided with rubber pad protects removal of painting and damage to the job.

Figure 16

15.3 LASHING

Use Nylon belts only for lashing of all components. It prevents removal off painting and cut in the materials.

Figure 17

Nylon Belts used for lashing the beams.

Figure 18

16 PRODUCT WISE SPECIAL INSTRUCTION

Additional instructions of packing not included in this standard shall be covered by individual product standard.

17 REFERRED STANDARDS (Latest publications including amendments):

1) AA51420	2) AA55619	3) AA51414	4) IS:3401	5) AA10108
6) AA56126	7) AA51402	8) AA51401	9) IS:1234	

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. HY-DG-1-180-00-57592-00

VIEW 'X-X'

1600 MIN HOOK DISTANCE REQUIRED

SPACE REQUIRED FOR BP ROTOR WITHDRAWAL 2600mm
MAX WEIGHT OF CASING COVER TO BE HANDLED-1300kg

2500 MIN HOOK DISTANCE REQUIRED

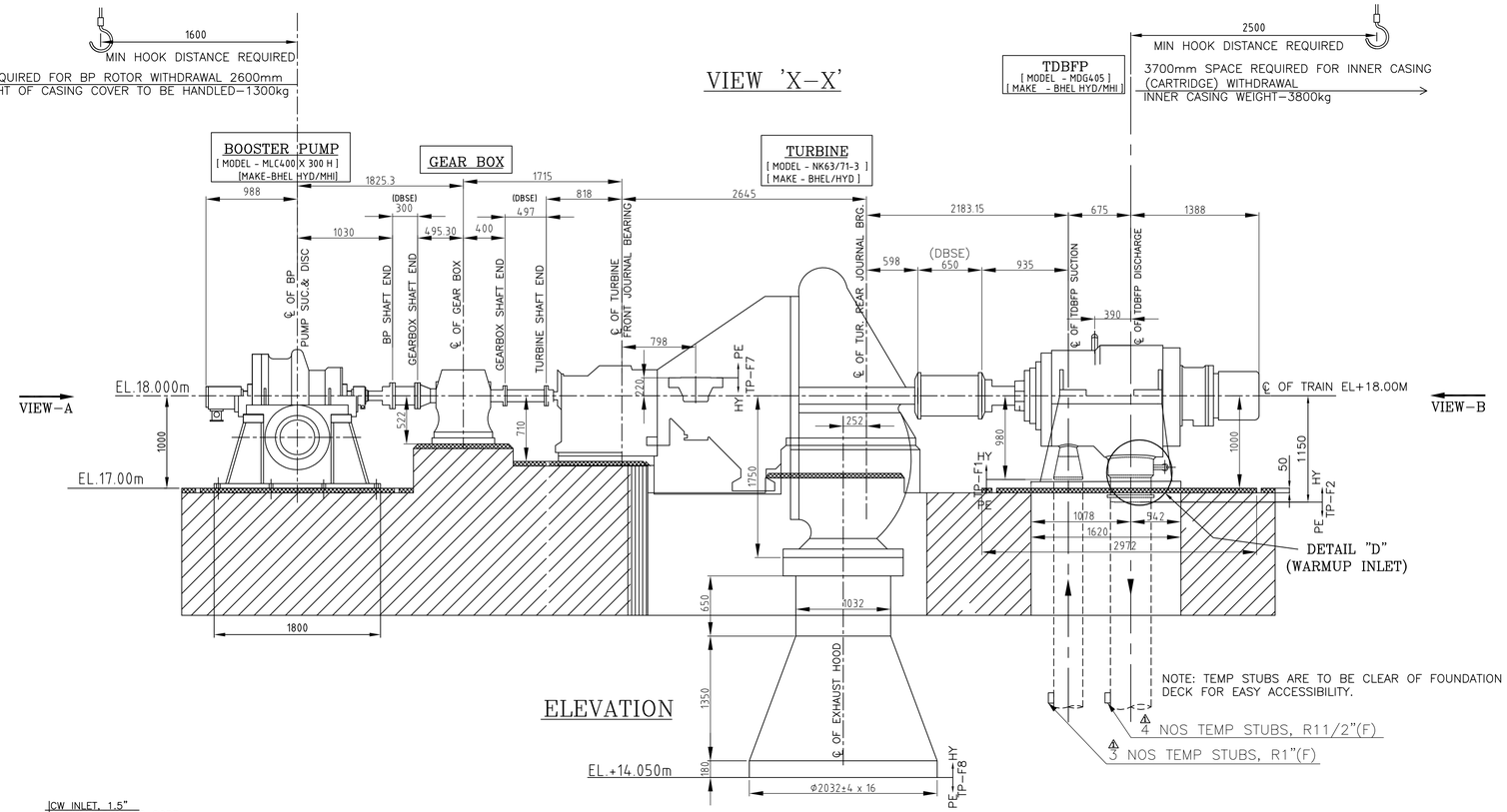
3700mm SPACE REQUIRED FOR INNER CASING (CARTRIDGE) WITHDRAWAL
INNER CASING WEIGHT-3800kg

BOOSTER PUMP
[MODEL - MLC400 X 300 H]
[MAKE-BHEL HYD/MHI]

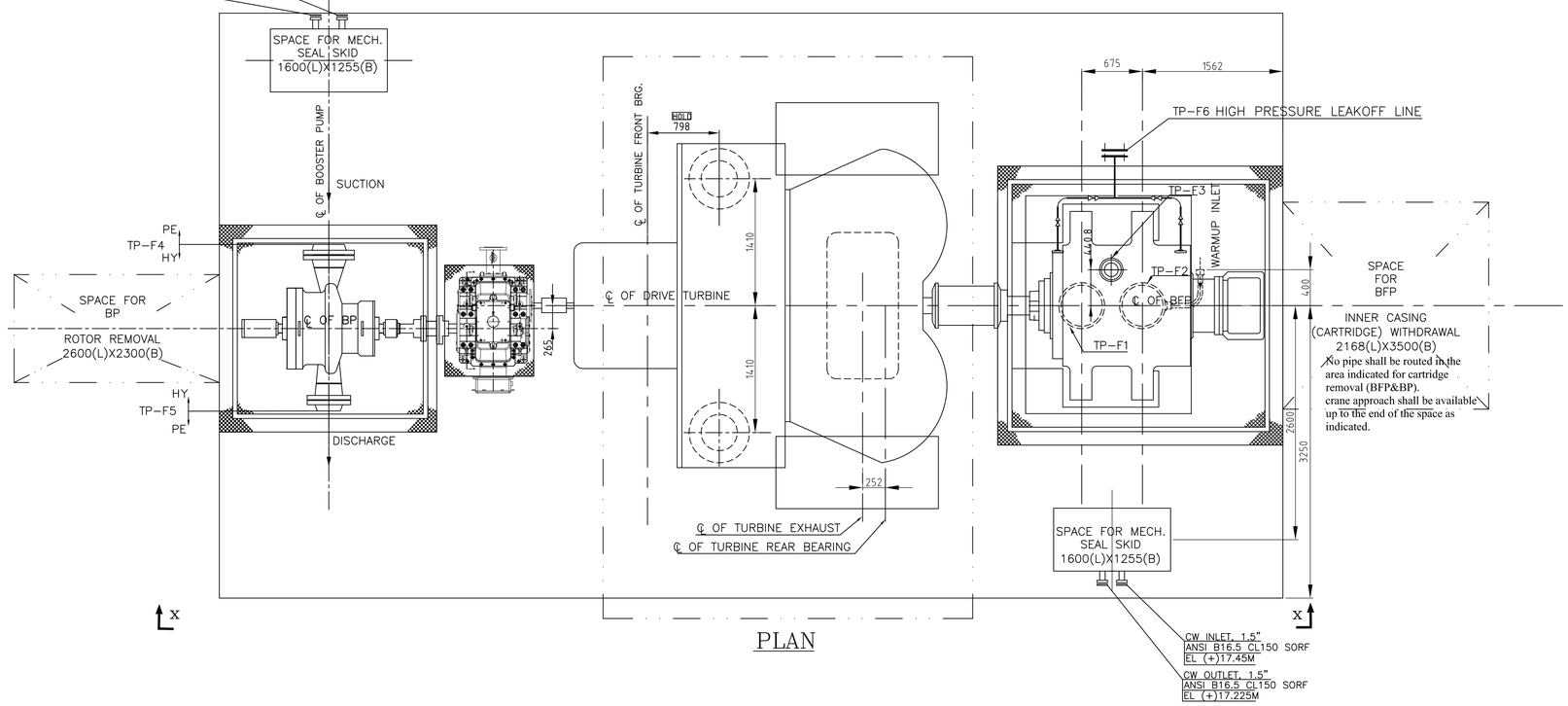
GEAR BOX

TURBINE
[MODEL - NK63/71-3]
[MAKE - BHEL/HYD]

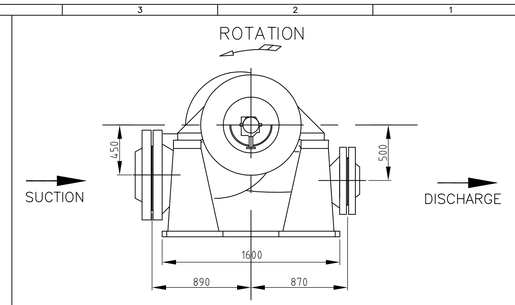
TDBFP
[MODEL - MDG405]
[MAKE - BHEL HYD/MHI]



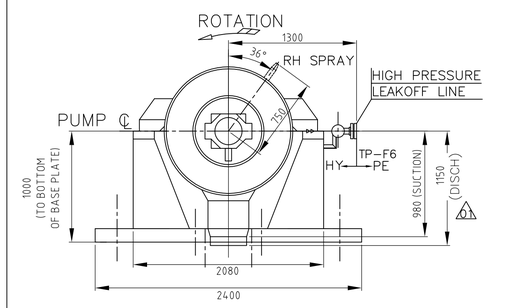
ELEVATION



PLAN



VIEW 'A' (BP)



VIEW 'B' (BFP)

NOTE :

1. FOR LOADING POINTS & LOADING DETAILS, TERMINAL DETAILS OF DRIVE TURBINE REFER TDBFP SET FOUND. DRG.
2. TERMINAL POINTS SHOWN IN THE HYD. SCOPE INCLUDES COUNTER FLANGES ALONG WITH FASTENERS & GASKETS.
3. DBSE – DISTANCE BETWEEN SHAFT ENDS.
4. SPACE INDICATED FOR BFP CARTRIDGE/BP ROTOR REMOVAL SHALL BE CLEAR OF ANY OBSTRUCTION (NO PIPING SHALL BE ROUTED IN THIS AREA.
5. FOR TDBFP LOCATIONS, REFER BHEL-PEM DWG.NO. PE-DG-390-100-M005
6. BFP & BP MECH SEAL SKID HAS TO BE PLACED AS CLOSE AS POSSIBLE TO PUMP SET AS PER SITE/PEM CONVENIENCE.

REFERENCE DRAWINGS:

S.No.	DRAWING NO.	TITLE
01	PE-DG-390-100-M005/ 2115-110-PVM-F-031	TG EQUIPMENT LAYOUT DRAWING GROUND FLOOR
02	HY-DG-1-31301-06335/ 2115-110-PVM-V-009	FOUNDATION ARRANGEMENT FOR BFP AND DRIVE TURBINE
03	HY-DG-3-180-00-55678/ 2115-110-PVM-W-019	ALLOWABLE FORCES AND THERMAL MOVEMENTS OF BFP
04	HY-DG-3-189-00-55585/ 2115-110-PVM-W-018	ALLOWABLE FORCES AND THERMAL MOVEMENTS OF BP

SCOPE OF SUPPLY — HY BHEL, HYD SCOPE; PE BHEL, PEM SCOPE

DVC DWG NO: 2115-110-PVM-B-040

PROJECT: RAGHUNATHPUR THERMAL PHASE-II (2X660 MW)
PACKAGE: STEAM TURBINE GENERATOR
OWNER: DAMODAR VALLEY CORPORATION

BHARAT HEAVY ELECTRICALS LIMITED HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN.	V KIRAN K REDDY	s.d/-	24.05.24	
CHD.	SURESH KUMAR	s.d/-	24.05.24	NA
APPD.	AVINASH SJK	s.d/-	24.05.24	

DEPT. PUMPS	SCALE	WEIGHT (KG)	REF. TO ASSLY. DRG. NO.	ITEM NO.	NO.OF ITEM
CODE 410	NTS	NA	NA	NA	NA

TITLE: GENERAL ARRANGEMENT OF TDBFP SET

DRAWING NO. HY-DG-1-180-00-57592 REV. 01

SHEET NO. 01 NO OF SHEETS 02

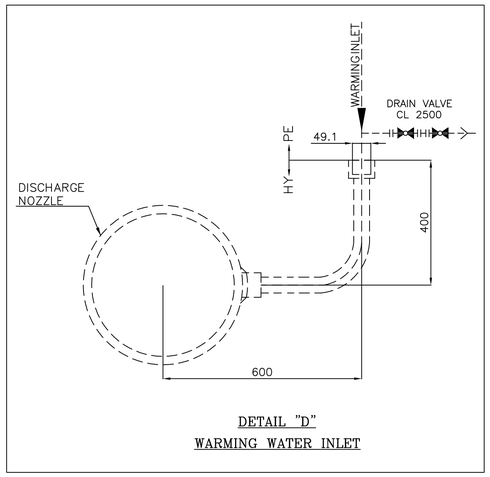
REV.	DATE	ALTERED	CHD./APPD.
A	11.04.25	REVISED AS PER CUSTOMER COMMENTS dtd:05.06.24	ALTERED: V KK REDDY CHD./APPD.: AVINASH SJK

1. JOB NO : 390
2. STATUS: CONTRACT
3. DRG./REF. NO. (INTERNAL) HY-DG-11800057592-00
4. DISTRIBUTION
5. TO
6. No. OF

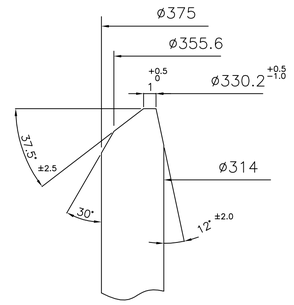
COMP. FILE NAME HY-DG-1-180-00-57592-00

SIGN. AND DATE

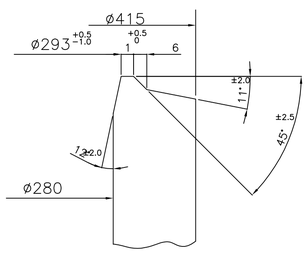
INVENTORY NO



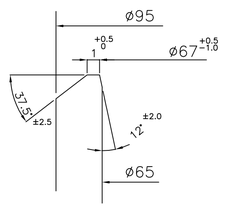
DETAIL "D"
WARMING WATER INLET



DETAIL A (SUCTION NOZZLE)

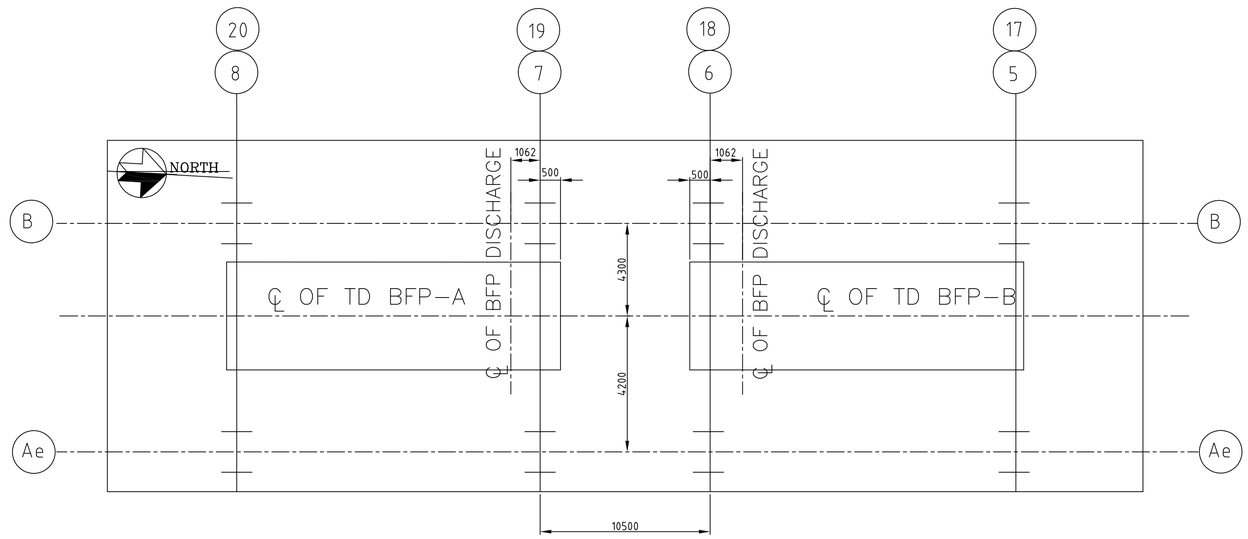


DETAIL B (DISCHARGE NOZZLE)



DETAIL–'C' (RH SPRAY)

WELD EDGE PREPARTION



KEY PLAN OF TDBFP SETS

TECHNICAL DATA OF TD BOILER FEED PUMP & TD BOOSTER PUMP

PUMP TYPE	UNITS	BOILER FEED PUMP	BOOSTER PUMP
MODEL		MDG 405	MLC400
MAKE/MANUFACTURER		BHEL (IN COLLABORATION WITH MHI)	
NO. PER UNIT/RATING		2/50%	
TYPE		MULTI STAGE,AXIALLY SPLIT INNER CASING & BARREL TYPE OUTER CASING	SINGLE STAGE, 2 BEARING DESIGN & DOUBLE SUCTION TYPE
DIRECTION OF ROTATION (VIEWED FROM PUMP DRIVE END)		CLOCKWISE	CLOCKWISE
DESIGN CAPACITY/PUMP	M^3/hr	1340	1340
DESIGN HEAD	MLC	3206	169
SHUT–OFF HEAD @ Design Point	MLC	3953	204
TEMPERATURE	DEG C	187.8	187.8
NPSH REQUIRED	MLC	43.1	6.1
DESIGN SPEED	RPM	5710	1495
TRIP SPEED	RPM	6281	1644
GRADE OF BALANCING		G 2.5	
DESIGN & TEST CODE		DESIGN AS PER LATEST HIS WITH COLLABORATOR MHI GUIDELINES TESTING AS PER ANSI/HI 14.6–2016	

TERMINAL POINTS

TERMINAL POINT	DESCRIPTION	NOMINAL SIZE	TERMINATED WITH	QTY.
TP–F1	SUCTION OF FEED PUMP	14"	BW END TO SUIT PIPE DIA AS PER DETAIL'A'	1
TP–F2	DISCHARGE OF FEED PUMP	16"	BW END TO SUIT PIPE DIA AS PER DETAIL'B'	1
TP–F3	R.H.SPRAY (2ND STG)	3"	BW END TO SUIT PIPE DIA AS PER DETAIL'C'	1
TP–F4	SUCTION OF BP	16'	COUNTER FL. TO SUIT PIPE DIA 406X12.7 THK	1
TP–F5	DISCHARGE OF BP	12"	COUNTER FL. TO SUIT PIPE DIA 323.85X12.7 THK	1
TP–F6	HIGH PRESS. LEAKOFF LINE	2"	SORF 2" CL 600	1
TP–F7	TURBINE MAIN STEAM INLET	10" #1500 WNRJ, SCH=60, CS		2
TP–F8	TURBINE EXHAUST HOOD	DIA 2032 X16		1

WEIGHTS OF PUMPS

ITEM	BOILER FEED PUMP		BOOSTER PUMP	
	DRY (kg)	WET (kg)	DRY (kg)	WET (kg)
PUMP	16000	16250	3500	3800
BASE	5600	5600	2650	2650
TOTAL	21600	21850	6150	6450

EQUIPMENT DATA

ITEM	WEIGHT (KG)
DRIVE TURBINE	61000 SINGLE HEAVIEST EQUIPMENT
GEARBOX	1030
COUPLING B/W BFP & TURBINE	200
COUPLING B/W BP & GEAR BOX	51

STATIC & DYNAMIC LOADS FOR BP & BFP

		BOOSTER PUMP	BFP
STATIC LOAD (kg)	VERTICAL	6450	21850
DYNAMIC LOAD (kg)	VERTICAL	5700	24375
	HORIZONTAL	5700	24375
	AXIAL	3800	16250

INVENTORY NO | SIGN. AND DATE | COMP. TEE NAME: HY-DG-1-180-00-57592-00

REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED: ROHIT.P	REV.	DATE	ALTERED:	REV.	DATE	ALTERED:	REV.	DATE	ALTERED: V KK REDDY
		CHD. APPD.			CHD./APPD.			CHD./APPD.			CHD./APPD.			CHD./APPD.			CHD./APPD.			CHD./APPD, M.M.R			CHD./APPD.:			CHD./APPD.:			CHD./APPD.: AVINASH SJK
ZONE			ZONE			ZONE			ZONE			ZONE			ZONE			ZONE			ZONE			ZONE			ZONE	A	11.04.25	REVISED AS PER CUSTOMER COMMENTS dtd:05.06.24

1. JOB NO : 390
2. STATUS: CONTRACT
3. DRG./REF. NO. (INTERNAL) HY–DG–11800057592–00
4. DISTRIBUTION
5. TO
6. No. OF

DVC DWG NO: 2115–110–PVM–B–040

PROJECT: **RAGHUNATHPUR THERMAL PHASE–II (2X660 MW)**
PACKAGE: STEAM TURBINE GENERATOR
OWNER: DAMODAR VALLEY CORPORATION

BHARAT HEAVY ELECTRICALS LIMITED, HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN.	V KIRAN K REDDY	s.d/–	24.05.24	
CHD.	SURESH KUMAR	s.d/–	24.05.24	NA
APPD.	AVINASH SJK	s.d/–	24.05.24	

DEPT. PUMPS	SCALE	WEIGHT (KG)	REF. TO ASSLY. DRG. NO:	ITEM NO.	NO.OF ITEM
CODE 410	NTS	NA	NA	NA	NA

TITLE: GENERAL ARRANGEMENT OF TDBFP SET

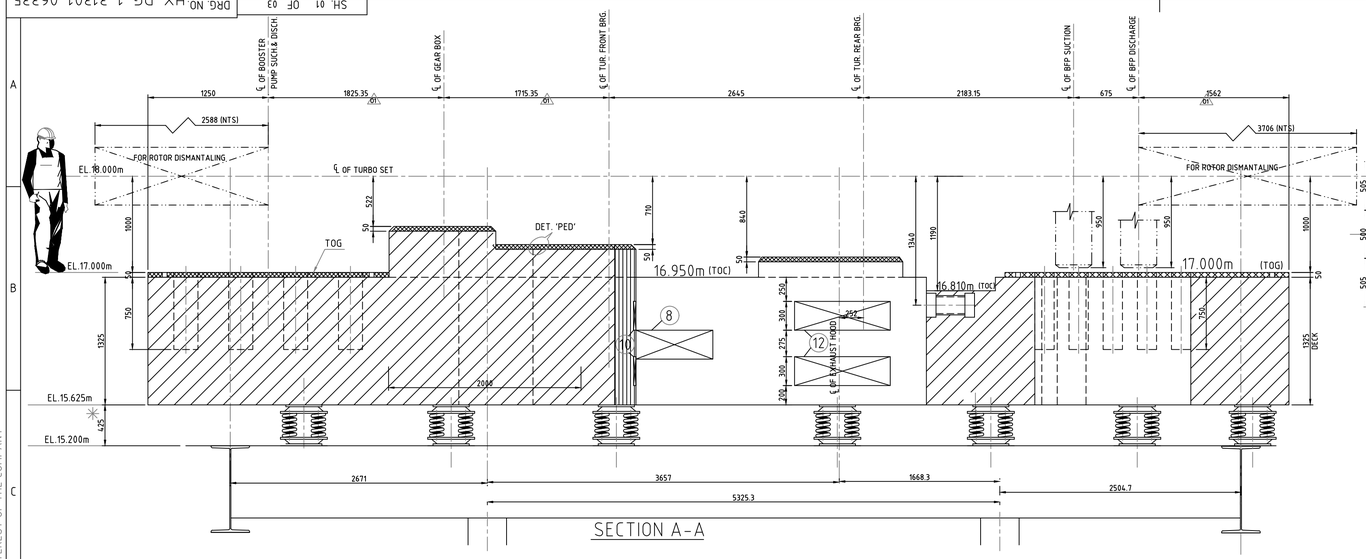
DRAWING NO. HY–DG–1–180–00–57592 REV. 01

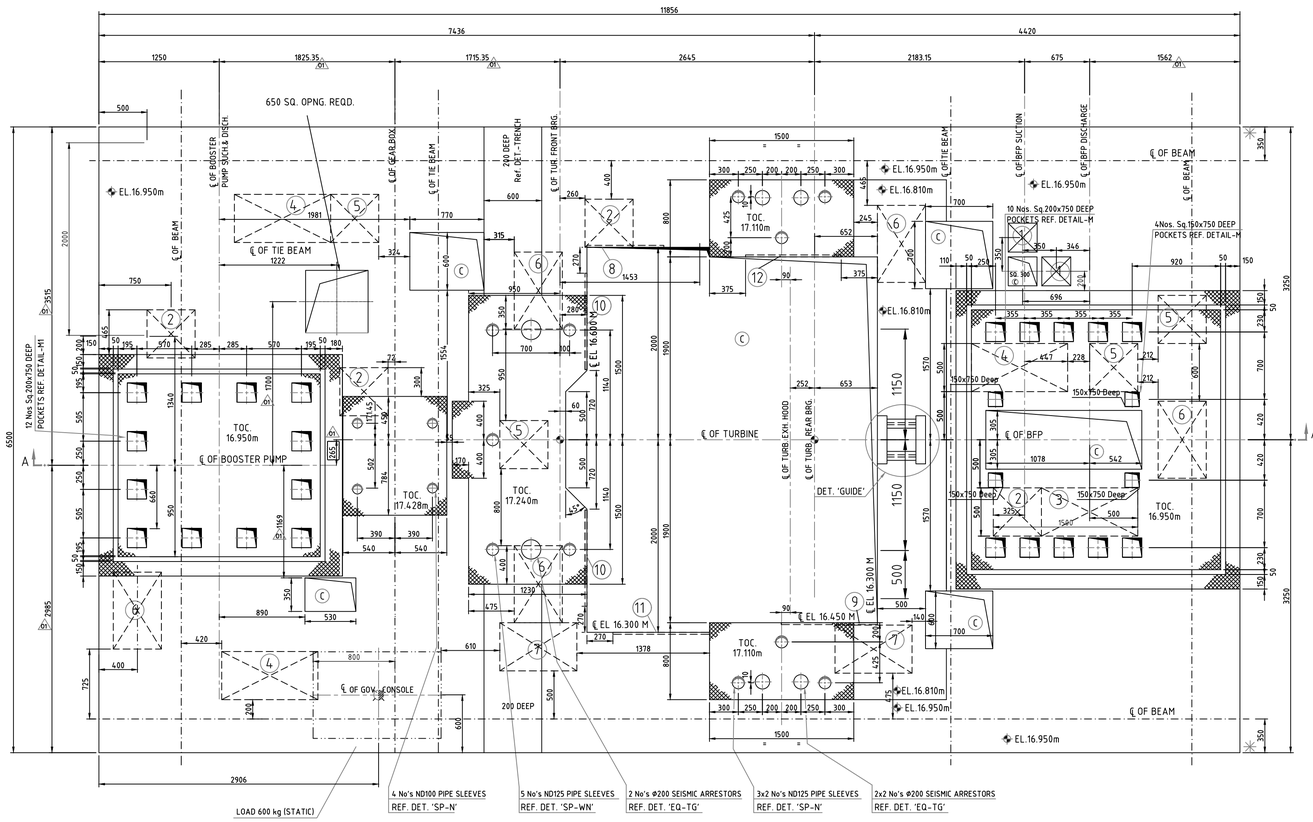
SHEET NO. 02 NO OF SHEETS 02

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. HY-DG-1-31301-06335 SH. 01 OF 03

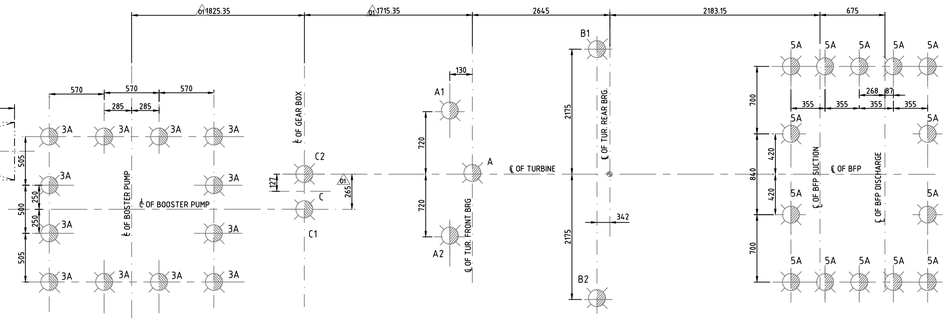


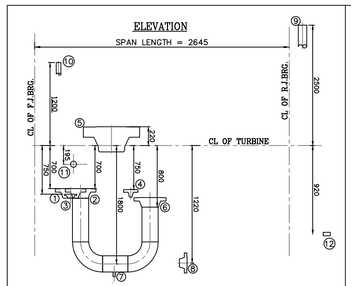


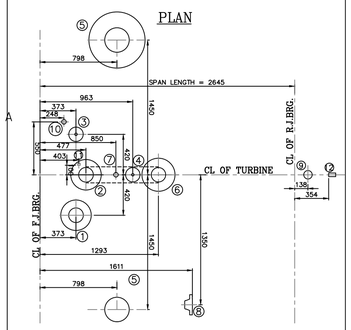
PLAN AT 17.00m (FOR PUMP-A)

(FOR PUMP-B ROTATE TOP DECK BY 180°)

LOCATION OF LOAD POINTS ON FOUNDATION TOP DECK (FOR PUMP-A & B)







SUPPORT PLATES : EP PLATE DETAILS REQUIRED BY PEM-MPL

DESIG.	PLATE SIZE	LOADS	QTY NO's	LOCATION
1	300 X 300	0.5 T	2	TOP OF DECK
2	500 X 500	2.5 T	4	BOTTOM OF DECK
3	1000 X 500	5.0 T	1	BOTTOM OF DECK
4	1000 X 500	1.5 T	3	BOTTOM OF DECK
5	500 X 500	1.0 T	4	BOTTOM OF DECK
6	500 X 800	2.0 T	5	BOTTOM OF DECK
7	800 X 500	5.0 T	2	BOTTOM OF DECK
8	800 X 500	2.0 T	1	VERTICAL, C.L. = 16.25M
9	1000 X 500	1.5 T	1	VERTICAL, C.L. = 16.25M
10	300 X 1000	0.5 T	4	VERTICAL SIDE OF DECK (CL EL 15.925 M & CL EL 16.225 M)
11	300 X 1000	0.5 T	2	VERTICAL SIDE OF DECK (CL EL 15.925 M & CL EL 16.225 M)
12	1000 X 500	0.5 T	2	VERTICAL SIDE OF DECK (CL EL 15.925 M & CL EL 16.225 M)

NOTES:-

1. THIS DRG.IS VALIED FOR BOTH TDBFP'S (A & B)
2. ALL EMBEDMENT & INSERT PLATES SHALL BE IN THE SCOPE OF CIVIL CONTRACTOR.
3. SPRINGS HEIGHT AND LOCATIONS ARE TO BE DECIDED BY CIVIL DESIGNER.
4. ✳ INDICATED DIMENSIONS ARE TO BE DECIDED CIVIL DESIGNER
5. FOR POINT LOAD DATA PLEASE REFER BHEL-PEM DRAWING.
   Drg. LOADING ON TD-BFP DECK (TDBFP-A. & TDBFP-B)
6. ALLOWABLE TOLERANCE IN HORIZONTAL AND VERTICAL DIRECTION :
   a) FOUNDATION DIMENSIONS ±10mm
   b) LOCATION OF EMBEDDED ANCHOR BOLTS ±5mm
   c) LOCATION OF SLEEVES FOR PIPING AND THROUGH HOLES FOR ANCHOR BOLTS ±10mm

SL. NO.	DESCRIPTION	QTY	TYPE OF FLANGE	STEAM PARAMETERS
1.	FRONT GLAND INLET	1	6" ₰300 WNRF,SCH=40,C.S.	1.1ata/330°C
2.	BALANCE PISTON GLAND	1	6" ₰300 WNRF,SCH=40,C.S.	2.1ata/331°C
3.	CASING DRAIN FLANGE-1	1	1" ₰600 WNRF,SCH=80,C.S	1.1ata/253°C
4.	CASING DRAIN FLANGE-2	1	1" ₰600 WNRF,SCH=40,C.S	15.5ata/397°C
5.	MAIN STEAM INLET	2	10" ₰1500 WNRJ,SCH=60,C.S.	15.5ata/397°C
6.	B.P. GLAND INTO CASING	1	6" ₰150 WNRF,SCH=40,C.S.	2.1ata/331°C
7.	BP PIPING DRAIN	1	1" SOCKET C.S.	2.1ata/331°C
8.	REAR GLAND INLET	1	4" ₰300 WNRF,SCH=40, C.S.	0.98ata/330°C
9.	REAR STEAM VENT	1	PIPE DIA 88.9x5.49, C.S.	0.98ata/330°C
10.	FRONT STEAM VENT	1	PIPE DIA 48.3x5.08, C.S.	0.98ata/330°C
11.	FRONT STEAM GLAND DRAIN	1	PIPE 10.2x2, SA312,TP321	0.98ata/330°C
12.	REAR STEAM GLAND DRAIN	1	DILO G 1/2" S.S	0.98ata/330°C

LEGEND:-

1. INDICATES LOAD POINTS.
2. a). ALL EP MARKED ON PLAN ARE REQUIRED AT BOTTOM OF DECK. AND EP MARKED ON SIDE (SECTION A-A & VIEW A) ARE REQUIRED AT BOTH SIDES OF DECK.
   b). ADDITIONAL EP OF 500 SQ ARE REQUIRED AT OPPOSITE SIDES OF OPENING FOR TURBINE EXHAUST AT 400MM BELOW EP-5 ALONG CENTRE LINE OF EXHAUST HOOD
   c). CL. ALL EP MARKED ON PLAN ARE REQUIRED AT TOP OF DECK.
3. INSULATION FOR FOUNDATION PROTECTION FOR TURBINE CUTOUT.
4. POCKETS.
5. TOC TOP OF CONCRETE
6. TOG TOP OF GROUT
7. CUT out in TG DECK (Thorough Opening)

STATUS : FINAL

PROJECT: **RAGHUNATHPUR THERMAL POWER PROJECT PHASE- II (2X660 MW)**

PACKAGE: STEAM TURBINE GENERATOR (STG)

OWNER : DAMODAR VALLEY CORPORATION

DVC DRG./DOC. NO.:2115-110-PVM-V-009

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: 2x660 MW DVC Raghunathpur

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

	NAME	SIGN.	DATE
DRN.	C.BALAJI		01.01.24
CHD.	B.SINGH		01.01.24
APPD.	M.A.H		01.01.24

NO.OF VAR. -N.A.-

REV.	DATE	ALTERED	CHD/APPD
01	24.03.25	ALTERED. C.BALAJI	CHD/APPD. B.SINGH
		DRAWING REVISED INLINE WITH GEAR BOX & CUSTOMER/CONSULTANT COMMENTS AND OTHERS MARKED AS 01	

DEPT. TCEP | CODE. 415 | UNTOL DIMS. GR. ~~F/NF~~ | SCALE 1:30 | WEIGHT (KG) -N.A.- | REF. TO ASSY. DRG. -N.A.- | ITEM NO. -N.A.- | NO.OF ITEMS -N.A.-

TITLE: FOUNDATION ARRANGEMENT FOR BFP & DRIVE TURBINE

CARD CODE N.A.

DRAWING NO.(1-313-01-06335) REV. HY-DG-1-31301-06335 01

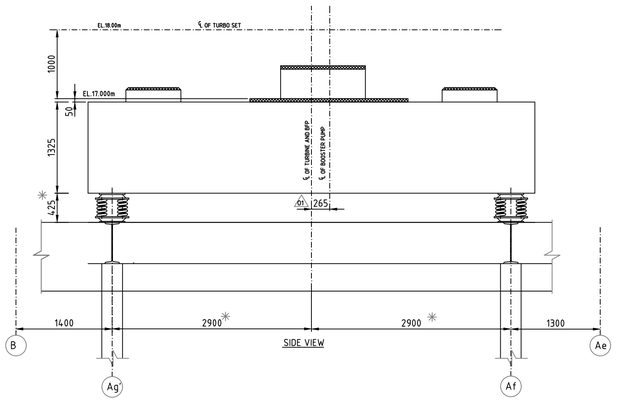
SHT. No 01 NO. OF SHT. 03

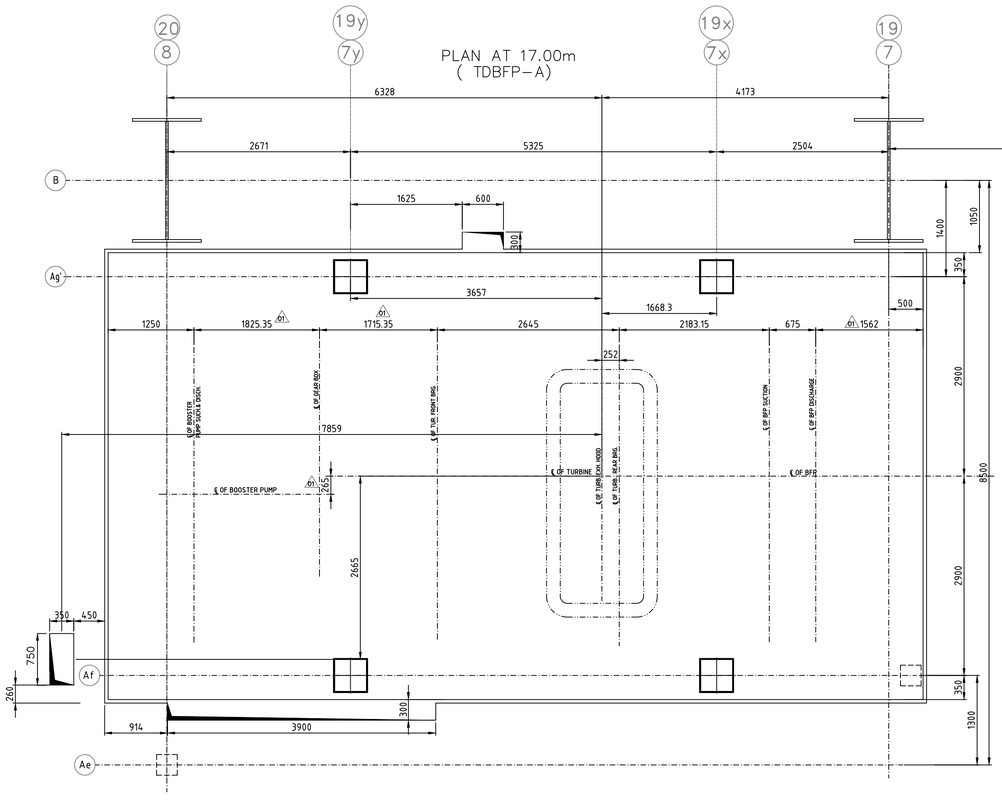
COMPUTER FILE NAME | REF. DRG NO. | SIGN. AND DATE | INVENTORY NO

FIRST ANGLE PROJECTION

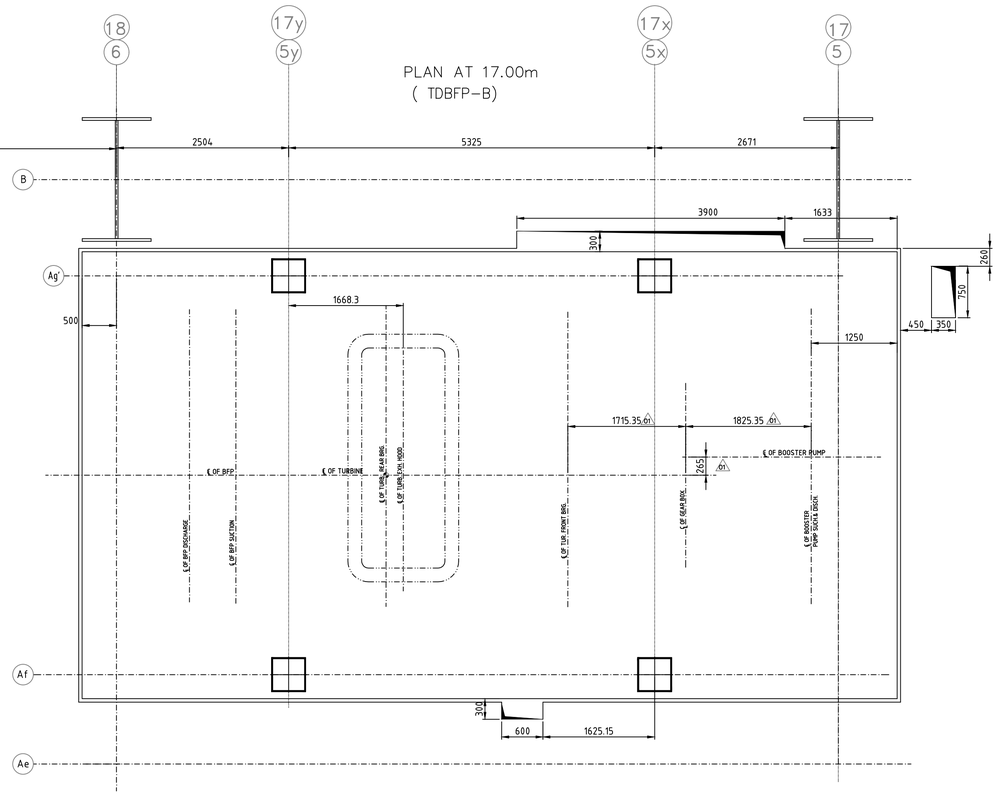
(ALL DIMENSIONS ARE IN mm)

DRG. NO. HY-DG-1-31301-06335 SH. 02 OF 03





10500(NTS)



GENERAL DIMENSIONAL LIMITS,FITS & TOLERANCES AS PER HY0230261

COMPUTER FILE NAME

REF. DRG. NO.

SIGN. AND DATE

INVENTORY NO

STATUS : FINAL

REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED
ZONE		CHD/APPD	ZONE		CHD/APPD	ZONE		CHD/APPD	ZONE		CHD/APPD	ZONE		CHD/APPD	ZONE		CHD/APPD	ZONE		ALTERED. CHD/APPD.
																		01	24.03.25	ALTERED. C.BALAJI CHD/APPD. B.SINGH

DRAWING REVISED INLINE WITH GEAR BOX & CUSTOMER/CONSULTANT COMMENTS AND OTHERS MARKED AS 01

PROJECT: RAGHUNATHPUR THERMAL POWER PROJECT PHASE II (2X660MW)

PACKAGE: STEAM TURBINE GENERATOR (STG)

OWNER : DAMODAR VALLEY CORPORATION

DVC DRG./DOC. NO.:2115-110-PVM-V-009 01

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: 2x660 MW DVC Raghunathpur

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN.	C.BALAJI		01.01.24	-N.A.-
CHD.	B.SINGH		01.01.24	
APPD.	M.A.H		01.01.24	

DEPT. T.E.P. | CODE. 415 | UNTOL. DIMS. OR ~~E.M.F.~~ | SCALE 1:30 | WEIGHT (KG) -N.A.- | REF. TO ASSY. DRG. -N.A.- | ITEM NO. -N.A.- | NO.OF ITEMS -N.A.-

TITLE: FOUNDATION ARRANGEMENT FOR BFP & DRIVE TURBINE

CARD CODE N.A.

DRAWING NO. (1-313-01-06335) HY-DG-1-31301-06335 | REV. 01

SHT. No 02 | NO. OF SHT. 03

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. HY-DG-1-31301-06335

SH. 03 OF 03

TYPE OF TURBINE :-	NK 63/71-3
TYPE OF BOILER FEED PUMP :-	MDG 405
TYPE OF BOOSTER PUMP :-	MLC 400X300H

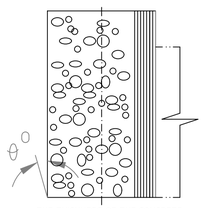
WEIGHT OF SINGLE HEAVIEST PIECE FOR

	ERECTION in kg.	MAINTENANCE in kg.
TURBINE	65000	24.000 01
BFP	21.600	3710
BP	6.150	1250

DIRECTION OF ROTATION VIEWED FROM BOOSTER PUMP TO BFP FOR :-

TURBINE - CLOCKWISE
BFP - CLOCKWISE
BP - COUNTER CLOCK WISE

DETAIL 'PED'

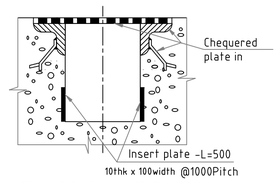


THE THICKNESS OF THE CONCRETE MEMBER MUST BE SUFFICEINT TO ENSURE THAT THE ANGULAR DEFLECTION DOES NOT EXCEED : 0.0115 DEG. WITH THE HORI-ZONTAL FORCES SPECIFIED.

DETAIL 'TRENCH'

REFER NOTE-14

PROPOSED TRENCH COVER



NOT INCLUDED IN B.H.E.L. SCOPE OF SUPPLY.

SPEEDS (RPM) 01

EQUIPMENT	RATED DESIGN	TRIP SPEED	CRITICAL SPEEDS
TURBINE	5710	6281	CRITICALLY DAMPED
BFP	5710	6281	20819
BP	1495	1645	13326

NOTE :- The installation details shown here are only informative. For final installation, ref. the Assembly drawings furnished alongwith the respective equipment.

FORCES ON FOUNDATION IN kgf

LOAD POINT / LOAD CONDITION	STATIC LOAD WITHOUT ROTATING WEIGHT	ROTATING WEIGHT	OPERATING WEIGHT OF CONDENSER/VACUUM PULL	SHORT CIRCUIT LOAD *	LOAD DUE TO OPERATING TORQUE	OPERATING UNBALANCE DYN. LOAD (ROTATING) **	FAILURE MODE LOAD ** (Turbine - Blade breakage
	1	2	3	4	5	6	7
A	-	2920	-	-	-	1200	7200
A1	14375	-	1403	-	900	-	-
A2	14375	-	1403	-	-900	-	-
B	-	-	-	-	-	-	-
B1	15955	1555	13318	-	300	350	3900
B2	15955	1555	13318	-	-300	350	3900
C	660	-	-	-	-	-	-
C1	-	110	-	-	-2200	50	300
C2	-	440	-	-	2200	50	300
C3	-	-	-	-	-	-	-
C4	-	-	-	-	-	-	-

FOUNDATION LOADING DATA

(LOAD POINT APPLICATION IS AT EACH POCKET) 01

LOAD APPLICATION POINT	EQUIPMENT	WEIGHT DRY	WEIGHT WET	STATIC LOAD ON EACH POINT(kg's) VERTICAL	DYNAMIC LOAD ON EACH POINT(kg's) VERTICAL	DYNAMIC LOAD ON EACH POINT(kg's) HORIZONTAL	DYNAMIC LOAD ON EACH POINT(kg's) AXIAL	01 ROTOR WEIGHT
5A	BOILER FEED PUMP (MDG 405) 01	21600	21850	1561	1742	1742	1161	650
3A	BOOSTER PUMP (MLC 400x300 H)	6150	6450	540	475	475	320	105

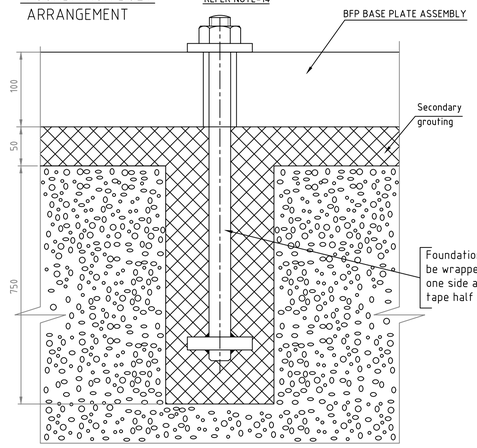
** At each supporting point acting in radial direction over 360 deg.
* Loads on either side of TG axis act in opposite directions and the direction changes at 50 cycles/sec.

NOTE :-1. DOWNWARD FORCES ARE POSITIVE
2. GRADE OF BALANCING: BFP, BP:G2.5
3. MASS MOMENT OF INERTIA:
BFP : 215 N-Sq.m] GD^2
BP : 466 N- Sq.m

DETAIL 'M'

FOUNDATION BOLT ARRANGEMENT

REFER NOTE-14

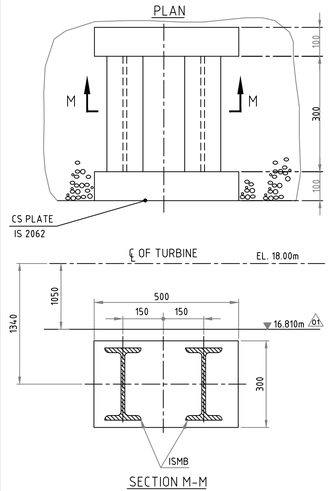


Note:Sealing mortar pouring and bitumen shall be part of ERECTION contract

DETAIL 'GUIDE'

(FOR EXHAUST HOOD GUIDE SUPPORT)

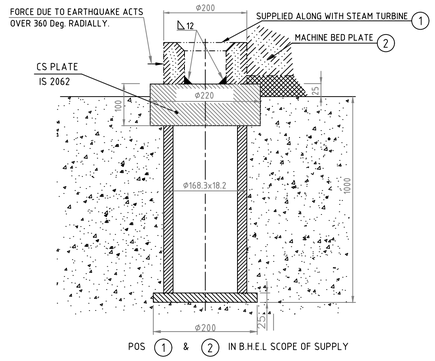
NOT INCLUDED IN B.H.E.L. SCOPE OF SUPPLY.



SECTION M-M

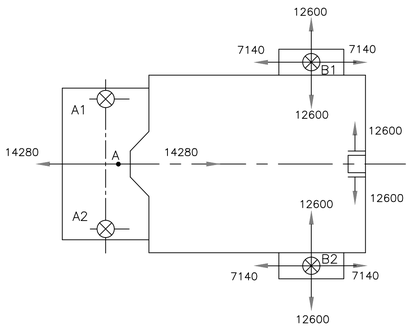
DETAIL 'EQ-TG'

REFER NOTE-14



POS (1) & (2) IN B.H.E.L SCOPE OF SUPPLY

HORIZONTAL FRICTIONAL FORCES IN kgf 01



A:WORKING POINT OF FORCE (mm) : 710
B1,B2:.WORKING POINT OF FORCE (mm) : 840
(THESE FORCES ALTERNATE IN DIRECTION)

THESE FORCES ALTERNATE IN DIRECTION

DETAILS FOR FOUNDATION CALCULATIONS

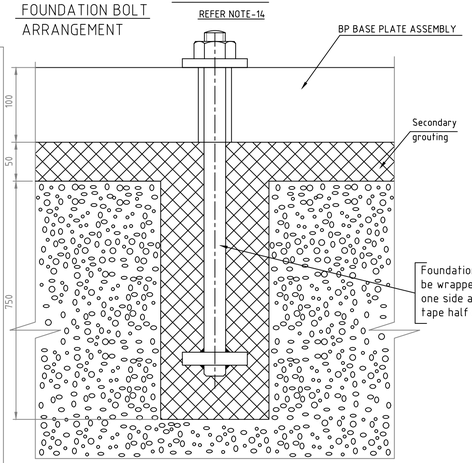
NOTES :-

1. All dimensions are in mm and elevations are in metres.
2. This foundation drawing is only intended as basis for preparing the layout for foundation (by the BHEL). All civil structural dimensions are tentative and same shall be decided by the civil engineer concerned. The foundation design calculations shall consider all the static and dynamic loads acting simultaneously.
3. Suitable earth quake coefficient applicable for the project site should be adopted for seismic design of foundation as per IS 1893.
4. The foundation block should be designed so that natural frequencies of foundation are sufficiently away from the frequencies of machines. The design shall be as per DIN 4024 standard and IS.2974 part III.
5. Design of the foundation shall consider the allowable limits of vibration behaviour of machines (Group - T) as per VDI 2056.
6. Bearing failure loads are less than failure load condition loads specified in col. 7 of the "Forces on Foundation " table.
8. Dynamic loads in axial direction are negligible.
9. Magnitude of unbalanced forces can be taken in vertical and horizontal directions as equal.
10. Max. live load on top of the deck is : 2000 kg./sq.m
11. Foundation block must not be joined to any other structure to avoid vibration transmission.
12. Portions shown thus ▨ in top deck are filled with secondary grouting. The concrete surface in these areas is to be ensured free from dust, grease and oil. Any wooden plugs present in these areas are to be removed. The packing plates below the machine sole plates shall be embedded into a 20 mm thick layer of special grout (local to plates) and are to be levelled horizontally. later, total secondary grouting may be completed.
13. For grouting instructions ref. TC-9-1901 (5 sheets). And for grouting cement specification ref. TC-9-1900.
14. All embedded plates, angles, sleeves, pipes, ducts and any other structurals are not part of Turbine scope of supply unless otherwise specified.

DETAIL 'M1'

FOUNDATION BOLT ARRANGEMENT

REFER NOTE-14

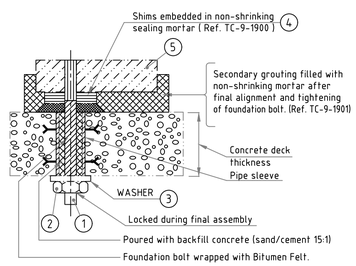


Note:Sealing mortar pouring and bitumen shall be part of ERECTION contract

DETAIL 'SP-WN'

FOUNDATION BOLT ASSEMBLY

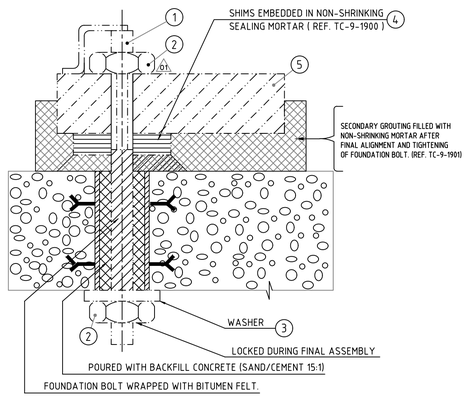
REFER NOTE-14



POS (1) TO (5) IN B.H.E.L SCOPE OF SUPPLY

DETAIL 'SP-N'

REFER NOTE-14



POS (1) TO (5) IN B.H.E.L SCOPE OF SUPPLY

GENERAL DIMENSIONAL LIMITS,FITS & TOLERANCES AS PER HY0230261

COMPUTER FILE NAME | REF. DRG NO. | SIGN. AND DATE | INVENTORY NO

REV.	DATE	ALTERED	CHD/APPD
01	24.03.25	ALTERED. C.BALAJI	CHD/APPD:. B.SINGH

ZONE: DRAWING REVISED INLINE WITH GEAR BOX & CUSTOMER/CONSULTANT COMMENTS AND OTHERS MARKED AS 01

STATUS : FINAL

PROJECT: RAGHUNATHPUR THERMAL POWER PROJECT PHASE- II (2X660 MW)

PACKAGE: STEAM TURBINE GENERATOR (STG)

OWNER : DAMODAR VALLEY CORPORATION

DVC DRG./DOC. NO.:2115-110-PVM-V-009 01

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: 2x660 MW DVC Raghunathpur

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

	NAME	SIGN.	DATE
DRN.	C.BALAJI		01.01.24
CHD.	B.SINGH		01.01.24
APPD.	M.A.H		01.01.24

NO.OF VAR. -N.A.-

DEPT.	UNTOL. DIMS.	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.	NO.OF ITEMS
TCEP	GR. C/M/F	1:30	-N.A.-	-N.A.-	-N.A.-	-N.A.-
CODE. 415						

TITLE: FOUNDATION ARRANGEMENT FOR BFP & DRIVE TURBINE

CARD CODE: N.A.

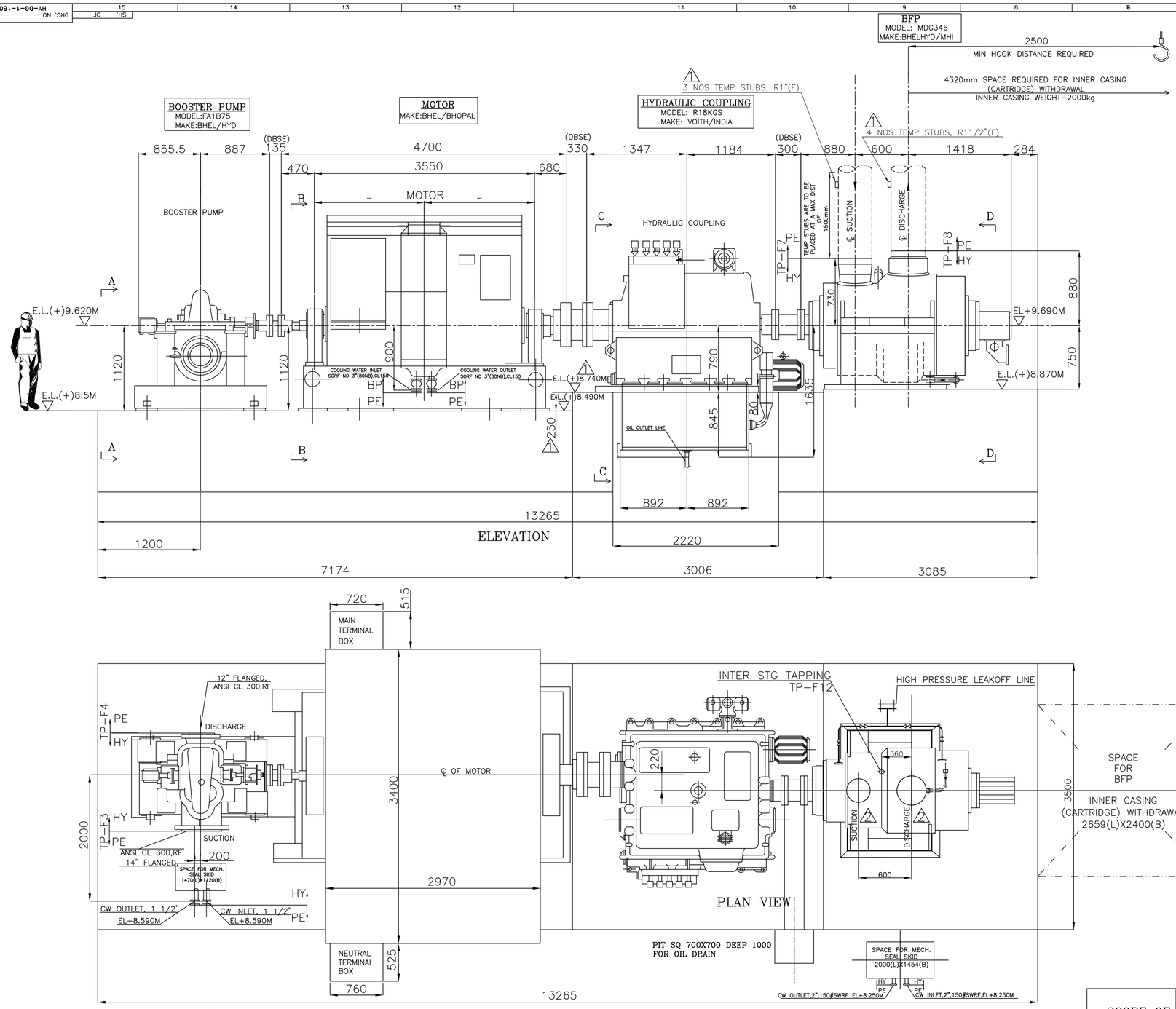
DRAWING NO. (1-313-01-06335) HY-DG-1-31301-06335 REV. 01

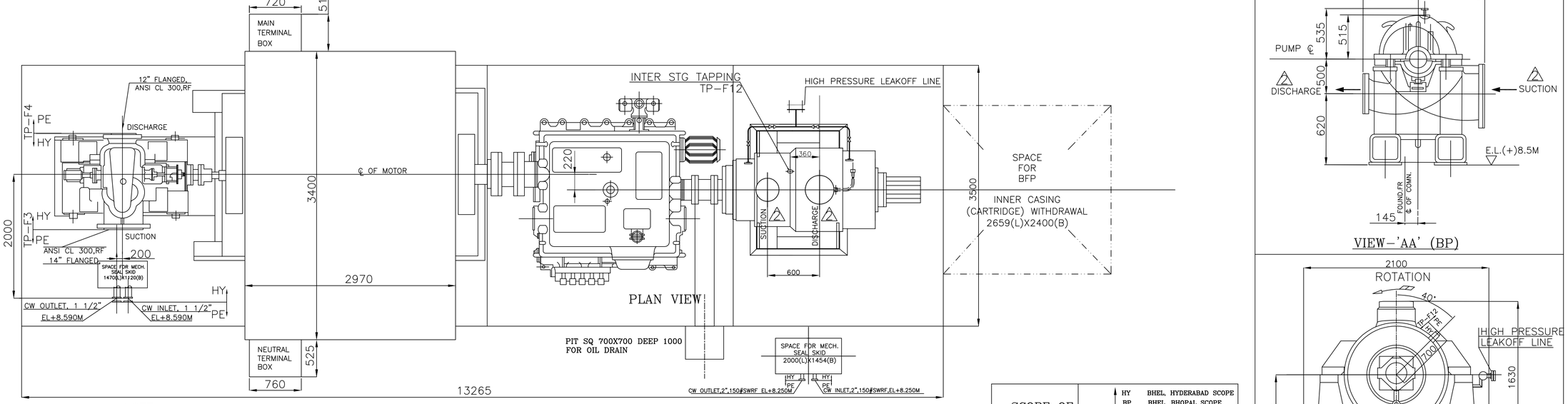
SHT. No 03 NO. OF SHT. 03

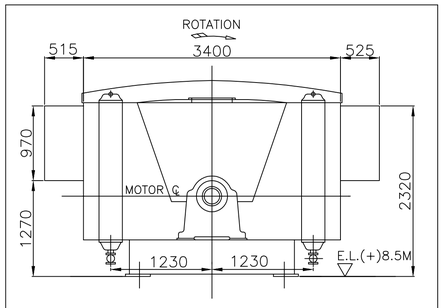
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

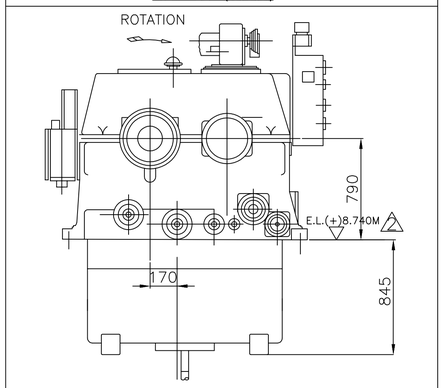
DRG. NO. HY-DG-1-180-00-57591 SH. OF



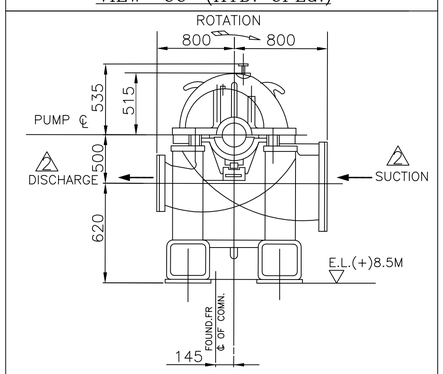




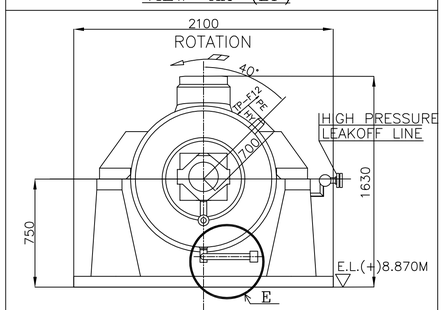
VIEW–'BB' (MOTOR)



VIEW–'CC' (HYD. CPLG.)



VIEW–'AA' (BP)



VIEW–'DD' (BFP)

NOTE :

1. TERMINAL POINTS SHOWN IN THE HYD. SCOPE INCLUDES COUNTER FLANGES ALONG WITH FASTENERS & GASKETS.
2. FOR LOADING POINTS & LOADS, REFER MDBFP FOUND. DRG.NO.: HY–DG–1–180–00–57593.
3. FOR MDBFP LOCATIONS, REFER BHEL/PEM DRG. NO.: PE–DG–390–100–M004
4. FOR KEY PLAN LAYOUT REFER MDBFP FOUNDATION. DRG.NO.: HY–DG–1–180–00–57593
5. DBSE : DISTANCE BETWEEN SHAFT ENDS
6. ⟶⟵ HIGH PRESS. LEAKOFF
7. BFP & BP MECH SEAL SKID HAS TO BE PLACED AS CLOSE AS POSSIBLE TO PUMP SET AS PER SITE/PEM CONVENIENCE.
8. REFERENCE DRAWINGS:

   GA OF MDBFP HYDRAULIC COUPLING & OTHERS HY–DG–2–180–00–55663
   DATA SHEET, PERFORMANCE CURVES, OGA & TERMINAL BOX ARRANGEMENT DRAWINGS FOR BFP MOTOR BP–DG–390–205–001

SCOPE OF SUPPLY	HY	BHEL, HYDERABAD SCOPE
	BP	BHEL, BHOPAL SCOPE
	PE	BHEL, PEM SCOPE

REV.	DATE	ALTERED	ZONE
1	07.04.25	ALTERED : V KK REDDY CHKD/APPD:AVINASH SJK	6
		REVISED AS PER CUSTOMER COMMENTS dtd:01.04.25 & latest drawings	
2	22.03.25	ALTERED : V KK REDDY CHKD/APPD:AVINASH SJK	5
		REVISED AS PER CUSTOMER COMMENTS dtd:18.06.24	

1. JOB NO1.: 390
2. STATUS : CONTRACT
3. DRG./REF. NO. (INTERNAL) HY–DG–11800057591–00
4. DISTRIBUTION
5. TO
6. No. OF

DVC DWG NO: 2115–110–PVM–B–039

PROJECT 5 RAGHUNATHPUR PHASE-II (2X660 MW)
PACKAGE STEAM TURBINE
OWNER DAMODAR VALLEY CORPORATION

BHARAT HEAVY ELECTRICALS LIMITED HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN.	V KIRAN K R	s.d/–	20.05.24	
CHD.	SURESH K	s.d/–	20.05.24	NA
APPD.	AVINASH SJK	s.d/–	20.05.24	

DEPT. PUMPS	SCALE	WEIGHT (KG)	REF. TO ASSLY. DRG. NO:	ITEM NO.	NO.OF ITEM
CODE 410	NTS	NA	NA	NA	NA

TITLE: GENERAL ARRANGEMENT OF MDBFP SET

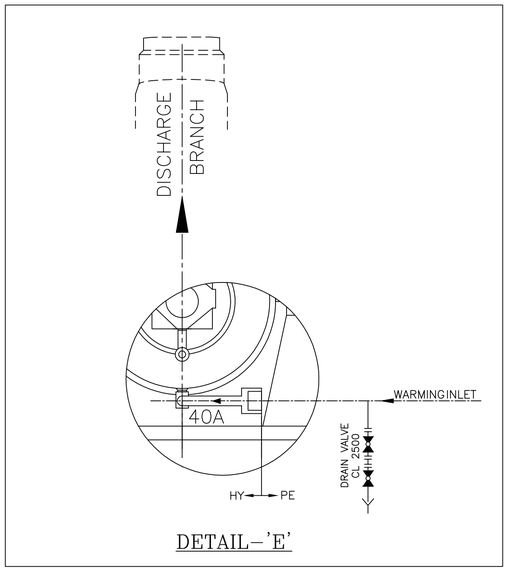
DRAWING NO. HY–DG–1–180–00–57591 REV. 02
SHEET NO. 01 NO OF SHEETS 02

COMP. FILE NAME: HY–DG–1–180–00–57591 | REF. DRG. NO. | SIGN. AND DATE | INVENTORY NO

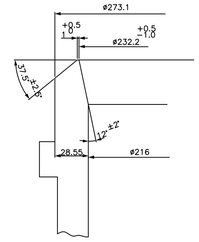
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

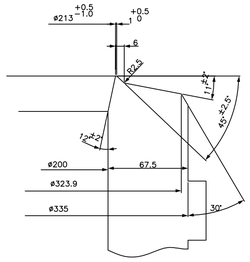
SH. OF DRG. NO. HY-DG-1-180-00-57591



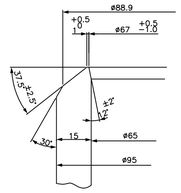
DETAIL–'E'



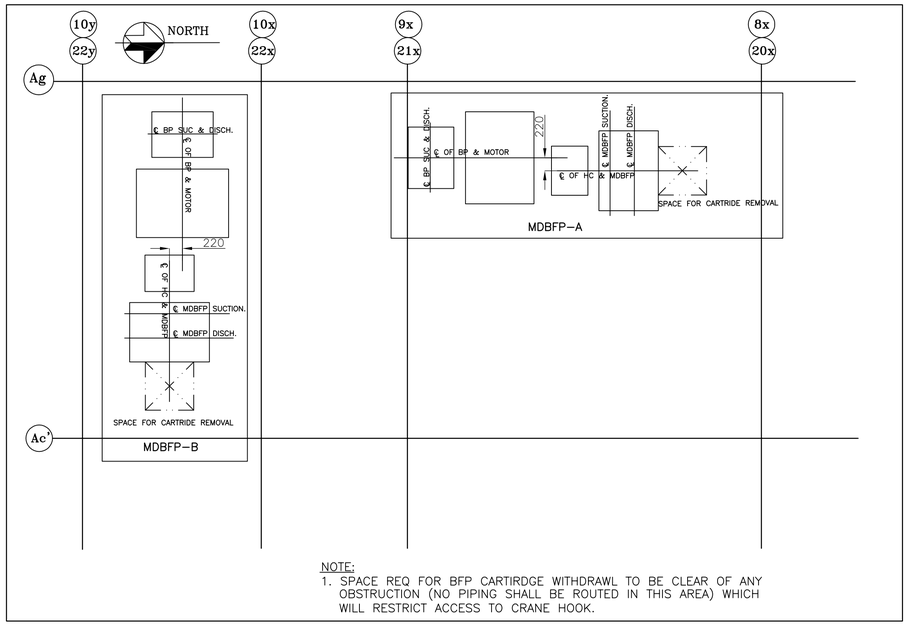
SUCTION NOZZLE



DISCHARGE NOZZLE



RH SPRAY



NOTE:
1. SPACE REQ FOR BFP CARTIRDGE WITHDRAWL TO BE CLEAR OF ANY OBSTRUCTION (NO PIPING SHALL BE ROUTED IN THIS AREA) WHICH WILL RESTRICT ACCESS TO CRANE HOOK.

KEY PLAN LAYOUT OF MDBFP–A & MDBFP B AT 8.5m

EQUIPMENT WEIGHTS

SNO	EQUIPMENT	WEIGHT (Kgs)
1	BOILER FEED PUMP incl. BASE PLATE	17000(DRY) 17300(WET)
2	HYDRAULIC COUPLING	10000 (WITHOUT OIL) 12500 (WITH OIL)
3	MOTOR	30700 SINGLE HEAVIEST EQUIPMENT
4	BOOSTER PUMP incl. BASE PLATE	4600

TERMINAL POINTS

TERMINAL POINT	DESCRIPTION	TERMINATED WITH	QTY.
TP–F7	SUCTION OF FEED PUMP	NOZZLE, (10")250A B.W	1
TP–F8	DISCHARGE OF FEED PUMP	NOZZLE, (12")300A B.W	1
TP–F12	INTER STAGE TAPPING (2nd STG) 1	NOZZLE, 80A B.W,TO SUIT PIPE ø88.9 X 11.13 MM	1
TP–F3	SUCTION OF BOOSTER PUMP	COUNTER FLANGE, 14" ANSI, B 16.5, WNRF, CL300	1
TP–F4	DISCHARGE OF BOOSTER PUMP	COUNTER FLANGE, 12" ANSI, B 16.5, WNRF, CL300	1

WELD EDGE PREPARATION

TECHNICAL DATA OF MD BOILER FEED PUMP & MD BOOSTER PUMP

PUMP TYPE	UNITS	BOILER FEED PUMP	BOOSTER PUMP
MODEL		MDG 346	FA1B75
MAKE/MANUFACTURER		BHEL (IN COLLABORATION WITH MHI)	
NO. PER UNIT/RATING		2/30%	
TYPE		MULTI STAGE,AXIALLY SPLIT INNER CASING & BARREL TYPE OUTER CASING	SINGLE STAGE, 2 BEARING DESIGN & DOUBLE SUCTION TYPE
DIRECTION OF ROTATION (VIEWED FROM PUMP DRIVE END)		CLOCKWISE	COUNTER CLOCKWISE
DESIGN CAPACITY/PUMP	M^3/hr	804	804
DESIGN HEAD	MLC	3164	211
SHUT–OFF HEAD @ Design Point	MLC	4251	244
TEMPERATURE	DEG C	187.8	187.8
NPSH REQUIRED	MLC	37.2	3.8
GRADE OF BALANCING		G 2.5	
MOTOR RATING OF BFP SET	kW	11,000	
2 MDBFP MOTOR SPEED	RPM	1494	
2 MDBFP MOTOR GD2 VALUE	kg–m2	2300	
DESIGN & TEST CODE		DESIGN AS PER LATEST HIS WITH COLLABORATOR MHI GUIDELINES TESTING AS PER ANSI/HI 14.6–2016	

COMP. FILE NAME: HY-DG-1-180-00-57591 | REF. DRG. NO. | SIGN. AND DATE | INVENTORY NO

REV.	DATE	ALTERED	CHD./APPD.	ZONE
1	07.04.25	ALTERED : V KK REDDY	CHKD/APPD:AVINASH SJK	REVISED AS PER CUSTOMER COMMENTS dtd:01.04.25 & latest drawings
2	22.03.25	ALTERED : V KK REDDY	CHKD/APPD:AVINASH SJK	REVISED AS PER CUSTOMER COMMENTS dtd:18.06.24

1. JOB NO : 390
2. STATUS : CONTRACT
3. DRG./REF. NO. (INTERNAL) HY-DG-11800057591-00
4. DISTRIBUTION
5. TO
6. No. OF

DVC DWG NO: 2115–110–PVM–B–039

PROJECT 5 RAGHUNATHPUR PHASE-II (2X660 MW)
PACKAGE STEAM TURBINE
OWNER DAMODAR VALLEY CORPORATION

BHARAT HEAVY ELECTRICALS LIMITED HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN.	V KIRAN K R	s.d/–	20.05.24	
CHD.	SURESH K	s.d/–	20.05.24	NA
APPD.	AVINASH SJK	s.d/–	20.05.24	

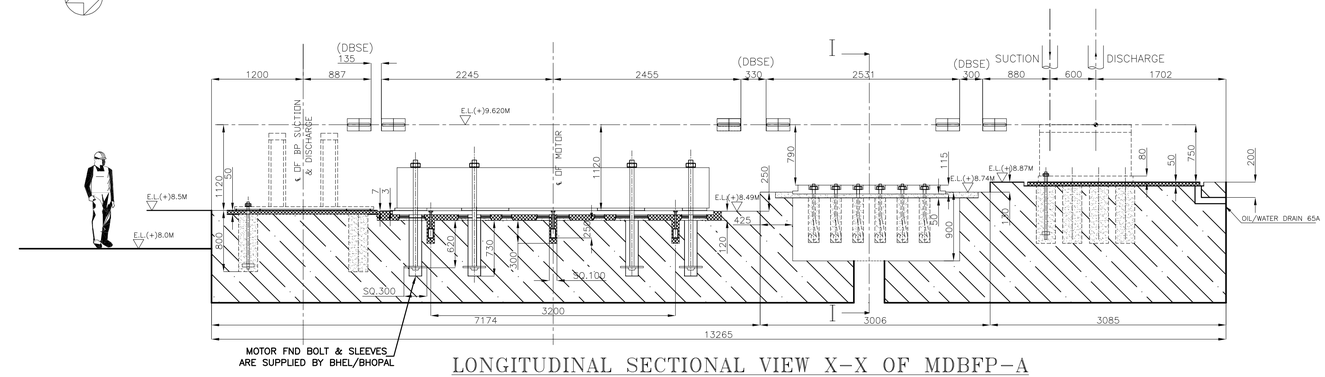
DEPT.	SCALE	WEIGHT (KG)	REF. TO ASSLY. DRG. NO:	ITEM NO.	NO.OF ITEM
PUMPS	NTS	NA	NA	NA	NA

CODE 410

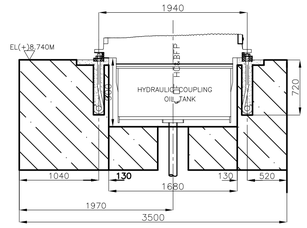
TITLE: GENERAL ARRANGEMENT OF MDBFP SET

DRAWING NO. HY-DG-1-180-00-57591 REV. 02

SHEET NO. 02 NO OF SHEETS 02



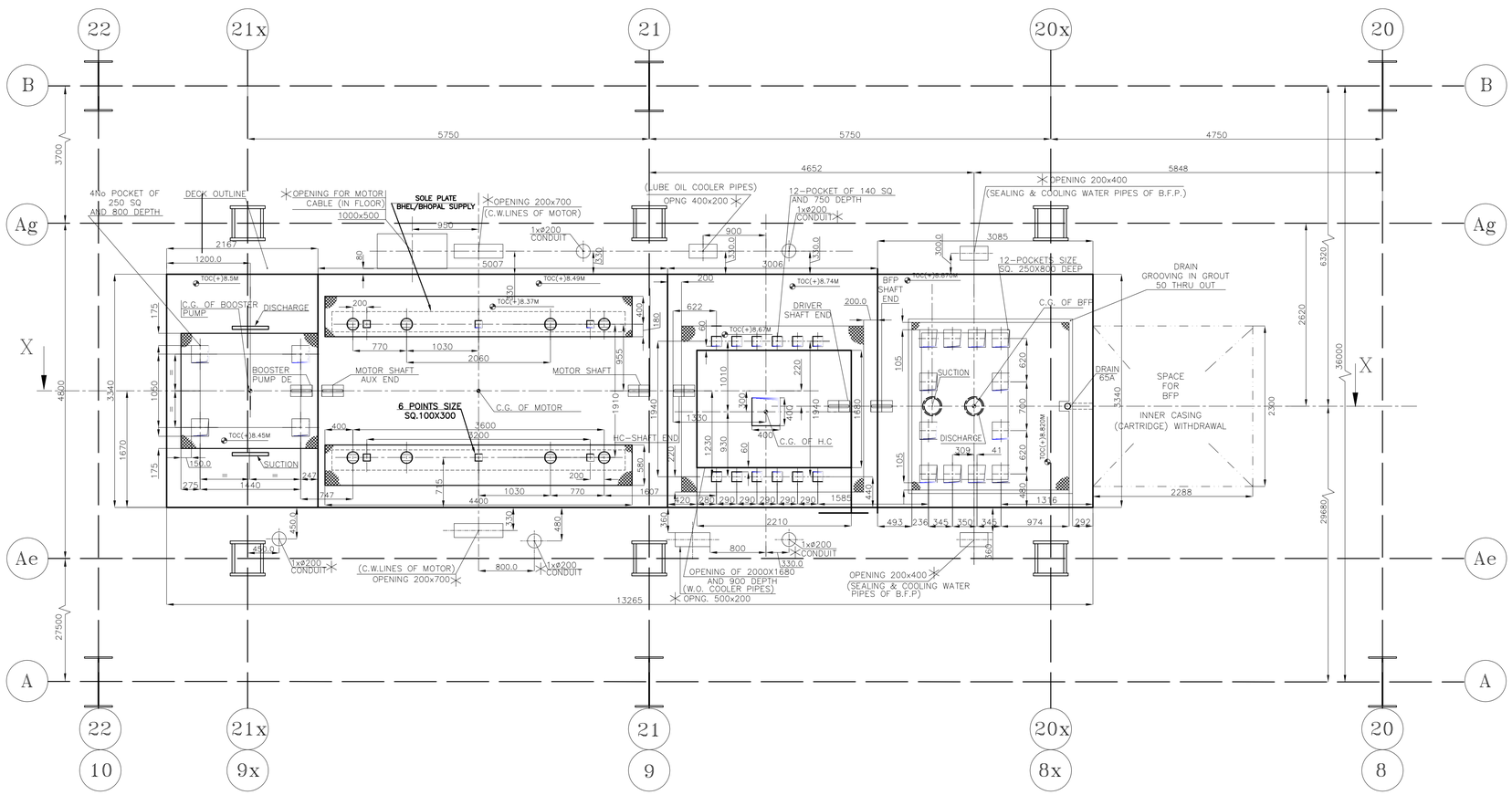
LONGITUDINAL SECTIONAL VIEW X–X OF MDBFP–A



SECTION I–I

LEGEND

- BLIND POCKET WITH SLOPE FOR POURING SECONDARY GROUTING
- BLIND POCKET
- OPENING
- ELEVATION
- THROUGH OPENINGS



FOUNDATION PLAN FOR MDBFP–A

NOTE:
1) FOUNDATION ARRANGEMENT IS IDENTICAL FOR MDBFP–B ALSO.
2) FOR FURTHER CLARIFICATION IN LAYOUT OF MDBFP SETS ARRANGEMENT REFER TO T.G EQUIPMENT LAYOUT PLAN AT 8.5M PEM DRWG NO PE–DG–390–100–M004.
3) REF. ALL COLUMNS, ROWS & ELEVATIONS BHEL/PEM Drg.No. PE–DG–390–100–M004.

TECHNICAL DATA OF MD BOILER FEED PUMP & MD BOOSTER PUMP

PUMP TYPE	UNITS	BOILER FEED PUMP	BOOSTER PUMP
MODEL		MDG 346	FA1B75
MAKE/MANUFACTURER		BHEL (IN COLLABORATION WITH MHI)	
NO. PER UNIT/RATING		2/30%	
TYPE		MULTI STAGE,AXIALLY SPLIT INNER CASING & BARREL TYPE OUTER CASING	SINGLE STAGE, 2 BEARING DESIGN & DOUBLE SUCTION TYPE
DIRECTION OF ROTATION (VIEWED FROM PUMP DRIVE END)		CLOCKWISE	COUNTER CLOCKWISE
DESIGN CAPACITY/PUMP	M^3/hr	804	804
DESIGN HEAD	MLC	3164	211
SHUT–OFF HEAD @ Design Point	MLC	4251	244
TEMPERATURE	DEG C	187.8	187.8
NPSH REQUIRED	MLC	37.2	3.8
GRADE OF BALANCING		G 2.5	
MOTOR RATING OF BFP SET	kW	11,000	
MDBFP MOTOR SPEED	RPM	1494	
MDBFP MOTOR GD2 VALUE	kg–m2	2300	
DESIGN & TEST CODE		DESIGN AS PER LATEST HIS WITH COLLABORATOR MHI GUIDELINES TESTING AS PER ANSI/HI 14.6–2016	

NOTE:

1) ALL ELEVATIONS ARE W.R.T TO TG HALL FINISHED FLOOR LEVEL WHICH CORRESPOND TO EL 0.0M
2) TOLERANCES FOR POCKET LOCATIONS ±5 MM.
3) TOLERANCES FOR CONCRETE DIMENSIONS ±10 MM.
4) TOLERANCES FOR TOP OF FOUNDATION BEFORE GROUTING +0 & –10 MM
5) ALL GROUTINGS ARE IN THE SCOPE OF BHEL–PS.
6) FOUNDATION SLEEVE IS EMBEDED IN CONCRETE AS THE EXCESS PROTUDING HEIGHT TO BE CUT OFF.
7) FOR GENERAL ARRANGEMENT OF MD BFP SET, REFER DRG NO. HY–DG–1–180–00–55791.
8) GA OF MDBFP HYDRAULIC COUPLING & OTHERS HY–DG–2–180–00–55663
9) DATA SHEET, PERFORMANCE CURVES, OGA & TERMINAL BOX ARRANGEMENT DRAWINGS FOR BFP MOTOR BP–DG–390–205–001

* PRELIMINARY

REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED: ROHIT.P	REV.	DATE	ALTERED:ROHIT.P	REV.	DATE	ALTERED: ROHIT.P	REV.	DATE	ALTERED:ROHIT.P	REV.	DATE	ALTERED: ROHIT.P	REV.	DATE	ALTERED:
		CHD. APPD.			CHD./APPD.			CHD./APPD.			CHD./APPD.			CHD./APPD.			HY–DG–1–180–00–57593			CHD./APPD:			CHD./APPD:			CHD./APPD:			CHD./APPD.
ZONE			ZONE			ZONE			ZONE			ZONE			ZONE			ZONE			ZONE			ZONE			ZONE		

1. JOB NO : 390
2. STATUS : CONTRACT
3. DRG./REF. NO. (INTERNAL) HY–DG–1–180–00–57593
4. DISTRIBUTION
5. TO
6. No. OF

DVC DWG NO: 2115–110–PVM–V–011, REV–00

PROJECT: **RAGHUNATHPUR THERMAL POWER PROJECT PHASE- II (2X660 MW)**
STEAM TURBINE GENERATOR (STG)
OWNER: DAMODAR VALLEY CORPORATION

BHARAT HEAVY ELECTRICALS LIMITED
HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN.	V KIRAN K REDDY	s.d/–	07.04.25	NA
CHD.	SURESH KUMAR	s.d/–	07.04.25	
APPD.	AVINASH SJK	s.d/–	07.04.25	

DEPT.	SCALE	WEIGHT (KG)	REF. TO ASSLY. DRG. NO:	ITEM NO.	NO.OF ITEM
PUMPS	NTS	NA	NA	NA	NA
CODE 410					

TITLE: FOUNDATION ARRANGEMENT OF MD BFP

DRAWING NO. HY–DG–1–180–00–57593 REV. 00

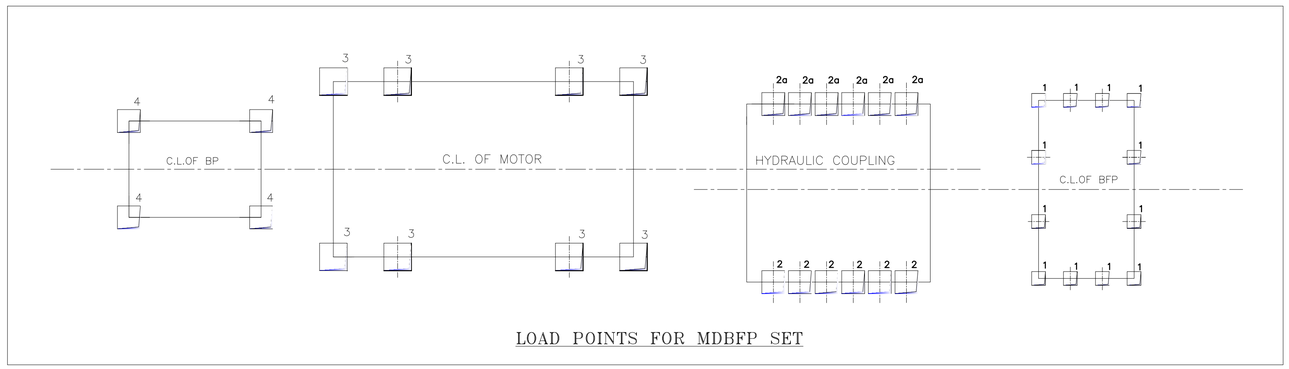
SHEET NO. 01 NO OF SHEETS 02

COMP. FILE NAME: HY–DG–1–180–00–57593

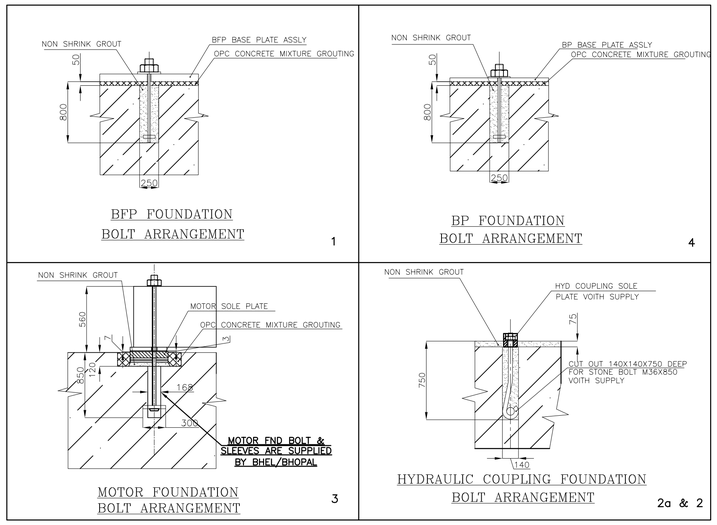
SIGN. AND DATE

INVENTORY NO

NORTH



LOAD POINTS FOR MDBFP SET



SPEEDS AT OPERATING POINTS (RPM)

EQUIPMENT	DESIGN POINT 1	95% UNIT LOAD UNDER MSP	RUN OUT POINT	BEP	EMERGENCY POINT	UNDER FREQ–1	UNDER FREQ–2
BFP	6215	6000	5355	5860	6345	6405	6380
BOOSTER PUMP	1494	1494	1494	1494	1494	1494	1494
MOTOR	1494	1494	1494	1494	1494	1494	1494
HYDRAULIC COUP. (INPUT SHAFT)	1494	1494	1494	1494	1494	1494	1494
HYDRAULIC COUP (OUTPUT SHAFT)	6215	6000	5355	5860	6345	6405	6380

FOUNDATION LOADING

LOAD APPLICATION POINT	EQUIPMENT	STATIC * LOADING ON EACH POINT (Kgs.)	DYNAMIC LOADING ON EACH POINT (Kgs)			EQPT. WEIGHT (Kgs)		ROTOR WEIGHT (Kgs)
			VERTICAL	HORIZONTAL	AXIAL	DRY	WET	
1	BOILER FEED PUMP	17300	20700	20700	13800	17000	17300	500
4	BOOSTER PUMP	1200	394	394	---	4600	4800	280
2	HYDRAULIC COUPLING R18KGS	985	505	505	---	10000	12500	INPUT ROTOR =1965 PRIMARY ROTOR=505 SECONDARYROTOR=460 OUTPUT ROTOR=314
2a			460	460	---			
3	MOTOR WITH BASE PLATE	9500	REFER NOTE–A			30700	---	8800

* INCLUDES ROTOR WEIGHTS.

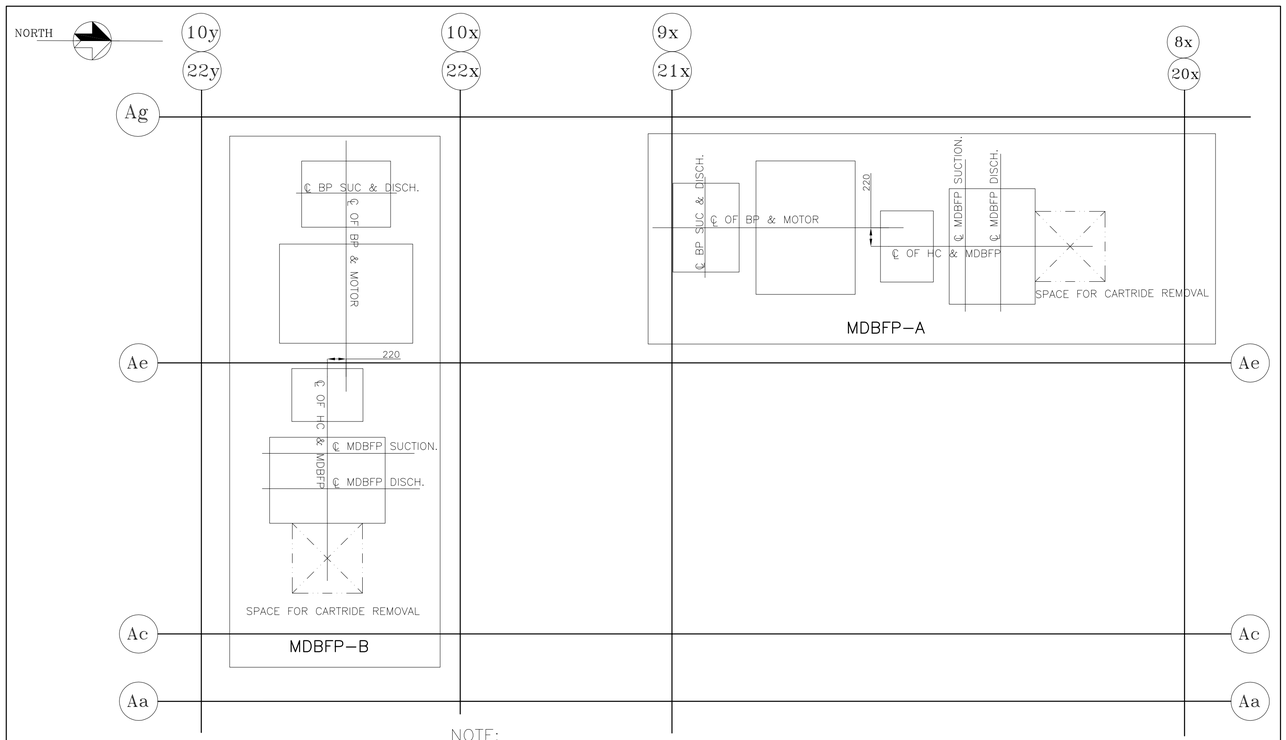
NOTE–A

MOTOR FOUNDATION DETAILS

1. MAX. FORCE CALCULATED FROM THE MAX. SUDDEN TORQUE (100% RESIDUAL FIELD), M_S= 517KN.
2. FORCE EXERTED BY THE WEIGHT ON EACH SIDE, G = 135 kN.
3. FOUNDATION LOAD ON EACH SIDE

COMPRESSIVE STRESS, A = Ms+G = 652 kN ; TENSILE STRESS, B = Ms–G = 382 kN.

MASS MOMENT OF INERTIA (GD^2)	Kg.M^2
BFP (Including Coupling)	15
BOOSTER PUMP	8.4
MOTOR	2300
HYDRAULIC COUP. INPUT SHAFT & PRIMARY PARTS	1440
HYDRAULIC COUP. OUTPUT SHAFT & SECONDARY PARTS REFERRED TO MOTOR SPEED.	40.8



NOTE:

1. SPACE REQ FOR BFP CARTIRDGE WITHDRAWL TO BE CLEAR OF ANY OBSTRUCTION (NO PIPING SHALL BE ROUTED IN THIS AREA) WHICH WILL RESTRICT ACCESS TO CRANE HOOK.

KEY PLAN LAYOUT OF MDBFP–A & MDBFP B AT 8.5m

COMP. FILE NAME: HY-DG-1-180-00-57593

INVENTORY NO | SIGN. AND DATE

REV.	DATE	ALTERED	APPD.	CHD.	ZONE
A					
		ALTERED: ROHIT.P		CHD./APPD.	
		ALTERED:ROHIT.P		CHD./APPD:D.B.R/M.M.R	
		ALTERED: ROHIT.P		CHD./APPD.	
		ALTERED:ROHIT.P		CHD./APPD:	
		ALTERED:ROHIT.P		CHD./APPD:	
		ALTERED: ROHIT.P		CHD./APPD:	
		ALTERED:		CHD./APPD.	

1. JOB NO :	390
2. STATUS :	CONTRACT
3. DRG./REF. NO. (INTERNAL)	HY–DG–1–180–00–57593
4. DISTRIBUTION	
5. TO	
6. No. OF	

DVC DWG NO: 2115–110–PVM–V–011, REV–00

PROJECT: RAGHUNATHPUR THERMAL POWER PROJECT PHASE- II (2X660 MW)
STEAM TURBINE GENERATOR (STG)

OWNER: DAMODAR VALLEY CORPORATION

BHARAT HEAVY ELECTRICALS LIMITED
HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN.	V KIRAN K REDDY	s.d/–	07.04.25	
CHD.	SURESH KUMAR	s.d/–	07.04.25	NA
APPD.	AVINASH SJK	s.d/–	07.04.25	

DEPT.	SCALE	WEIGHT (KG)	REF. TO ASSLY. DRG. NO:	ITEM NO.	NO.OF ITEM
PUMPS	NTS	NA	NA	NA	NA

CODE 410

TITLE: FOUNDATION ARRANGEMENT OF MD BFP

DRAWING NO. HY–DG–1–180–00–57593 REV. 00

SHEET NO. 02 NO OF SHEETS 02