BHARAT HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)
HIGH PRESSURE BOILER PLANT
PURCHASE DEPARTMENT - FOSSIL BOILERS
THIRUCHIRAPALLI - 620014
TAMILNADU (INDIA)

PHONE :2574111
GRAMS : BHARATELEC
FAX NO: 2520719
E-mail:
Web:

429-002/A

Enquiry No	Enquiry Date	Due Date for Quotation
1701600973 - 18	16.07.2016	18.08.2016

Please quote Enquiry No, Date and due date in all correspondences. This is only a request for quotation and not an order.
Bid should be submitted in two parts. 1.Techno-commercial bid (Part-I) and 2.Price bid(Part-II) in a separate sealed cover and both covers must be placed in a third cover and sealed. Our Enquiry No., Enq. date & Enq. Due date must be written on all three covers.

Item	Description	Unit	Quantity	Delivery Schedule Quantity	Date
10	L068319759301001 PASSENGER CUM GOODS ELEVATOR OF CAPACITY :3000kg; SPEED: 0.55m/sec AS PER SPECIFICATION : CI:0683:ELEV/REV.00. 1) NUMBER OF LANDINGS SHALL BE 13 INCLUDING GROUND FLOOR. 2) LANDING LEVELS OF ELEVATOR SHALL BE AS FOLLOWS; 0.0mm, 11550mm, 19425mm, 29225mm, 38500mm, 45500mm, 56525mm, 64575mm, 74550mm, 86800mm, 99225mm, 105175mm & 112175mm. 3) FINISHED FLOOR LEVEL (FFL) = (-)200mm.	NO	2.000	2.00	31.03.17
20	L068619759301001 PASSENGER CUM GOODS ELEVATOR OF CAPACITY :2000kg; SPEED: 0.55m/sec AS PER SPECIFICATION : TDC:TCI:263:RC/REV.04. 1) NUMBER OF LANDINGS SHALL BE 12 INCLUDING GROUND FLOOR. LANDING LEVELS OF ELEVATOR SHALL BE AS FOLLOWS: 0.0mm, 9350mm, 18650mm, 21500mm, 24200mm, 30400mm, 37625mm, 43575mm, 49050mm, 58150mm, 70750mm & 73950mm. 2) FINISHED FLOOR LEVEL (FFL) = (-)200mm. 3) DESIGN, CONSTRUCTION AND FINISH OF THE CAR - SS SHEET FABRICATED (ASTM 304 NO:4 HAIRLINE FINISH). 4) CAR DOOR & LANDING DOOR - SS PANEL(ASTM 304 NO:4 HAIRLINE FINISH) CENTRE OPENING. 5) CAR ENCLOSURE - SS CONSTRUCTION (ASTM 304 NO:4 HAIRLINE FINISH).	NO	1.000	1.00	31.03.17
30	L171319759301001 PASSENGER CUM GOODS ELEVATOR - CAPACITY : 2000kg; SPEED: 0.55m/sec AS PER SPECIFICATION : TDC:TCI:263:RC/REV.04. 1) NUMBER OF LANDINGS SHALL BE 13 INCLUDING GROUND FLOOR. LANDING LEVELS OF ELEVATOR SHALL BE AS FOLLOWS; 0.0mm, 8500mm, 17350mm, 21700mm,	NO	2.000	2.00	31.03.17

The offers should reach us 30 minutes before the time of opening of tenders.
The offers will be opened at 14.30 hrs on the due date of tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening.Late and delayed offers are liable to be rejected.

K. MUTHUKUMARASAMY
Sr. Engineer
Materials Management / EOI
BHEL, TIRUCHY - 620 014.

Yours faithfully,
For **BHARAT HEAVY ELECTRICALS LIMITED**

20.07.16

MANAGER / PURCHASE
(FOSSIL BOILERS)
Yours faithfully,

BHARAT HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)
HIGH PRESSURE BOILER PLANT
PURCHASE DEPARTMENT - FOSSIL BOILERS
THIRUCHIRAPALLI - 620014
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1701600973 / 16.07.2016 **23505**

24900mm, 28700mm, 32800mm,
36600mm, 45900mm, 58600mm, 61400mm,
69800mm & 80800mm.
2) FINISHED FLOOR LEVEL (FFL) = (-)200mm
3) TRAP DOOR & ENTRANCE AT BOILER SIDE
4) DESIGN,CONSTRUCTION AND FINISH OF THE CAR - SS SHEET FABRICATED (ASTM 304 NO:4 HAIRLINE FINISH).
5) CAR DOOR & LANDING DOOR - SS PANEL(ASTM 304 NO:4 HAIRLINE FINISH) CENTRE OPENING.
6) CAR ENCLOSURE - SS CONSTRUCTION (ASTM 304 NO:4 HAIRLINE FINISH).
ENCLOSURE:
1) SPECIFICATION : TDC:TCI:263:RC/REV.04
REMARKS :
1) VENDOR QP SHALL BE SUBMITTED AFTER PLACEMENT OF P.O. AND SUBJECTED TO CUSTOMER APPROVAL.
2) VALUE REFERENCE: PPO. 7000014206 DT 17/08/2012.
3) REV. 01 - INDENT IS REVISED TO UPDATE SPECIFICATION AS PER MM/BOI MAIL DT 01/10/2015.

40	L180919759301001	NO	1.000	1.00	31.03.17

PASSENGER CUM GOODS ELEVATOR OF CAPACITY :2000kg; SPEED: 0.55m/sec AS PER SPECIFICATION : TDC:TCI:263:RC/REV.04.
1) NUMBER OF LANDINGS SHALL BE 17 INCLUDING GROUND FLOOR.
LANDING LEVELS OF ELEVATOR SHALL BE AS FOLLOWS:
0.0mm, 5700mm, 12000mm, 17000mm,
22550mm, 28500mm, 32700mm, 36500mm,
40300mm, 44100mm, 50100mm, 56300mm,
62500mm, 68500mm, 73900mm, 80900mm &
87450mm.
2) FINISHED FLOOR LEVEL (FFL) = (-)200mm.
3) TRAP DOOR & ENTRANCE AT BOILER SIDE
4) DESIGN,CONSTRUCTION AND FINISH OF THE CAR - SS SHEET FABRICATED (ASTM 304 NO:4 HAIRLINE FINISH).
5) CAR DOOR & LANDING DOOR - SS PANEL(ASTM 304 NO:4 HAIRLINE FINISH) CENTRE OPENING.
6) CAR ENCLOSURE - SS CONSTRUCTION (ASTM 304 NO:4 HAIRLINE FINISH)

This Enquiry shall be monitored by Independent External Monitor
Shri V.V.R Sastry, Ex-CMD/ BEL
957, 9th Main
3 Stage, 3 Block
Basaveswaranagar
Bangalore- 560079
Ph: +91 80 23225150
sastryvvr@gmail.com

The offers should reach us 30 minutes before the time of opening of tenders. The offers will be opened at 14.30 hrs on the due date of tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening.Late and delayed offers are liable to be rejected.

Yours faithfully,
For **BHARAT HEAVY ELECTRICALS LIMITED**

20.07.16

K. MUTHUKUMARASAMY
Sr. Engineer
Materials Management / BOI
BHEL, TIRUCHY - 620 014.

MANAGER / PURCHASE
(FOSSIL BOILERS)
Yours faithfully,

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HIGH PRESSURE BOILER PLANT
PURCHASE DEPARTMENT - FOSSIL BOILERS
THIRUCHIRAPALLI - 620014
TAMILNADU (INDIA)

PHONE :2574111
GRAMS : BHARATELEC
FAX NO: 2520719
E-mail:
Web:

1701600973 / 16.07.2016 23505

General Note:

All the tenders may be addressed to the following address:

The Tender Opening Cell / MM
Room No: 26, Building 24, Ground Floor
Bharat Heavy Electricals Limited
TIRUCHIRAPALLI 620014

In case personal delivery of the offer, it shall be dropped into the respective box kept in Room No: 26, after duly entering the data in the system.

Offers will be accepted only up to 14.00 Hrs on the due date. Therefore, vendors shall ensure to submit the offers well before this time. All due date extension requirements should be addressed to the respective Purchase mail IDs. All the due date extension requests from vendors will be considered only up to 48 hours before the due date and time.

Vendors are requested to avoid submission of offers through e mail / fax. In case of any unavoidable situation, offers shall be sent through e mail to the following mail ID only tender_cell@bheltry.co.in.

As tenders are being opened by Common Tender Opening Cell, offer covers should be sealed with tenderer's distinctive seal and super scribed with correct Tender No. item of supply and due date of opening.

The offers will be opened at 14.30 hrs on the due date of the tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening. Late and delayed offers are liable to be rejected.

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

The supplier shall submit EI/EII forms to BHEL time to time as indicated by the BHEL and in case of inordinate delay in issuing EI/EII forms, then BHEL reserves the right to deduct 5% of the value of the supplied items against which EI/EII forms pending to be issued

Enclosures:

1) General terms and conditions.
2) (Annexure-A) Commercial terms and conditions for Indigenous vendor.
3) (Annexure-A) Commercial terms and conditions for Import vendor.
4) Sub-Delivery Enquiry Deviation Format.
5) Specification: CI:0683:ELEV for Neyveli project.
6) Specification TDC:TCI:263:RC/Rev.04 for Wanakbori, OPGCL & MEIL ,Tuticorin projects.
7) Vendor Quality Plan format.

The offers should reach us 30 minutes before the time of opening of tenders.
The offers will be opened at 14.30 hrs on the due date of tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening.Late and delayed offers are liable to be rejected.

Yours faithfully,
For **BHARAT HEAVY ELECTRICALS LIMITED**

20.07.16

K. MUTHUKUMARASAMY
Sr. Engineer
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MANAGER / PURCHASE
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PURCHASE DEPARTMENT - FOSSIL BOILERS
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1701600973 / 16.07.2016 23505

8) ELELVATOR MANDATORY SPARES - WANAKBORI.
9) ELELVATOR MANDATORY SPARES - NEYVELI.
10)ELELVATOR MANDATORY SPARES - OPGCL.

"LD clause has to be confirmed without fail."

The offers should reach us 30 minutes before the time of opening of tenders.
The offers will be opened at 14.30 hrs on the due date of tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening.Late and delayed offers are liable to be rejected.

Yours faithfully,
For **BHARAT HEAVY ELECTRICALS LIMITED**

20-07-16

K. MUTHUKUMARASAMY
Sr. Engineer
Materials Management / BOI
BHEL, TIRUCHY - 620 014.

MANAGER / PURCHASE
(FOSSIL BOILERS)
Yours faithfully,

General Terms and conditions for Enquiry No.1701600973 dated 16.07.2016

1.	We require the Supply & Commissioning of Passenger and Goods cum Passenger Elevator as per the Specification: TDC:TCI:263:RC/Rev 04 for Wanakbori, OPGCL, MEIL Tuticorin BHEL Projects sites and Goods cum Passenger Elevator as per the Specification CI:0683:ELEV for Neyveli BHEL Project site. Kindly submit your competitive offer in duplicate indicating compliance or deviation for each point of the specification immediately for our consideration. The tender will be opened positively **on 18.08.2016 at 14.30 IST.**
2.	Bid should be submitted in Two parts. 1. Techno-Commercial Bid for Supply and Erection and Commissioning (Part-I) for all the projects in one cover. Unpriced price bid should be enclosed in in Techno commercial bid. 2. Price Bid (Part-II) for each project shall be submitted in individual sealed covers by mentioning Enquiry reference and Project name. All the project wise Price bids shall be enclosed in a single cover and shall be submitted as total again by mentioning the Enquiry reference and Price bid. The price should necessarily contains a) price for material supply along with applicable tax and duties and b) erection & commissioning charges along with applicable taxes and duties. 3. Both the Technical bid cover and Price bid cover may be submitted enclosed in a single cover as a total offer again by mentioning the enquiry reference.
3.	Techno-Commercial bid of Supply and Erection and Commissioning will be opened first. Price bid of technically suitable and customer approved vendors only will be opened with prior intimation.
4.	Technically suitable vendor whose name is not figuring in the customer approved vendor list will be taken up with customer for approval. If the approval is not given, the respective offer will not be considered.
5.	Along with Techno-Commercial bid you are requested to indicate from whom you are going to source the components also send a typical type Test Certificate for the components from that maker. Without the type Test Certificate, your offer may not be considered for further processing. Foreign vendor should indicate the agency in India to carry out the activities of port clearance, transporting the material to site , storage, erection and commissioning, handing over to BHEL/end customer
6.	Your offer shall be supported by relevant technical documents like Quality plans, catalogues, leaflet, General arrangement drawings etc. for technical evaluation and for getting customer approvals.
7.	Only Manufacturers are eligible to participate in this bid. Traders & Dealers are not eligible to participate in this bid. If authorized dealer of a manufacturer is participating in the bid they have to furnish the mutually signed Agency Agreement along with offer.
8.	Lowest prices received against BHEL enquiries need not be the technically acceptable one and in that case, BHEL reserves the right not to consider the same.
9.	Quote should confirm our specifications and enclosed Commercial Terms & Conditions (Annexure-A). Point wise confirmation are to be submitted along with your quote with duly signed, stamped to find the suitability.
10.	Container for packing the elevator material should be arranged by (indigenous) vendor container retention charges will not be paid for first 3 years then container retention charges are applicable vendor to quote the monthly charges /elevator/month with ceiling value. Foreign vendor should supply the material in SOC (Shipper owned container)

11.	The Sub-delivery Enquiry Deviation format shall be submitted after filling up all the references and deviations if any duly signed and stamped. Any deviation indicated else ware will not be considered.
12.	In the event of placement of PO, every dispatch of material shall accompany the packing list, detailing the Numbers of items. An advance Copy of dispatch details shall be furnished to MM/BOI/BHEL/Tiruchy-14.
13.	The delivery of the item shall be strictly as per BHEL's Enquiry / Purchase orders. In case of urgency/Postponement, the delivery period have to be altered to meet BHEL Project site's requirement.
14.	Inspection by BHEL / BHEL appointed Third Party Inspection Agency at vendor works.
15.	L1 finalization will be done based on Project wise total cost to BHEL (supply, erection & commissioning, and applicable tax and duties) basis with due consideration of mandatory spares price along with main elevator price.
16.	Note for vendors who are not in our list of approved vendors:- Vendors who are not in our list of approved vendors are required to fulfil the following conditions. In addition to technical and commercial conditions, you have to submit all the documents duly filled in "Supplier Registration Forms" through online (available in http//www.bheltry.co.in/- Online Vendor Registration- Material Management). Duly filled-in Supplier Registration Forms, along with all credentials and supporting documents, Certificate of Rating from D&B (Dun & Brad) sheet or equivalent agencies (For Foreign vendors), Financial Performance / Profit & Loss Account / Balance sheet for last three years etc. (With Techno-Commercial Bid). Availability of minimum manufacturing, handling, testing and measuring facilities, to be detailed are to be mentioned clearly. All the documents to be uploaded. Apart from Qualifying the Techno- Commercial requirements of the enquiry, BHEL has the right for spot assessment of the facilities for evaluation, approval and for registration.
17.	No representative is allowed to attend tender opening without authorisation letter from competent authority of the firm.
18.	Integrity pact format should be submitted along with your offer duly filled, signed and stamped without fail.
19.	If there is any clarifications, you are requested to contact Mr. K. Muthukumarasamy, Sr.Engineer/MM/BOI, BHEL, Thiruchirapalli-620014. Phone No.+91-431-2574103; e-mail:kmsamy@bheltry.co.in

ANNEXURE-A (INDIGENOUS)
ACCEPTANCE OF TECHNO - COMMERCIAL TERMS AND CONDITIONS BY THE BIDDERS

Description of the Equipment:	**Elevator for** **Neyveli Project – Tamil Nadu State** **Wanakbori Project – Gujarat State** **OPGCL Project – Orissa State** **MEIL, Tuticorin Project – Tamil Nadu State**
BHEL Tender No. & Date	

Sl. No.	Terms and conditions	Vendor's confirmation
1.	**Technical :** **As shown in Enquiry**	
2.	**Firm Price :** The quoted / finalised rates shall be Firm till execution of the supplies. Offer with PVC clause will not be considered.	
3.	**FOR Basis :** The quote shall be on **FOR-Respective Project site** basis as indicated in enquiry, inclusive of Packing, Forwarding, Freight & Transit Insurance charges.	
4.	**Payment terms :** 80% (excluding taxes) direct payment against receipt of material at BHEL Project Site and submission of PBG for 10% of the order value and Indemnity Bond on prorata basis. Balance 20% payment will be made on handing over of the Elevator. Actual tax will be paid on tax reimbursement claim along with CA certificate and Tax receipt. No other Payment term is acceptable to BHEL.	
5. (a)	**Liquidated damages :** Delivery of the goods specified in the purchase order should be made within the time prescribed. Failure to dispatch the materials in the time as per the delivery quoted in our Purchase Order would make the supplier liable to an un-conditional LD at the rate of 0.5% of the **total order value** per week or part thereof subject to maximum of 10% of the **total order value**. For staggered delivery schedule, LD shall be 0.5% of the undelivered portion per week of the delay or part thereof, subject to a maximum of 10% of the total order value.	
5. (b)	**Loading Criteria :** **LD / Penalty:** Any deviation of the above LD/Penalty clause, loading will be applied to the extent to which it is not agreed by the bidder (at offered value).	
6. (a)	**Guarantee / Warranty Period** : Vendor shall Guarantee that the materials, workmanship and performance of the apparatus installed under this specification is perfect in every respect and that they will make good of any defects (not due to careless operation) which may develop within 18 months from the date of formal handing over of the equipment.	
6. (b)	**Loading Criteria :** **Guarantee / Warranty Period:** No Deviation is permitted. If still vendor offered any deviation on the Guarantee / warranty period it will lead to rejection of offer.	

7. (a)	**Performance Bank Guarantee:** 10% of material value as PBG shall be offered.	
7. (b)	**Loading Criteria :** Performance Bank Guarantee: No Deviation is permitted and the deviated offers are liable for rejection	
8.	**Taxes & Duties :** All Taxes, Duties, Service Taxes etc. payable as extra to the quoted price should be specifically stated in offers along with CST & TIN No / Tariff No. etc., failing which the purchaser will not be liable for payment of such Taxes and Duties.	
8. (a)	**Excise Duty :** Indicate the applicable percentage **Wanakbori Project – Gujarat State** **OPGCL Project – Orissa State** **MEIL, Tuticorin Project – Tamil Nadu State** **Neyveli Project – Tamil Nadu State** **Exempted being Mega Power** Exempted project documents will be forwarded at the time of despatch	
8. (b)	**CST / VAT :** Indicate the applicable percentage **Neyveli Project – Tamil Nadu State** **Wanakbori Project – Gujarat State** **OPGCL Project – Orissa State** **MEIL, Tuticorin Project – Tamil Nadu State**	
8. (c)	Other applicable Taxes if any :	
9.	**Risk purchase :** If the supplier fails to deliver the goods within the delivery specified in the Purchase Order, BHEL will be entitled to terminate the contract and to Purchase elsewhere at the risk and cost of the seller either the whole of the goods or any part which the supplier has failed to deliver or despatch within the delivery period mentioned in the Purchase Order.	
10.	**Delivery :** As per Enquiry	
11.	**Validity :** 90 days from PRICE BID opening.	
12.	**General Condition :** Kindly submit the 'No deviation format' with clear indication of Data Sheet No / Specification ref, Drawing, and Quality plan.	
13.	**Reverse Auction :** Reverse Auction is not applicable for this tender.	
14.	BHEL will consider the ranking after the loading is applied as referred above wherever deviations are observed.	
15.	**MSE Clause** In line with Gazette notification issued by Ministry of Micro Small and medium enterprises on MSE suppliers, the following special provisions shall be applicable. If L1 vendor is an MSE vendor entire project package will be	

	ordered on L1 vendor. If a Non MSE vendor is coming as L1,then L1 prices will be counteroffered on MSE vendor who is quoting price within the price band L1+15% and if they are agreeing purchase order will be awarded for full/complete supply of total tendered value to MSE. If more than one MSE vendors are available in the L1+15% price band then lowest of the MSE vendor will be selected for counteroffering. If lowest MSE vendor is not accepting it will be counteroffered to the next MSE vendor in the price band and so on. Finally if any of the MSE vendor in the price band is not accepting it will be ordered on L1 non MSE vendor. MSE suppliers can avail the intended benefits only if they submit along with the offer, attested/notarized copies of either EM II certificate having deemed validity (five years from the date of issue of acknowledgement in EM II) or valid NSIC certificate or EM II certificate along with original of CA certificate (Format enclosed at Annexure-1 where deemed validity of EM II certificate of five years has expired)) applicable for the relevant financial year (latest audited). Date to be reckoned for determining the deemed validity will be the date of bid opening (Part 1 in case of two part bid). **Non submission of such documents will lead to consideration of their bid at par with other bidders. No benefit shall be applicable for this enquiry if any deficiency in the above required documents are not submitted before price bid opening. If the tender is to be submitted through e-procurement portal, then the above required documents are to be uploaded on the portal. Documents should be notarized or attested by a Gazetted officer.** ***Definitions of MSEs owned by SC/ST is under:*** • ***In case of proprietorship firm, proprietor must be SC/ST.*** • ***In case of partnership firm, the SC/ST partners must be holding at least 51% shares in the unit.*** • ***In case of private limited companies, at least 51% share must be held by SC/ST promoters.*** Authorised Offices to Issue SC/ST certificate. The caste/Tribe/Community certificate issued by the following authorities in the prescribed form for SCs/STs can be considered. • District Magistrate / Additional District Magistrate/Collector/Deputy commissioner/Additional Deputy commissioner/Deputy collector/1st class stipendary magistrate/Sub divisional Magistrate/Taulka Magistrate/Executive magistrate/Extra Assistant commissioner. • Chief Presidency magistrate/Additional chief presidency magistrate/Presidency magistrate. • Revenue Officer not below the rank of Thasildar. • Sub-Divisional officer of the area where the individual and / or his family normally resides.	
15. (a)	Whether MSME vendor (Yes or No)	
15. (b)	MSME documents attached (Yes or No)	
15. (c)	Documents sent as attachment to this tender shall be signed with company seal and uploaded in the EPS (IN PDF FORMAT) or enclosed along with offer in case of non EPS tender. ALL PAGES MUST BE SIGNED WITH COMPANY SEAL.	

ANNEXURE-A (IMPORT)

ACCEPTANCE OF TECHNO - COMMERCIAL TERMS AND CONDITIONS BY THE BIDDERS

Description of the Equipment:	**Elevator for** **Neyveli Project – Tamil Nadu State** **Wanakbori Project – Gujarat State** **OPGCL Project – Orissa State** **MEIL, Tuticorin Project – Tamil Nadu State**
BHEL Tender No. & Date	

Sl. No.	Terms and conditions	Vendor's confirmation
1.	**Technical :** **As shown in Enquiry**	
2.	**Firm Price :** The quoted / finalised rates shall be Firm till execution of the supplies. Offer with PVC clause will not be considered.	
3.	**Price Basis :** The quote shall be of 2 parts **a)** Material supply on **CFR Chennai seaport** and SOC (Shipper owned container) basis inclusive of applicable Customs Duty. **b)** Charge for Port clearance, transportation of material to project site, Erection & commissioning and handing over with applicable tax and duties.	
4. (a)	**Payment terms :** BHEL Payment term is 80% through LC 10% on erection and 10% after expiry of warranty period. No other Payment term is acceptable to BHEL. Respective bank charges to respective account.	
4. (b)	1) In the case of Usance LCs the loading will be considered @ 1.5% on the offered Value. 2) For LC at sight the loading will be considered @ 3.5% on the offered Value. 3) Normally CAD at sight and Confirmed LCs are liable for rejection.	
4. (c)	**Performance Guarantee:** 10% of the payment will be put on hold up to the expiry of Warranty period(as given in 4a)	
4. (d)	**Loading Criteria :** Performance Guarantee: No Deviation is permitted and the deviated offers are liable for rejection	
5. (a)	**Liquidated damages :** Delivery of the goods specified in the purchase order should be made within the time prescribed. Failure to dispatch the materials in the time as per the delivery quoted in our Purchase Order would make the supplier liable to an un-conditional LD at the rate of 0.5% of the **total order value** per week or part thereof subject to maximum of 10% of the **total order value**. For staggered delivery schedule, LD shall be 0.5% of the undelivered portion per week of the delay or part thereof,	

	subject to a maximum of 10% of the total order value.	
5. (b)	**Loading Criteria :** **LD / Penalty:** Any deviation of the above LD/Penalty clause, loading will be applied to the extent to which it is not agreed by the bidder (at offered value).	
6. (a)	**Guarantee / Warranty Period:** Vendor shall Guarantee that the materials, workmanship and performance of the apparatus installed under this specification is perfect in every respect and that they will make good of any defects (not due to careless operation) which may develop within 18 months from the date of formal handing over of the equipment.	
6. (b)	**Loading Criteria :** **Guarantee / Warranty Period:** No Deviation is permitted. If still vendor offered any deviation on the Guarantee / warranty period the offer is liable for rejection	
7.	**Delivery Period :** As per Enquiry.	
8.	**Validity :** 90 days from PRICE BID opening.	
9.	Port of loading and Port of discharge should be indicated without fail. Weight of the total consignment shall be indicated in the offer.	
10.	Foreign Exchange rate prevailing on Techno-Commercial bid opening date will be taken for calculation.	
11.	BHEL will evaluate the offers and consider the ranking after the loading is applied as referred above wherever deviations are observed	

429-024	**MATERIALS MANAGEMENT / BOI** **SUB-DELIVERY ENQUIRY DEVIATION FORMAT**

Page : of

Schedule of deviation to Sub-delivery Enquiry No.	:
Description	:
Documents	:
Drawing No.	:
Quality Plan	:
Packing Procedure	:

Document reference	BHEL called for	Firm's alternative offer

Certified that other than the above deviations, we are accepting all the other specifications and requirements in full to your Enquiry.

Station :

Date : Signature of firm's representative Firm seal

Note : 1. Deviations should be taken only in the extreme case
2. If necessary, use additional sheets with page control number

Bharat Heavy Electricals Limited

HIGH PRESSURE BOILER PLANT, TIRUCHIRAPALLI-620014.

CONTROLS & INSTRUMENTATION

CI:0683:ELEV	PAGE 01 OF 08

SPECIFICATION FOR

GOODS CUM PASSENGER ELEVATOR

REV. NO	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED
00	22-10-2014	INITIAL RELEASE	S.Rajavelu		

CLAUSE NO.	TECHNICAL DELIVERY CONDITIONS	
1.0	**SITE CONDITIONS**	
	Altitude above MSL	Less than 1000m.
	Relative humidity	100%.
	Design Ambient Temp.	50 deg.C
	Atmosphere	Tropical, Dusty, Corrosive and highly polluted.
	Wind loads @ 10 metres above sea level	As per IS-875(Part 3) / 1987
2.0	**GENERAL**	
	This specification is intended to cover the design, engineering, manufacture, inspection, delivery, erection, commissioning, and maintenance & service before handing over to customer of 3 Tonne Goods cum Passenger Elevator for boiler applications. Vendor shall fully comply with this specification including Annexure-A. If any technical requirements indicated anywhere in specification including Annexure-A and Annexure-B cannot be complied to, the same to be indicated clearly with technical reasons along with the offer. If any conflict of requirements are there across the specification Annexure-A shall be given more priority Annexure-B consists of data regarding twisting and deflection requirements of elevator given by M/s Alstom. The same to be incorporated in the design by elevator vendor. Also vendor shall ensure accurate, reliable and trouble-free operation of elevator in corrosive, dusty conditions and environments.	
3.0	**PRE QUALIFICATION REQUIREMENT (APPLICABLE IN CASE OF OPEN TENDER)**	
	The elevator offered shall be in satisfactory operation for boiler applications in fossil fuel fired power plants of unit rating 250MW or above. Vendor shall submit a list of reference thermal plants (with elevator capacity, landing levels and travel) where their elevator is in satisfactory operation for more than one year. Commissioning and service support for the elevator shall be available in India.	
4.0	**STATUTORY REQUIREMENTS**	
	Obtaining all the statutory clearances required from the concerned authorities (including payment if any) upto handing over of the elevator shall be the responsibility of the elevator vendor.	
5.0	**REFERENCE STANDARDS**	
	The Elevators shall be designed in line with the recommendation contained in the latest editions of Standards **IS: 14665: 2000 (All Parts)**. The equipment shall comply with latest revision of Indian standard and wherever 'IS' is not available, it shall comply with the generally accepted international codes and practices.	
6.0	**SCOPE OF WORK**	
	i) Design, engineering, manufacture, inspection, delivery, erection, commissioning and handing over. ii) Maintenance & services during guarantee period**.** iii) Necessary erection / commissioning spares and consumables shall be included in vendor scope. iv) Necessary tools and tackles required for maintenance or testing or inspection shall be covered in vendor scope. v) Mono-rail beam will be supplied by purchaser (BHEL) in machine room. vi) A steel ladder has to be provided for access to the pit by the Elevator vendor. vii) Guard to protect the hoist way including temporary barricades at hoist way openings by Elevator vendor. viii) Scaffolding as per erection requirement shall be provided by the Elevator vendor. After completion of handing over activities, the scaffolding materials may be taken back by the vendor. ix) All the electrical equipment including Lift well, Hoist way & machine room lighting with fittings, Power/control/trailing cables, MCCB/MCB & ELCB for 415 V AC 3ph supply and 240 V AC single phase supply (to receive the incoming feeders provided by customer) shall be included in the Elevator vendor scope. x) The vendor shall assume all responsibility in proper design and operation of each and every component of the elevator as well as the elevator as a whole. Complying with Indian electricity rules & Indian electricity acts and applicable statutory requirements (of Government of India and applicable States) as well as procedural formalities also shall be taken care by the Elevator vendor.	
7.0	**EXCLUSIONS**	
	Works not included in elevator contract, but furnished by others in accordance with local codes and regulations and the approved drawing of the Elevator vendor. i) Civil works associated with the Elevator pit. ii) Furnishing and installation of steel beams (Hoisting beams) in the machine room to lift equipment during installation and to facilitate maintenance. iii) Machine room civil works including concrete flooring. iv) Steel structures for Columns and associated bracings and approach platforms up to landing doors at each level.	

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	v) Supporting steel material between hoist way & car will be provided by BHEL.		
8.0	**ELEVATOR PARTICULARS & DESIGN PARAMETERS**		
	i) Goods Cum Passenger Elevator shall be provided with 1 no. fireman's switch (Alarm Switch). ii) The Elevator shall be located on the side of the boiler as indicated in the plant layout drawing which will be provided during detailed engineering. iii) Entry to the Elevator shall be indicated in the enquiry. Foundation plan and elevation with landing levels shall be as per purchaser (BHEL) drawings.		
9.0	**Design Criteria and Equipment specification for Goods Cum Passenger Elevator**		
	i)	Type of service	Goods cum Passenger Elevator (as per enquiry)
	ii)	Number required	As per enquiry
	iii)	Load on the Elevator	
	iv)	Rated speed	
	v)	Total travel	
	vi)	No. of floors to be served (Landing levels)	As per enquiry
	vii)	Entrances	One number in each floor
	viii)	Method of control Motor Speed Control & Logic Control:	As per Annexure-A
	ix)	Flooring of Car	As per Annexure-A
	x)	Position of Machine room	
	xi)	Design, construction and finish of car	
	xii)	Car door	
	xiii)	Landing door	
	xiv)	Car Enclosure	
	xv)	Lighting and fan in the car	Recessed fluorescent light fittings for illumination level of 100 lux on Car floor shall be provided. Cabin charger ventilation fan with control suitable for operation on 240 V, 50 Hz, AC single phase power supply shall be provided. Portable light shall be provided on Car top. Adequate ventilation and illumination of car to be ensured.
	xvi)	Method of operation of car	As per Annexure-A
	xvii)	Operation of Elevator	
	xviii)	Signals / Indicator	As per Annexure –A & Battery operated alarm bell and emergency light with suitable battery and battery charger and controls. Audio annunciation for car position indication shall also be provided inside the car.
	xix)	Shaft lighting	The Elevator shaft shall be suitably illuminated by providing CFL fittings at every 3m (three metres) from bottom of Lift well.
10.0	**DETAILS OF SPECIAL TREATMENT FOR ELEVATOR**		
	As the Elevators are to be installed in a heavily polluted and dusty area in a thermal power station, the Elevator components shall be given special corrosion treatment as indicated below.		
	Painting of Elevator and accessories shall be as per Annexure-A and as below.		
	i)	Cars & Counter weight	Anti-corrosive epoxy paint
	ii)	Fish plates	Anti-corrosive epoxy paint
	iii)	Car & Counter weight buffer	Anti-corrosive epoxy paint
	iv)	Supports(Buffer)	Anti-corrosive epoxy paint
	v)	Rail Brackets	Anti-corrosive epoxy paint
	vi)	Bracket & rail fasteners	Zinc-passivated with epoxy painted
	vii)	Tie down bolts	Zinc-passivated with epoxy painted
	viii)	Machine	Anti-corrosive epoxy paint
	ix)	Brake adjusting screw & coupling fasteners	Zinc-passivated
	x)	Bracket	Anti-corrosive epoxy paint
	xi)	Controller cabinet	Anti-corrosive epoxy paint as per industry standard.
	xii)	Hall buttons	Dust-proof with stainless steel hardware.

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	xiii)	Car operating panel	Dust proof contact & button with aluminium face plate and SS hardware. Main face plate SS
	xiv)	Governor	Cover and casting epoxy painted. Other components zinc plated.
	xv)	Governor Tension frame	Hot dip galvanised and anti-corrosive epoxy paint with M.S. shaft for sheave.
	xvi)	Car frame, level brace rods and counter weight frame	Epoxy paint as per IS-1477 Part 1 & 2.
	xvii)	Safety equipment (Linkages)	Zinc-plated
	xviii)	Safety switch and car gate switch	IP-65. Dust proof heavily zinc plated arm, stainless steel shaft and housing as per vendor standard.
	xix)	Guide shoe	Zinc-plated
	xx)	Cam bar mountings and channels	Zinc-plated and anti-corrosive epoxy paint
	xxi)	Counter weight frame	Anti-corrosive epoxy paint
	xxii)	Guide shoe with Nylon ribs	Zinc-plated
	xxiii)	Filter weights	Anti-corrosive epoxy paint
	xxiv)	Rope fasteners	Zinc-passivated and chromate dipped
	xxv)	Hoist rope	Greased, self-lubricating
	xxvi)	Governor rope	Greased, self-lubricating
	xxvii)	Car enclosure, interior gate, car door and landing door	Anti-corrosive two coats baked enamel paint
	xxviii)	Alarm and door open bells (Electronic hooter)	Painted.
	xxix)	Junction box	Metallic body - dust proof with Anti-corrosive epoxy paint
	xxx)	Hall position indicator and car position indicator	Dust proof with stainless steel enclosure and Face plate.
11.0	**MECHANICAL EQUIPMENT**		
11.1	**ELEVATOR CAR**		
	As per Annexure-A		
11.2	**CAR DOOR**		
	As per Annexure-A		
11.3	**LANDING DOORS**		
	As per Annexure-A		
11.4	**LOAD PLATE**		
	A load plate displaying the rated load of the Elevator in terms of persons and kilograms shall be fitted in the car in a conspicuous position.		
11.5	**SUSPENSION ROPES**		
	As per Annexure-A		
11.6	**SHEAVES AND PULLEYS**		
	All driving sheaves and pulleys fixed to and revolving with the shaft shall be fixed by means of sunk keys of sufficient strength and quality. Sheaves and pulleys shall be made of cast iron as per the latest edition of IS 14665 and free from cracks, sand holes and other injurious defects. They shall have suitable flanges and smoothly machined rope grooves. The diameter of the sheave or pulley shall be as specified in the latest edition of IS 14655 or equivalent International Standards.		
11.7	**SHAFT**		
	Shafts and axles shall be forged steel. They shall have sufficient rigidity and bearing surface. Any shaft when stepped shall be turned to a reasonable radius at the point of reduction.		
11.8	**COUNTER WEIGHTS**		
	As per Annexure-A		
11.9	**GUIDE RAILS**		
	As per Annexure-A		
11.10	**BUFFERS**		
	As per Annexure-A		
11.11	**EMERGENCY SAFETY DEVICES AND BRAKES**		
	The Elevator shall be provided with safety device attached to the Elevator car frame and placed beneath the car. The safety device shall be capable of stopping and sustaining the Elevator car up to governor tripping speed with		

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	full rated load in car. The application of the safety device shall not cause the Elevator platform to become out of level in excess of 3 cm/m measured in any direction. Slack rope switches, if necessary, shall also be provided. The Elevator vendor shall also provide personnel evacuation system during the power failure to the Elevator. The Machine shall be provided with direct current spring set, solenoid release double shoe brakes of sufficient capacity to stop the car at any position with the design load. These brakes shall be designed in such a way that it gets applied automatically in the event of power failure.
11.12	**AUTOMATIC RESCUE DEVICE (ARD)-(BATTERY DRIVE)**
	Contractor shall provide a modern advanced electronic drive system of "RESCUING Passengers Trapped in an ELEVATOR" in case of power failure. In addition to the above, bell and cranking device to be provided with hand wheel connected with motor shaft for manual lowering of elevator to the nearest landing level. For all Elevators with ARD, an audio & visual indicator shall be provided inside the Elevator car to alert the person trapped inside that he/she is being rescued. Capacity of battery shall be such that minimum three rescue operations can be performed without recharging. ARD panel shall be suitable for floor mounting.
11.13	**OVERLOAD DEVICE**
	Every passenger Elevator shall be provided with an overload device, which will prevent the Elevator from starting in case the Elevator car is loaded to 110 percent of the rated capacity of the Elevator or more. Elevator shall remain stationery with door open. Audio & visual warning device (Load weighing device) shall be provided to alert the passenger in case of overload.
11.14	**OVER SPEED GOVERNOR AND GOVERNOR ROPES**
	As per Annexure-A
11.15	**LEVELLING DEVICE**
	As per Annexure-A
11.16	**MACHINE ROOM AND OVERHEAD STRUCTURES**
	As per Annexure-A All the overhead machinery shall be supported on beam to be furnished by the contractor. The machinery support beam shall rest on top of or be designed to be framed into the contractor's structural steel frame for the boiler house. The Elevator drive controller and all other apparatus and equipment of Elevator installation, except such apparatus and equipment which function in the machine room shall be located at the top of the Lift well. Adequate machine room and hoist way lighting shall be provided by the Elevator vendor. The maximum loads transmitted by the single heaviest equipment both during erection and maintenance of the Elevator to the machine room floor and other structures like guides etc. shall be furnished by the Elevator vendor within 15 days of placing the award letter. Sound reducing materials below machines in machine room shall be provided. Machine room shall be provided with minimum 200 Lux illumination. **MACHINE ROOM Air conditioning** Machine room shall be provided with 5 tonnes or with 1 No. of 2 tonne and 2 nos., of 1.5 tonne capacity A/C units (minimum) to make the machine room dust proof. If higher capacity of A/C is required for proper cooling, the same is to be indicated in the offer.
11.17	**TERMINAL STOPPING AND FINAL LIMIT SWITCHES**
	As per Annexure-A
12.0	**ELECTRICAL EQUIPMENT AND CONTROLS**
12.1	**OPERATION AND INTERLOCKS**
	The operation of the Elevator shall be simplex, selective, collective, and automatic, with or without operator. The Elevator operation shall conform to the following requirements. i) The operation of the Elevator shall be through a push button station located inside the car. ii) The Elevator shall not move unless the car door, landing door and all other protected openings connected with the control circuit are closed. iii) Two push buttons, one for upward and the other for downward movement at each intermediate landing and one push button at each terminal landing shall be shall be provided in the landing floors in order to call the car. iv) The landing doors shall be interlocked so that the landing door at any floor shall not open when the Elevator is not on that floor. v) Push button shall be fixed in the car for holding the doors open for any length of time required.

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12.2	**ELEVATOR DRIVE**
	The Elevator drive shall be equipped with automatic electromagnetic coil type brakes. The Elevator shall be driven by a drive suitable for method of control offered by the Elevator vendor. No friction gearing or clutch mechanism shall be used for connecting the main driving gear to the sheaves.
12.3	**ELECTRIC MOTORS**
	Motor shall be as per Annexure-A.
12.4	**CONTROLLERS**
	The controllers shall be designed to start, accelerate, stop and reverse the Elevator when the appropriate push buttons are pressed. It shall be arranged so as to provide maximum convenience to the operator. Contact finger buttons shall be easy to adjust and replace. The speed control device shall be such as to give smooth, easy and accurate speed control. The Elevator controls shall be housed in dust and vermin proof enclosures. The controls shall be wired with stranded copper conductor cables. All equipment mounted shall be neatly labelled as per wiring diagram. Ventilating louvers are to be provided in the panels. Control panel shall be suitable for floor mounting.
12.5	**CABLES AND INTERNAL WIRING**
	The circular trailing cables shall conform to IS 4289 Part-I (Elastomer insulated) or IS 4289 Part II (PVC insulated) / Flat type trailing cable shall conform to IEC 60227-06. All other cables shall be as per Annexure-A.
12.6	**EARTHING**
	Earthing shall be carried out as per IS 14665, IS 3043 and Indian Electricity Rules. The Elevator structures, motor, frames, metal cases and all electrical equipment including conduit, cable armouring and guards shall be properly bonded and earthed by two separate and distinct connection. The earth bus will be connected to the station earth mat by the owner.
12.7	**POWER SUPPLY**
	One three phase 415V, AC, 50 Hz UPS Supply for Elevator main motor, and one single phase 240V, AC, 50 Hz supply feeders for lighting, Air conditioner and control panels will be provided in the machine room by BHEL. The exact Power requirement in kVA of three phase supply and single phase power supply shall be indicated in the offer itself by the vendor. The junction box having MCCB/MCB Isolation of adequate rating shall be arranged by the vendor to receive the above supplies. The Elevator vendor shall also indicate the proposed location of junction box in the machine room. All further distribution, cabling and wiring from the junction box shall be carried out by the Elevator vendor. The vendor shall arrange to tap power supply required for constructional purposes from the point terminated by the owner.
13.0	**OTHER REQUIREMENTS**
	Electric high speed door operators for the opening and closing of the car doors and landing doors shall be furnished and installed. The car and landing doors shall be mechanically connected and shall move simultaneously in opening and closing. The car door and landing door shall be power closed and shall be controlled in opening and closing by oil cushioning mechanism built into the gear unit or alternate arrangement equally/better than this. Necessary lockable switches shall be provided in the Elevator machine room to control the operation of the door. Should the electric power fail, it must be possible for the doors to be manually opened from within the car provided the car is exactly at the landing level. Overload relays shall be provided to protect the drive motor against overload or a power failure. Suitable protection shall be provided on the controller to protect the Elevator equipment from phase reversal, low voltage. Suitable arrangement shall be provided to intimate unit control room during emergency in the form of audio-visual alarm. Complete set of special tools and tackles required shall be supplied along with Elevator. Each tool and tackle shall be stamped so as to be identified easily for its use and size. Tools shall be supplied in a steel tool box. The list of tools and tackles shall be furnished along with the offer. One number Fire extinguisher (suitable for electrical fire) shall be provided along with each elevator.
14.0	**SPARES**
	The vendor shall furnish the List of commissioning, mandatory and recommended spare parts and indicate separately in the offer with item wise price under the title “Schedule of Spare Parts”. The spares recommended above with unit prices shall be valid for at least for three years of normal consumption for operation of the plant. The vendor shall also indicate the service expectancy for these spare parts under normal operating conditions before the replacement is necessary. All the spares offered shall be strictly interchangeable with the parts for which they are intended for replacement.

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15.0	**DRAWINGS / DOCUMENTS**
	The following preliminary documents / drawings should be enclosed along with the offer without fail. i) Detailed description of the system offered. ii) List of thermal power where the offered system is in operation. iii) Performance certificate of the system offered. iv) Write-up on interlocks, controls and safety devices provided. v) General Arrangement of Elevator (including hoist way, pit well etc.) vi) General Arrangement of machine room and equipment in machine room. vii) Electrical control scheme with legend and write-up. viii) Machine room Air-Conditioning details. ix) Foundation and loading details of machine room floor and the concrete structure. x) Filled in vendor data sheet for Elevator, Main motor and Door operator motor. xi) Filled in vendor quality plan. xii) The major components of Elevator with weight details to be indicated by the vendor in the offer itself. xiii) The make, type, capacity, range of all bought out items xiv) Any deviation from the enquiry specification shall be indicated in the "Sub-delivery Enquiry Deviation Format" attached along with the enquiry. No deviations, unless explicitly taken up by vendor in the enquiry stage itself in the said format and accepted by BHEL in writing, shall be considered after firm order. In case no deviations are there, vendor to indicate "No-deviation" in the fully filled up format. xv) Documents as per Annexure –A The following documents / drawings shall be submitted within 15 days from the firm order. i) Elevator General Arrangement drawings for BHEL/Customer approval. ii) Elevator Technical Datasheet Drawing approvals shall be obtained by vendor before manufacture of elevators.
16.0	**WARRANTY**
	The Elevator Vendor shall guarantee that the materials, workmanship and performance of the apparatus installed under this specification is perfect in every respect and that they will make good of any defects (not due to careless operation) which may develop within 18 months from the date of formal handing over of the equipment.
17.0	**MAINTENANCE**
	After the completion of the installation, maintenance and service for the equipment furnished under this specification shall be provided by the vendor for a period of eighteen months. This service shall include monthly inspections of the installation during regular working hours by trained employees and shall include all necessary adjustments, greasing, oiling, cleaning, supply of genuine standard parts to keep the equipment in proper operation except any part made necessary by misuse, accidents or negligence caused by others.
18.0	**ACCEPTANCE**
	After erection, the performance of the Elevator shall be tested for ascertaining the conformity with the specification and upon satisfactory completion of the tests, the Elevator will be taken over. The responsibility for obtaining commissioning and handing over protocol signed by the customer lies with the Elevator vendor.
19.0	**QUALITY ASSURANCE AND TESTING**
	As per Annexure-A. Vendor quality plan to be submitted in case of order receipt.
20.0	**PACKING AND STORAGE**
	Packing and storage at site shall be done as per vendor standard. However the following points to be taken care by the vendor. At the time of shipment equipment shall be clean inside and outside. The vendor shall pack all equipment and materials furnished by him in such a manner as to ensure protection against damage and deterioration during shipment and storage which includes local transportation and site storage. Modules, or electronic equipment shall be wrapped and sealed in plastic to protect from rain and dust. The plastic wrapping shall include, as required, the use of a desiccant to protect the equipment from excessive moisture. The items shall be treated and packed for long storage under the climatic conditions prevailing at site. Each item part shall clearly be marked or labelled on the outside of the packing in single case. The general description of the contents shall be shown on the outside of such cases. All cases, containers and other packages shall be marked suitably and numbered for the purpose of identification. All cases, containers and other packages are liable to be opened for such examination as may be felt reasonable by the purchaser. The vendor shall bear in mind the shipment of the plant having ball or roller type bearings for which the following special provisions shall apply: i) If temporary transit bearings are fitted to such plant, then, additionally, two complete sets of service bearings shall be included and shipped with such plant.

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	ii) If the item of the plant is shipped with service bearings in position, then additionally one complete set of service bearings shall be included and shipped with such plants. In either or both of the above provisions, the cost of the additional sets of bearings shall be included in the offer. **iii)** If replacement of any bearing is required due to damages during shipment or other causes, the spare bearings shall be used to replace at free of charge.
21.0	**O&M MANUALS**
	Vendor to furnish standard O&M manuals for each capacity of elevator, immediately after the release of first purchase order for BHEL's further use (Two copies of CD-ROM). The O&M manual prepared shall be such that the same shall be usable along with the relevant drawings for this project. O&M manuals along with project details, if any, has to be updated by vendor and handed over to site (Customer & BHEL/Site, after commissioning of elevator) in necessary format as desired by customer.
22.0	**LIST OF ELEVATOR OPTIONAL PRICES**
	The following optional prices to be indicated along with offer for arriving at the base price of elevator. i) Rate for addition / deletion of 1 number landing. ii) Rate for addition / deletion of 1Mtr. in travel height. iii) Extra price for having 0.75mps & 1mps speed of goods elevator instead of 0.55 mps for 3 Tonne elevator iv) Extra price for Car with SS (ASTM 304 No: 4 Hairline finish) for 1) 3 Tonne elevator v) Extra price for Landing door with SS (ASTM 304 No: 4 Hairline finish) for 1) 3 Tonne elevator vi) Additional price of Automatic Rescue Device (ARD) for increased height of 15 Mtrs. vii) Auto annunciation in the form of metres viii) Extra price for fire resistant landing doors (1 hour as per BS:476 (Part 20 & 22))

ANNEXURE - A

13 ELEVATORS ,HANDLING & HOISTING FACILITIES

13.1 Elevators,

Elevators and handling & hoisting facilities will be provided by the Contractor for various areas/ plants of Steam Generator Package for ease of access, approach and maintenance. Following have been envisaged.

a) Elevators

13.1.1 Passenger / Freight Cum Passenger Elevator

13.1.1.1 Introduction

a) One number "3000 kg Passenger cum Freight Elevator" in the boiler house of each steam generator.

13.1.1.2 Scope of Work

1. The scope of work of the Contractor will consist of design, manufacture, fabrication, supply, inspection, transportation to site, erection, testing and commissioning of 1 (One) No . of 3000 kg Capacity Passenger cum Freight elevator latest design, to be operated with or without an attendant. Supply of necessary fixtures, if any, required for erecting the elevators in position will also be under Contractor's scope of work.
2. The Contractor will furnish separately item wise prices for supply of Mandatory spares. Proper coding and referencing of spare parts will be done so that later identification with appropriate equipment will be facilitated.
3. The scope of supply will cover the required quantity of initial fill of grease, lubricants hydraulic fluids etc. (including quantity required for flushing, topping upto successful completion of trial operation), consumables and erection spares necessary for erecting and commissioning the equipment.
4. Necessary tools and tackles required for maintenance or testing or inspection will be covered in the scope of supply of the Contractor.
5. Questionnaire and technical data sheets as enclosed will be duly filled in and submitted during detailed engineering.
6. Mechanical details:

- The elevator cage will be of welded steel construction with floor made of suitably braced chequered plates for 3000 kg Freight cum passenger elevator.
- Automatic centre opening horizontally sliding doors will be provided suitable for the purpose intended. Necessary interlocking between the doors and car movement during normal operation will be provided. Complete car body with fan on top will be provided. The landing doors will be provided with arrangement for opening it during emergency.
- The driving mechanism for the elevator will be installed in a machine room located and designed suitably for easy maintenance. Machine room will be provided with suitable access and adequate ventilation facilities.
- The elevator will be suitable to operate without any operator. Every floor will be provided with call push button and indication about movement and its direction. The elevator cage will be provided with necessary switches including limit switches, landing stop switches, door contacts, counter weight buffers, car buffers, emergency light, emergency bell, switch and floor indicator. It will also be provided with overload alarm and protection.
- An over speed safety device to stop the car whenever the car achieves runway speed limit resulting from high speed descending of the car will be in the scope of Contractor. The actuation of safety device will cut off the power supply to the motor and apply the brake immediately.
- Necessary light points in the hoist way and pit for the proper illumination of shaft and pit.
- Necessary test weight for carrying out the test.
- Commissioning spares required for the Elevators will be included in the scope of Contractor.
- Safe access for maintenance and removal of all mechanical and electrical parts will be ensured, without additional scaffolding.
- All parts requiring replacement or inspections or ubrication will be easily accessible without the need for dismantling of other parts/equipment.
- All machinery or equipment included under this specification will be equipped with safety devices and clearances to comply with recognized standards and purchaser's requirement.
- Minor civil works and equipment grouting of all bolts, sills, support members, indicator and button box etc.
- Suitable lubrication system will be provided for guide rails as well as for other items.
- The hoist rope will have adjustable self-aligning hitches.
- Steel T-Guides will be provided for the car and counter weight. The counter weight will be guarded/ protested by means of wire mesh cage for safe operation.

- Spring buffers will be provided as a means of stopping the car and counter weight at the extreme limits of travel. Buffers in the pit will be mounted on steel channels which extend between both the car and counter weight guide rails.

a) General

- The elevators will conform to the following stipulations, in genera :
- The elevator will be designed in accordance with IS: 14665 (Part I) Part – 2/Sec – 1, Part – 3/Sec – 1)2000 and IS: 14665 (Part 4/ Sec 1 to 9) 2001 and other relevant IS specifications and subject to any modifications and requirements specified herein after.
- Elevators will be installed inside the building to facilitate movement of man and material to various floor levels and will operate from lower most level to top most level and will be located at identified location.
- The elevator will be operated electrically with fittings as indicated in technical parameters.
- The elevator will be equipped with all standard safety systems such as Bell and cranking in case of power failure, emergency rescue battery back-up, hand wheel connected with motor shaft for manual lowering of elevator to the nearest landing level in case of power failure, limit switches, indicators, over speed safety governor for car, emergency light fittings, etc.
- Elevator shaft is to be provided with adequate lighting.
- The elevator will be suitable for continuous 24 hours round-the-clock operation.
- The motor for the elevator will be squirrel cage induction motor with VVVF control for controlling the speed during starting and stopping at landings
- Trouble-free performance of the elevator incorporating the operational, controlling and safety requirements, as specified, is to be guaranteed.
- The Contractor under this specification will assume all responsibility in proper design and operation of each and every component of the elevator as well as the elevator as a whole.
- Complete drive, electrical and mechanical control equipment, & control panel etc., will be installed in the machine room.
- A selector switch and a set of push buttons will be provided on the top above the ceiling of the car to operate the elevator locally for inspection and maintenance. The selector switch when set to position "Inspection" will exclude control from other places and movement of the car in the desired direction will be effected by the push buttons.

- For normal operation of the elevator, the selector switch will be set to the position working. It will be possible to operate the elevator only when the appropriate button is kept in pressed condition.
- Provision will be made for a safety gear, which will operate in case of free fall or over speeding of elevator car or counter weight in the descending direction. This safety gear, while freezing the cabin mechanically to the guides, will also interrupt the control supply through a limit switch.
- The particular landing door will open only after the elevator car has stopped at the landing. Additional provision will be made for opening of the landing door in case of emergency by means of a special key. The landing doors will be so designed that their closing and opening is not likely to injure a person.
- Provision will be made to prevent the opening of any landing door when the car is passing that zone in response to a call from another landing.
- At all the intermediate levels "Up" & "Down" call buttons with indicators will be provided. Car position indicator will also be provided at all levels. At ground level, "Up" call button with indicator & at top most level "Down" call button with indicator will be provided.
- The circuit which supplies current to the motor will not be included in any twin or multi-core trailing cable used in connection with the control safety devices /signaling equipment.
- All electrical cables will be so laid that they are not liable to damage and can be easily inspected and maintained.
- For other details relevant IS standards will be followed.

a) Design construction and performance requirement

i) Load:

The elevator will be designed to elevator the pay -load in addition to weight of the car itself and other accessories.

ii) Speed

The elevator will travel at a speed mentioned in the technical characteristics (Table)

iii) Size

The inside dimensions of the platform of the car (clear inside) will be as furnished in the table. The inside clear height of elevator will be 2300 mm.

iv) Travel and landings

The elevator car will travel from ground floor at reference elevation to top landing as specified in the technical parameters table. In between these two levels the car will stop at every intermediate platform level.

v) Wire Rope

The car and counter weight will be suspended by steel wire ropes. The number of wire ropes and size of wire rope will be so chosen that highest factor of safety is achieved as per standard. Not less than three independent suspension ropes will be used. The minimum diameter of rope will be 12mm and factor of safety 12.

vi) **Car**

- **Car frame**
  - Every elevator car will be carried in a complete frame of steel which will be sufficiently rigid to withstand the operation of the safety gear without permanent deformation to the car frame. The car structure will be of steel with special painting or of stainless steel.
  - At least four renewable guide shoes with renewable linings or set of roller guides will be provided, two at the top and two at the bottom of the car frame.
- **Car enclosure**
  - The car will be enclosed on all sides by means of car body and door. The sides of the car will be lined with heavy gauge stainless steel sheet plate properly braced and reinforced.
  - The enclosure will be flush on the inside and securely fastened to the platform. The car body floor will be of M.S steel construction with chequered plate top. Side panels will be of stainless steel grade 304 and roof of stainless steel over MS frame.
  - The car will be equipped with handrails on three sides, fan with grills and suitable lighting with fittings. The light will be left on during the whole time of use.
  - Necessary provisions will be made for adequate ventilation of the car. Ventilation opening will be provided in the enclosure roof as per requirement of IS: 14665 (Part 3/Sec 1 & 2)-2000. A separate switch will be provided in the car for the fan.
  - The enclosure of the elevator car will withstand a thrust of 35 kg applied normally at any point, excepting any vision panel, without permanent deformation.
- **Car platform**
  - Car platform will be constructed of structural steel shapes or securely fastened with steel flooring covered with PVC tiles flooring. The platform will be designed on the basis of rated loads evenly distributed. The car floor will comprise a smooth non-slip surface.
  - Since the car leveling device will be used, subsequent aprons of sufficient depth will be fitted to the car floor to ensure that no

space is permitted between the threshold and the landing while the car is being leveled to a floor.

- **Car roof**
  - Car roof will be covered with sheet metal to prevent dripping of lubricants from ropes-sheave bearings. The top flooring will be of steel with decorative false ceiling. A three pin plug socket with a switch for head lamp will be fitted on the top of the car for use during maintenance. The roof will be strong enough to support atleast two persons.
  - Provision for slow speed (1/2 of rated speed) operation from car top in up and down directions in independent mode will be made to facilitate maintenance of devices in the hoist way. Necessary fittings will be provided for this purpose.
  - Difference in levels of the car floor and landing will not exceed the figures indicated in IS 14665 (Para 3/Sec 1 & 2)-2000 under heading "Leveling Accuracy ".
  - Suitable lubrication system will be provided for guide rails as well as for other items.
- **Car Door**
  - The elevator car will be provided with horizontally sliding doors. (Wherever vertically bi-parting type sliding doors are indicated/ this may read as horizontally sliding doors)
  - The door of elevator will open at all the platform levels.
  - Car door will have a clear opening of 1600 mm wide X 2000 mm high for 3000 kg elevators. The door operation will be automatic.
- **Hoist way door**
  - Horizontally sliding doors having a clear opening (as per IS) will be provided at each of the landing for elevator door
- **Door hangers & tracks**
  - Hangers and tracks for car door and each having a clear hoist way door will be provided. Suitable material will be used to minimize the noise. Ball bearing rollers or equivalent arrangement will be provided to take upward thrust of the doors. Suitable devices will be provided for transmitting from one door panel to the other.
  - All required material for landing entrance e.g. extruded aluminum or equipment sills, structure angles, headers etc. will be provided.
- **Door operation for car door and hoist way doors**

- The doors operation will be automatic. The necessary door cushioning device will be provided.
- Necessary safety devices will be provided to prevent the movement of the car until the car door and hoist way doors are closed properly.

7. Car Self-Leveling Device

   The elevator will be equipped with automatic self-leveling devices to bring the car to the floor landings. These self leveling will be correct for over travel or under-travel and rope stretch.

8. Control and operation

   The elevator control i.e. the system governing starting or stopping the elevator machine, determine the direction of the travel, regulating the rate of travel, regulating the rate of acceleration and deceleration and controlling running speed of the moving member will be through 3 phase two speed squirrel cage induction motor. The AC drive motor for the elevator will be accelerate or decelerate the elevator according to requirement. Reversal in direction of movement of the elevator will be achieved by reversing the motor 3phase supply.

   The operation of the elevator i.e. method of actuating the control will be "Selective Collective Automatic Operation" as per clause 3.41.3 of IS 14665 (Part2/Sec1): 2000 with and without attendant. All accessories required for the "collective operation as outlined therein, namely selector and its driving will be furnished complete.

   The controller will be preferably microprocessor based.

9. Car Operation Panel

   In the car the Contractor will provide an operation panel containing push buttons numbered to the landing served; two position switch marked to indicate " with attendant" and "without attendant" an emergency call button connected to alarm bell to serve as an emergency signal; push buttons or switches for fans and other facilities provided in the elevator as required.

10. Car Position Indicator in Car

    A signal indication will be provided by the appropriate numeral (which will be floor no./ level of respective floor) being illuminated when the car is passing the corresponding floor. The indication will remain illuminated when the car is stopped at a floor. Up & Down direction jewel lights will also be provided. The car position indicators are needed to be provided at all landings.

    Provision to indicate elevator capacity in Kg as well as in terms of person will be made available in the car. Other signals like "over oad" "Elevator is under maintenance" etc. will also be provided.

11. Push Button Station and Call- Registered Tell-tale Lignts at Hoist way

A single "Up" and "Down" push button at terminal landings and "Up" "Down" each push intermediate landing including call register light for each push button will be provided. These will remain illuminated till the call is answered.

12. Emergency Exit

The elevator car will be provided with an emergency exit / automatic rescue device of adequate dimension.

13. Terminal Buffers

The terminal buffers will be provided for stopping the car and the counter weight at the extreme ends of travel. All structural steel members required to install the buffers will be supplied by the elevator supplier.

14. Counter-Weights and Counter-weight Frames.

Counter weight sections will be mounted on structural metal frames so designed to retain the weights securely in its place.

Counter –weight frame will be guided on each guide rail by upper and lower guiding members attached to the frame

A substantial metal counter- guard of required length will be provided at the bottom of the hoist way.

A compensating chain of adequate strength connecting car bottom and counter weight frame will be provided for balancing the car and counter-weight while running with minimum load condition.

15. Guides for Car and Counter- weight.

Car and counter- weight guides will be of rigid steel and will be continuous throughout the entire length and will be provided with adequate steel bracings and stiffeners. Guide for both car and counter weight will meet the requirement of IS: 4666-1980. The necessary lubrication device for guide rail will be provided.

16. Terminal Limit Switches and Final Limit Switches

Terminal limit switches for normal operation will be provided to slow -down and stop the car automatically at terminal landings and final limit switches will be provided to automatically cut off the power and apply the brake, when the car travel beyond the terminal landing.

17. Traction Machine

The design ambient temperature for this equipment will be taken, as 50° C. The motor insulation will be class F or superior. The motor should be S5 duty in case of regenerative or dynamic braking is applied.

Space heater with thermostat will be provided where necessary.

Protective relays will be furnished on the controller to protect against phase reversal, low voltage and phase failure. Overload and other protective relays will also be furnished for traction motor.

18. The elevator after erection will be tested as follows:

a) Test with 100% and 110% of rated load as per IS: 14665 - 2000.

b) A static load test with 125% of rated load as per IS: 14665 – 2000 to check that the brake will sustain the car.

c) All other tests on electrical system as mentioned in IS: 14665 - 2000.

d) Any other test felt necessary by Owner and supplier to ensure proper functioning and installation of the elevator.

e) Demonstration of the functioning of all safety provisions made available in the elevator.

f) The Contractor will arrange for weights, slings, wire ropes, stop watches and other necessary equipment/ instrument to carryout the test.

19. Technical characteristics

S. No	Description	Freight cum Passenger Elevators
1	Capacity	3000 kg
2	Location	Boiler House of each Steam Generator
3	Quantity	2 Nos. (1No. per boiler)
4	Type	Electrically operated
5	Car speed	0.55 m/s for boiler elevator. 1 m/s for ESP building elevator
6	Total Car travel	To be decided by the Contractor
7	No. of landings	12Nos. (Approx) However, exact number of landings to be decided by the Contractor. Final no. of landings will be approved by the purchaser. Following will be covered essentially in the above landings. i) Ground floor ii) All burner operating floors/ Coal feeder floor iii) Any one of the sact blower floors. iv) Boiler Drum/ Tripper floor v) Main operating floor of STG Hall vi) Coal gallery vii) Laboratory Floor viii) Any other landings where access is required.
8	Location of machine room	Directly above the Lift.
9	Power Supply	Power supply will be at 415V AC 3 -Phase, 4wire, 50 Hz from the emergency MCC.
10	Signals	Landing calls registered indicators, UP / DOWN (visual) Digital position indicator in car and at all Floors

S. No	Description	Freight cum Passengar Elevators
11	Car gate & landing gate	Horizontally sliding type doors
12	Elevator	Selective collective automatic control operation
13	Car size (Clear inside)	2000x3000x2300mm Ht.
14	Elevator well size (Clear inside)	2900x3300mm.
15	Hoist way construction	Structural Steel Bldg.
16	Special feature	Car lighting and Fan automatic sleep

20. Additional features

a). Power supply to elevators will be from emergency MCC, which will be fed from the purchaser's N/E switch gear.

b). Elevator will be provided with telephone set and mounting bracket in side the car and necessary communication facilities which will be hooked up with plant telephones.

c). Suitable arrangement will be provided to intimate control room during emergency in the form of audio-visual alarm. Cable supply, laying and termination from Elevator to respective control room will be in the scope of Contractor.

d). Automatic rescue device.

e). Adequate capacity of reputed make Elect. Hoist along with monorail will be provided in the machine room for maintenance of the equipment. Monorail will be provided by BHEL

21. Electrical Details

a). General

The scope of work of the Contractor will include design, manufacture, shop testing, supply, erection, testing and commissioning of all electrical equipment associated with the Elevator. The electrical scope of work will be as follows:

All cables (power , control & signal), motors, brakes, motor control panel (elevator panel)including VVVF control(digital) for AC drives, limit switches, digital indicators, illumination system inside the elevator, flexible cables required for the system, combined luminous buttons with luminous digital hall position indications at all floors, digital car position indicators inside elevator, car, battery operated alarm bell, emergency light, cabin fan, ventilation fan, overload warning indicator inside the car, fireman's switch, rescue device etc. to make the system complete in all respect for efficient operation of the elevator.

415 V +/- 10%/, 50 Hz +/- 5%, 3 phase, 4 wire power supply will be taken from the power supply feeder of the emergency MCC. One no suitably rated isolator will be considered in the elevator machine room. One

no 15 Amp., 24 V socket outlet for hand lamp will be provided on top of car by Contractor. Control supply will be 110V A.C, 50Hz.

The Contractor will indicate the make of all equipment, components used for the electrics of the elevator car.

The equipment offered will be suitable for trouble free and efficient service in the tropical humid climate with an ambient temperature of 50°C and maximum relative humidity of 88%. The maximum temperature of 50°C and maximum humidity of 90%, however, may not occur simultaneously.

The electrical equipment will comply with the latest revision of relevant Indian Standards and wherever such Indian Standard is not available, it will comply with the generally accepted international codes and practices. The equipment will be dust and waterproof.

All Electrical equipment will conform to latest Indian Electricity Rules and regulations and the statutory requirement of Government of India and the Govt. of the State of Tamilnadu as regards to safety requirement, earthing and other essential provisions specified therein.

The materials used and the equipment supplied will be new, reliable and of the class most suitable for the purpose for which they are intended. The equipment design and installation will allow easy access to facilitate inspection, maintenance and repair.

Test certificates of all equipment will be submitted before inspection of the same.

All necessary assistance in getting the equipment inspected by authorities will be given by the Contractor.

b). Design Construction and Performance Requirement

i) Low voltage squirrel cage induction motor

The design and performance of motors will conform to IS: 325 -1978.

c). Electrical Design

i) Motors will be cage induction motor suitable for DOL starting/VVVF control. Motors will be suitable for 415V + 10% -10%, 50HZ + 5% /- 5% supply. Motor will be suitable for frequent start/stop operation.

ii) Rating of the motor selected will be based on the class of duty and the load imposed by the equipment. The accelerating characteristics of the motor will be matched with those of the coupled machine so that smooth acceleration is obtained without over heating the motor.

iii) Motors will be capable of starting and running up with normal load and 85% of rated voltage at its terminals. The pull out torque of the motor will not be less than 275 % of the full load torque.

iv) Motor will be suitable for heavy duty, reversible, frequent starting, elevator service.

vi) The motor KW will be de-rated for 50OC ambient and heating due to VVVF control.

vii) The class of insulation will be 'F'. Under normal running conditions the temperature rise will be limited to class B as measured by resistance method.

Additional requirements for LT VVVF duty Motors:

Sl. No	Parameters	Description
1.	Type	- AC Squirrel cage induction motor. - Inverter Duty
2.	Standard	- IPSS 1-03-001 / IS 325 NEMA Standard MG1-1993 Part 31 or the latest revision in so far as it is applicable.
3.	Constructional Features	
•	Frame size & rating	- As per IS 325 10:1 constant torque speed range motors may exceed frame standard by one frame rating.
•	Motor body	Grey iron casting as per IS:210-1978
•	Motor Feet	Integrally cast with the stator
•	Body Design	- Prevent breakage or other failures due to vibrations normally encountered in heavy industries. - Motors will be of weather proof construction. - Designed to operate in the humid air stream.
•	Protection for Motor & Bearing	IP - 55 (with canopy for motor)
•	Motor Shaft	Shall be provided with an external recessed slinger at the drive end of the motor to provide additional (minimum IP-54) protection from moisture and foreign material.
•	Shaft ends & Extension	Cylindrical as per requirement Shaft will be extended for encoder / tacho. mounting, accordingly suitable hole will be drilled and tapped.
•	Internal Encoder	Motors with speed variation of 1000:1 at constant torque will have internal built in encoder for speed feedback

Sl. No	Parameters	Description
•	Bearing	Roller type bearing upto 5 kW. Ball Bearing at NDE end for above 5 kW All motors will have fully re-greasable, anti-friction bearings. All motors will have cast iron inner bearing caps. Bearings will be oversized. All motors will have a charged lubrication system to inhibit moisture condensation. Standard motors will have extended grease fittings on the opposite drive-end to facilitate re-lubrication. Grease ports will be located on the periphery of the motor end shield. Motor will be fitted with a shaft slinger or V ring seal on the drive end for a minimum of IP-54 protection (to help protection of bearing from ingress of dust, dirt or fluids).
•	Hazardous Area safety design	NA
4.	Terminal box	
•	Location	RHS viewed from DE / On top
•	Suitability	The terminal box will be oversize as compared to NEMA requirements.
•	Rotation	4 x 90 degrees
•	Earthing stud	Inside Terminal Block
•	Miscellaneous	Shall be gasketed between the terminal box halves. The conduit box will be field convertible to cast iron. External screws and bolts will be grade five, hex heads and be plated to resist corrosion.
•		The terminal box will be amply dimensioned to receive FRLS PVC insulated and armoured cables with aluminium conductors.
5.	Cooling	TEFC, Effective bi-directional Motor with 1000:1 speed range and constant torque will have external fan. External fan motor will be 3 phase, 415 V AC. Cooling will be effective in either direction of rotation.

Sl. No	Parameters	Description
6.	Quality of operation	
•	Vibration intensity	Shall be limited as per IS 12075-1986. Shall not exceed .08 inches / second velocity.
•	Noise level	As per IS: 12065-1987
•		Motors will be dynamically balanced with full key in the shaft and the fan.
7.	Electrical design	
•	Power Supply	415 V –- 10%, 3-phase, 50 Hz + 5% & - 5%, 4-wire AC, 50 kA for 1 second, solidly earthed.
•	Speed control	VVVF Drive
•	Service factor	1.0 for VFD power 1.15 for sine wave power
•	Peak transient voltage	1600 V
•	Minimum rise time	0.1 microsecond
•	Starting Torque	200 % rated torque for 1 minute below base speed
•	Constant horsepower operation	1.5 times base speed
•	Duty	S5 / Suitable for operating with Elevator duty motor
•	Max speed permissible	150 % rated
•	Derating for VVVF	As per above mentioned standard
•	Insulation	Class F or better insulation
•	Torque Type	Normal / High / High slip type / Stall Torque type
•	Space Heater	All motors above 30 kW
•	Temperature Rise	By resistance, will be 70 degrees C or less.
•	No. of Poles	4/As per the manufacturer's recommendation
8.	Operating Characteristics	
•	Operation with variation in the voltage or the frequency	Motor will able to start and accelerate with 85% of rated voltage. Motors will operate successfully under running conditions at rated load with variation in the voltage or the frequency not exceeding the following conditions: +/-10% rated voltage at rated constant V/f ratio except for specific torque boost situations. Motors will operate successfully

Sl. No	Parameters	Description
		under running conditions at rated load and V/f ratio when the voltage unbalance at the motor terminals does not exceed one percent.
•	Torques	Motors will meet or exceed the minimum locked rotor (starting) and breakdown torques specified in NEMA Standard MG1 Part 12 for Design B for the rating specified when on sine wave power.
•	Locked rotor (starting) currents	Shall not exceed NEMA Design B values for the specified rating on 5:1 constant torque or less and variable torque motors. NEMA Design A values are allowed for 6:1 constant torque or higher value constant torque rated motors. Motors will be capable of a 20 second stall at six times full load current without injurious heating to motor components.

d). Brakes

- Brakes will be DC electro-magnetic type.
- Brake power supply 220V DC obtained through individual transformer rectifier set.
- Brakes will be of heavy duty type suitable for elevator operation having long mechanical life.
- Brakes will be self-aligning and quick acting type.
- Brakes will be electrically released and spring applied for fail safe operation.
- Brakes will have facility for torque adjustment.
- The coil connection will be brought out to a suitable terminal box.
- The necessary rectifier and brake control panel will be supplied along with the brake.

e). Limit Switches

- Limit switches will be of robust construction capable of withstanding repetitive operations.
- Limit switches will be heavy duty type either lever or rotating cam operated.
- The limit switch contacts will be rated at least for 10A at 110 V AC/5Amps 220VDC.
- The limit switches will be housed in robust metallic oil and dust tight enclosure conforming to IP:65.
- At least 2 NO and 2 NC contacts will be provided for each limit switch.

f). L.T. Motor control panel

1. Basic Design Parameters
   - Power Supply system - 415 V + 10%/-10% 3 phase and neutral 50 HZ + 5%/-5%
   - Neutral effectively earthed.
   - Insulation level - 2.5 kV for 1 minute
   - System short circuit level - 50 kA for 1 second.
2. Constructional Features
   - Floor mounting, free standing with base channel for fixing on the inserts in the floor.
   - Single front, totally enclosed.
   - Enclosure conforming to IP:52 as per IS:2147-1962.
   - Suitable for cable entry from bottom with detachable gland plate
   - Rear access through removable rear cover.
   - Minimum operating height of devices on panel to be 400mm and maximum operating height to be 1800 mm.
   - Clear legible icentification labels will be provided for all compartment panels and control devices.
   - To ensure good earth continuity, all bolted joints will be provided with tooth spring washers.
   - Two separate earthing terminals will be provided for earthing.
   - The motor control panel of the elevator will be provided with base channel of 75 mm (ISMC 75).
   - Painting will be shade no. 631 as per IS:5-1978
   - Pilot devices operable from the front.
   - Components and devices accessible from the front.
   - Protection against accidental contact with live parts while maintaining a compartment and keeping others in services.
   - Compartment door interlocked with main power isolating devices.
   - Bus bar sizes to be selected in accordance with the nominal current rating of incoming load break switch and for full short circuit power.

g). Incomers and Isolators

- The motor control panel will have one incomer switch of AC 23 duty
- The incomers will be provided with voltmeter and ammeters complete with fuse, selector switches and CTs.
- All switches will be double break type.
- All fuses will be HRC fuses and will not be of bolted type in switch fuse units.

h). Contactors

- All contactors will be AC4 duty as applicable with min. 25A rating.
- Shall have at least 2 NO + 2 NC auxiliary contacts with minimum rating of 16A at 110 V AC.
- For reversible drives mechanically interlocked, contactors will be used.
- All coils will be suitable for 110 V, AC with no economy resistor.
- Insulation of coils will be class 'E' or better. will pick up positively at voltage between 85% and 110% of the rated value.

i). Thermal Overload Relay

- Bimetallic Triple Pole, ambient temperature compensated
- Inverse time lag, and reset type.
- Shall conform to IEC - 292-1.
- Shall have built in single-phase protection.
- At least one make and one break auxiliary contacts will be provided.
- Manual reset push button will be located on the compartment door.

j). Auxiliary Relays

- Coil voltage 110V AC
- 4 NO - 2 NC contacts rated for 10A

k). Timers

- Coil voltage 110V AC
- ON/OFF relay as required
- 2 NO - 2 NC contacts

l). Control Transformer

- Control transformer will be double wound dry type conforming to IS: 2026- 1977 with tapping at +/- 2.5% and +/- 5% on the primary side.

m). Switches & Fuses

- Isolating switches will be triple pole/ double pole, air break, heavy duty type (MCCB), capable of safely breaking the full load current of the associated feeder.
- All MCCB will be suitable for rated system fault level.
- Control circuit will be protected by individual control MCB's with min. short ckt. rating 9kA and rating 16A.

n). Cables

- All power cables for fixed wiring inside the premises will be 1100 V grade, Cooper Conductor, FRLS PVC insulated and sheath conforming to IS:1554 (Part1)-1988 armored or unarmored depending on application.
- All flexible cable will be EPR insulated and CSP sheathed or better.

- Control cable will be 1100 V grade, copper conductor PVC insulation and sheath conforming to IS:1554 (Part1)-1988.cable will be armoured or unarmored depending upon application.

o). Earthing

- All structure electrical equipment conduit/ Tray etc. will be effectively grounded in accordance with Indian Electricity rules. Earthing conductors are to be connected with earthing grid of the building. Earthing on the car including interconnection with main grid will be under the Contractor's scope.

p). Wiring

- All wiring will be accessible from the front and will be done by 1.1 KV grade FRLS PVC insulated flexible copper wires.
- Not more than two connections will be done at any one terminal.
- Interlocked type identification ferrules will be provided.
- Auxiliary wiring will be properly marked as per IS:5578 -1984
- 20% spare terminals with a minimum of 6 nos will be provided.
- All power terminals will be stud type. All control terminals will be Elmex type rated at least for 10A and suitable for terminating 2 nos 2.5 sq. mm copper conductors.
- All hoist way and car wiring will be done with armoured cable as per IS: 1554 (Part 1) - 1988 and IS: 5571-1979 and flexible cable as applicable.
- The cables used in the elevator installation will conform to latest revision of IS: 4289-1984.
- A trailing cable, which incorporates conductors for the control circuit, will be separate and distinct from that which incorporates lighting and signaling circuits. All control and signaling cables will have stranded copper conductor of minimum size 1.5-sq mm copper. 20% spare cores will be provided in each control/ signaling cable.

q). VVVF Drive

1. Basic Design Particulars
   - Rating as per class IV of IEC 146 viz., 100% continuous, 125% for two hours, 200% for 10 seconds
   - The protection class will be class I as per IEEE- 444 - Direct voltage capability
   - Shall be able to maintain rated DC bus voltage at rated DC current at 94% rated AC voltage.
   - The converter will safely perform inverter duty at 90% rated voltage and rated DC voltage
2. VVVF assembly

The drive will be Thyristor/Transistor/IGBT based Three phase out put supply as per requirement. The Inverter will be suitably rated to take the load of total system for a duration of app. 10 minutes.

The Inverter will be designed as per relevant IS & IEC standard.

r). Battery, Battery Charger

1. Battery unit.

Battery unit will be maintenance free Nickel Cadmium type. The capacity of the battery will be selected based on minimum site ambient temperature and will be suitable to supply for short time rating of approx. 10 minutes to automatic rescue device control circuit, a arm bell & emergency lighting. The capacity of battery will be supported with battery calculation.

2. Battery Charger

The charger will have 3 phase full wave controlled rectifier bridge with their protective device. Input voltage will be 415 V + 10% & – 10%, 50 Hz. +5% & –5%. Charger will be suitable for float charge and boost charging.

13.2 Painting

The exposed surface of all items of equipment will be thoroughly cleaned and painted as indicated below:

i) One primer coat of 30-40 microns (Dry film thickness- DFT) of PVC co-polymer- alkyd resin with red oxide/zinc chromate.

ii) For corrosive atmosphere, all exposed surfaces will be coated with two primer coats of epoxy zinc based on zinc duct.

iii) An intermediate coat of PVC co-polymer alkyd resin of 70-80 micron (DFT) will be applied after re touching of damaged part of paint surface during erection.

iv) The intermediate coat will be of PVC co-polymer alkyd resin with micaceous iron oxide (MIO) for installation in corrosive atmosphere.

v) A final coat of paint of 40-50 micron (DFT) PVC co-polymer alkyd with weather resistant pigment of approved colour and glossy finish will be applied

vi) Interior of all gear housing will be painted with oil resistant paints.

vii) All parts inaccessible after assembly will be painted with and assembled while paint is still wet.

viii) Parts exposed to atmosphere beyond 800 C will be painted with zinc ethyl silicate primer followed by a coat of high build epoxy polyamide enamel.

13.3 Quality System, Inspection & Testing

13.3.1 General

1. Inspection & testing of plant & equipment will be carried out by Purchaser/Consultant at the works of Contractor /Sub-Contractor during

manufacturing and on final product to ensure conformity of the same with the acceptable criteria of technical specifications, approved drawings, authenticated manufacturing drawings and reference national / international standards

2. This specification is in addition to provisions laid-down in Purchaser's General Condition (GCC) of the Contract.

13.3.2 Quality System Requirements

Contractor must recognize the importance of quality and follow defined quality programme in all manufacturing and quality control activities of the product. Contractor must define and implement the tasks and controls the will provide needed assurance in case manufacturing of product is sub-contracted either partly or fully and/or for the procured components of the product.

Purchaser / Consultant reserves the right to verify the quality programme and entire product characteristics to assure the intended and specified quality of the product.

13.3.3 Quality Assurance Plan (QAP)

Contractor will furnish Quality Assurance Plan (QAP) for respective equipment for Purchaser/Consultant's approval at least two months prior to start of manufacturing.

13.3.4 Test Certificates and Documents

For each of the items being manufactured, relevant test certificates and documents, as applicable for each of the equipment, in requisite copies including original will be submitted to Inspection Agency. All test certificates must be endorsed by the manufacturer and Contractor with linkage to project, purchase order and acceptance criteria.

13.3.5 Inspection of assemblies or their sub-assemblies

- Winding unit consisting of motor, gear, traction sheaves, brake mounted on complete base plate, no load test run, part load and full load at Contractor's works.
- Car body and doors.
- Governor and guide rails.
- Deflector pulleys, counter weight and its frame.

13.4 Performance Parameters

The Contractor will ensure the following performance.

- Rated capacity of the elevator
- Speed of the elevator
- Accurate positioning of the elevator

13.5 Documentation

1. Information to be furnished by the Contractor during detailed engineering:

   The Contractor will submit adequate sets of following technical drawings & technical data/ information during detailed engineering for elevator.

   a) General Arrangement of the Elevator incicating load data, details of various openings in machine room floor as well as elevator well shaft, buffers etc.
   b) Filled in questionnaire.
   c) List of tools & tackles.

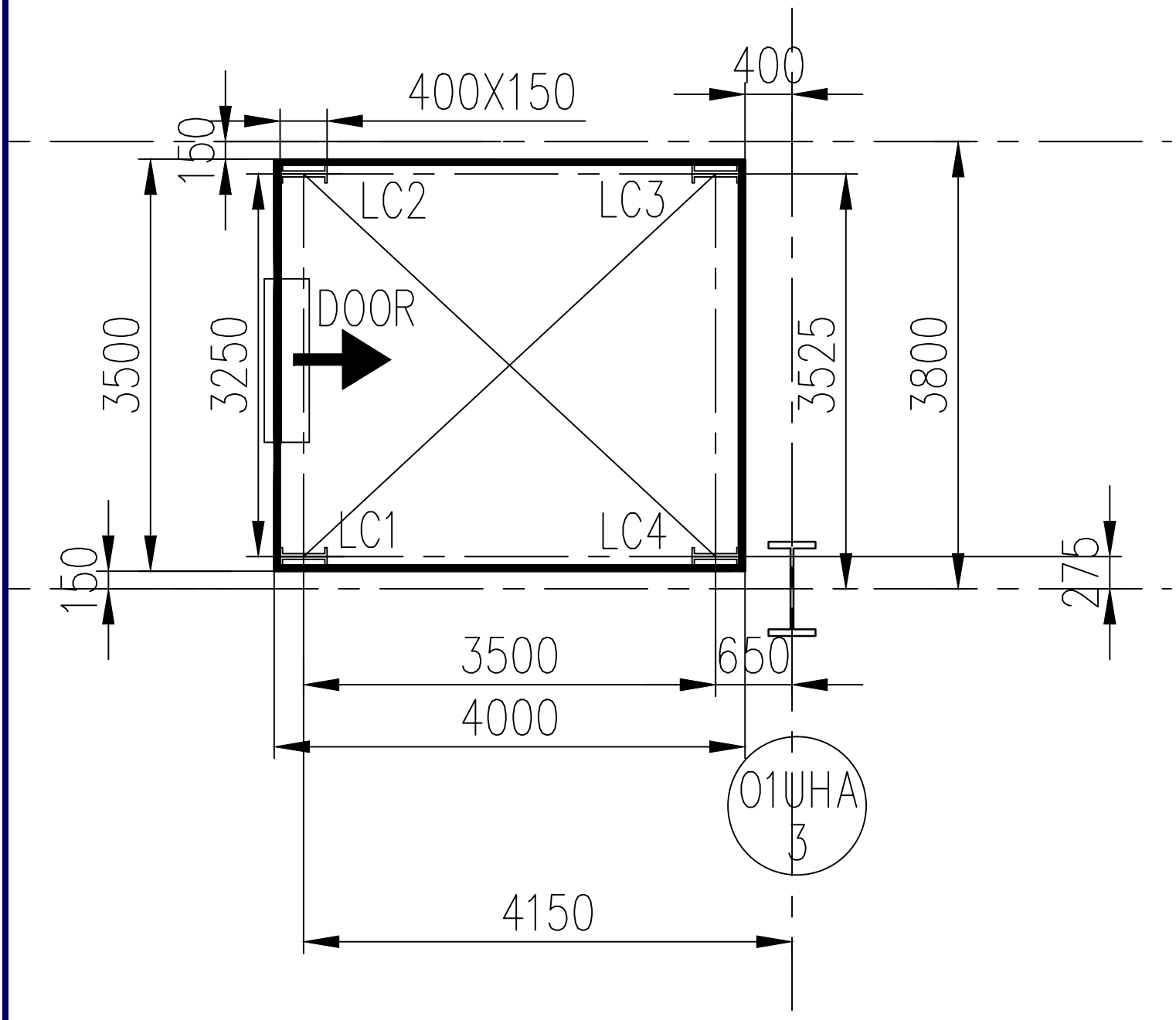
2. List of drawings/ documents to be furnished by the Contractor for approval

   a) General arrangement drawing of elevator showing full details in plan and sections.
   b) Quality Assurance Plan for inspection.
   c) Test and inspection certificate.
   d) List of tools & tackles.

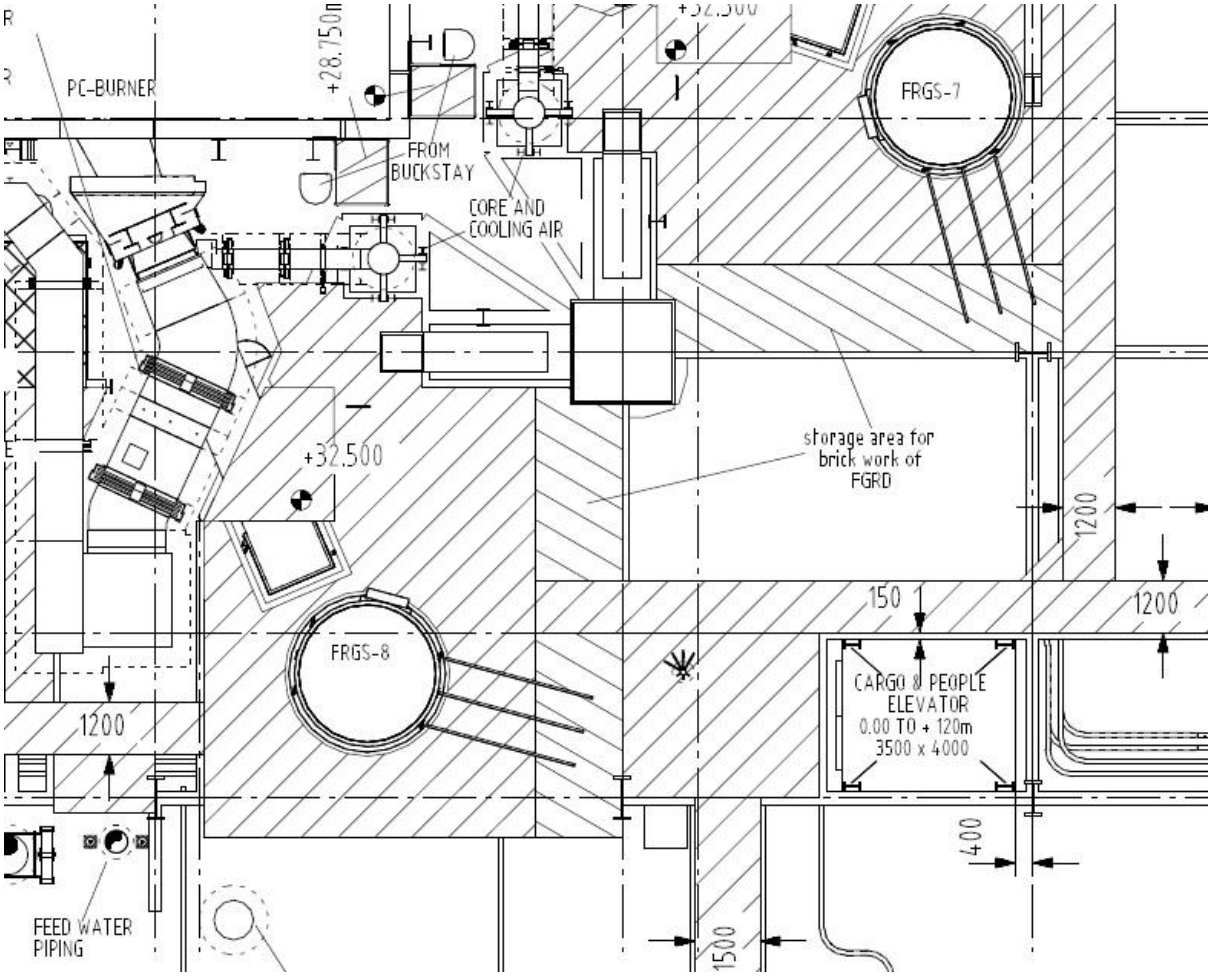
3. List of drawings/documents to be submitted along with equipment by the Contractor

   a) GA drawings, complete assembly and sub assembly drawings of the equipment.
   b) Drawings of all equipment/component received from sub supplier.
   c) Motor data sheets/ characteristics
   d) Electrical schematic diagrams
   e) Test and warranty certificate for each item of equipment.
   f) Test reports and inspection reports.
   g) Instruction manuals for testing and commissioning.
   h) Operation, maintenance and safety manuals.
   i) Requirement of special tools and tackles, if any, for subsequent maintenance.

ELEVATOR - MACHINE ROOM

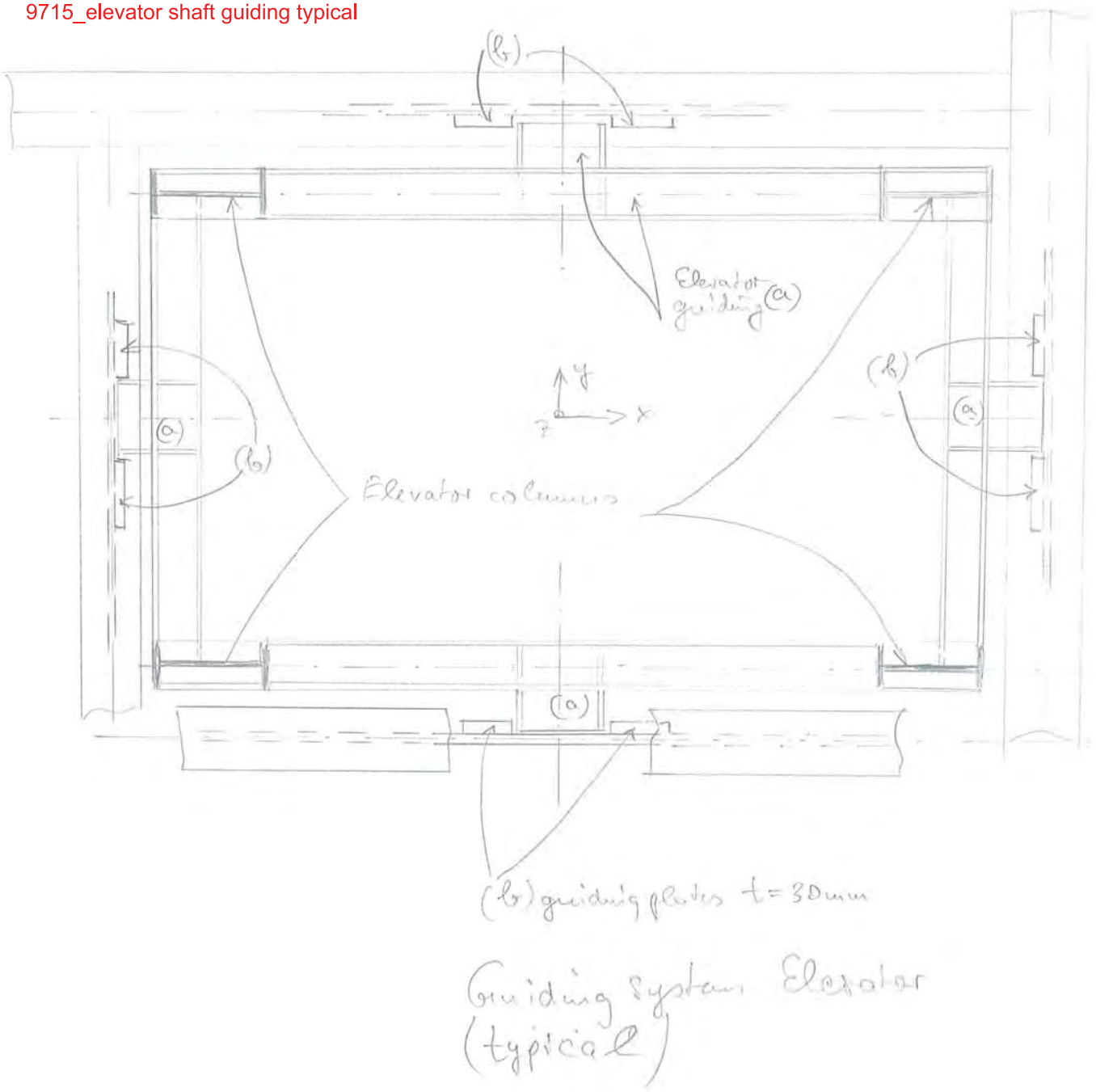


BOILER PLAN ARRANGEMENT



ANNEXURE -B (M/s ALSTOM DATA)

9715_elevator shaft guiding typical

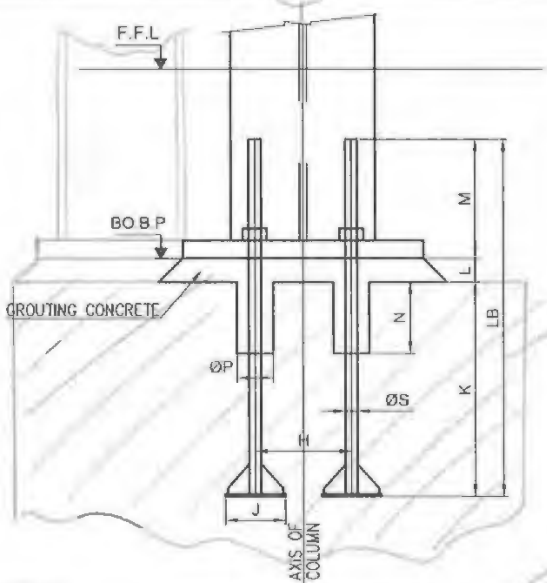


Guiding System Elevator (typical)

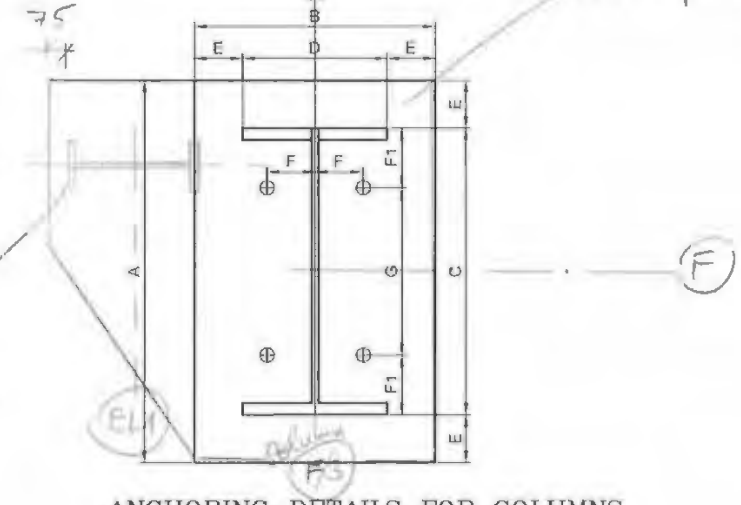
DRAWING NO: 0-00-281-27286

9715_elevator shaft guiding typical

PROPOSAL
FOUNDATION - Special type



foundation Bolts



base plate for boilerhouse column F/3 and elevator column EL1

F

COLUMN ELEVATOR

EL1

F/3

ANCHORING DETAILS FOR COLUMNS

COLUMN DETAILS	A	B	C	D	E	F	F1	G	H	ØP	ØS	LB	M	L	K	J	N	BO.B.P.	COLUMN AXIS	COLUMN ORIENTATION
F/12, F/10, F/9, F/6 F/5, F/3, P/9, P/6	1200	1000	1000	800	100	200	200	600	400	127	40	1500	270	50	1180	354	300	-0.150	PARALLEL TO LONG. AXIS OF BOILER	
H/12, H/3, K/12, K/3 M/12, M/3, O/12, O/3	1200	1000	1000	800	100	200	200	600	400	127	40	1500	270	50	1180	354	300	-0.150	PARALLEL TO TRANS. AXIS OF BOILER	
G/13, G/2, H/13, H/2																			PARALLEL	

- Checker plate area loading — f ≤ L/200, max f = 6mm

Hoistbeams:

Max vertical deformation:

- Manually operated cranes and monorails: f ≤ L/500
- Electric overhead crane up to 50t capacity f ≤ L/750

Max horizontal deformation:

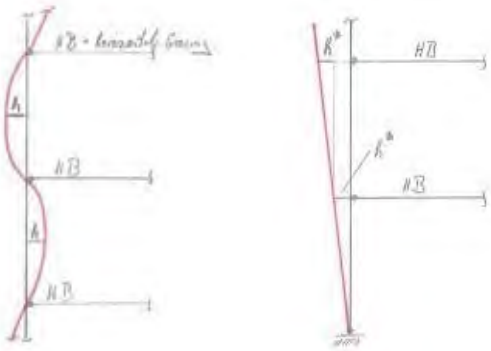
- Crane gantry girder due to surge — h ≤ L/2000, max h = 15mm
- Main columns at crane rail due to action of crane surge load only — h ≤ H/2500, max h = 10mm
- Open gantry columns at crane rail level due to action of crane surge load only — h ≤ H/4000, max h = 10mm

Elevator:

Max deflection values are given by BHEL (see MOM of the 06.02.2014). Any deviations or additional requirements must be clarified with BHEL.

Max horizontal deformation:

- Deflection requirements for elevator travel — $h \leq (H_{2,HB}-H_{1,HB})/500$ (2mm/m), max h = 15mm
- Inclination requirement for elevator travel — h* ≤ H/500mm, h* ≤ +/- 30mm (between two horizontal bracing systems)



ALSTOM will provide a table with the deflections of each basic point for all levels. This document has to be checked by the fabricator for the requirements of serviceability.

Deflection value table will be only provided in case of detailed fabricator request in case given values are not possible which would have to be explained.

Form No. 168170E - 04.08 1.48760 A4 Hoch (01.14) - ALSTOM

Lasttabelle / Loadtable

Auftrag / Order: **Neyveli** | Phase / Scope: **BE** | Abteilung / department: E-CSA | ABD Dokument-Nr: **148760_21050_7003**

ALSTOM Boiler Deutschland (Stuttgart) | Index / rev.: 1 | customer Doc- no.1 :

Baugruppe / assemblygr. / WBS: | System: elevator | Datum / Date: 01.08.2014 | customer Doc- no. 2 :

no. of system: 9715 | Bearbeiter: arranger dep: SDT/TSO

Kontrolle | Zurücksetzen

lfd.-Nr load-No.: area-No.:	Ind. Rev.: of point + table	Last load - typ LP LL AL ML	Lastart load - kind a stand b hang	KKS-Nummer / KKS-no. LP-no. Department	Koordinaten Lastpunkt coordinate of loadpoint position 1 X (mm)	Y (mm)	position 2 (LL ; AL; ML) X (mm)	Y (mm)	OK belasteter Stahlbau TOS steelbeam Z (mm)	Lasteinleitungshöhe H-Last ges. Lastpunkt level H-forces of loadpoint Z c (mm)	Lastfall Loadcase	Kräfte charakteristisch Forces without safety factor x LP ML [kN] LL [kN/m²] AL [kN/m²]	y LP ML [kN] LL [kN/m²] AL [kN/m²]	z LP ML [kN] LL [kN/m] AL [kN/m²]	free load allowed	Lagerungstyp type of bearing Typ	Lastpunkt-Verschiebung in Richtg./ LP-Displacement in direction dx (mm)	dy (mm)	dz (mm)	zugehöriger Lastplan (Nr.) / support-book-nr. Erfordert. Stahlträger-Flanschbreite H-Last am Unterflansch, sonst, Bemerkung associate loaddrawing (no.) / support-book-no. necessary breadth of steel-flange H-force at bottom-flange, other comment	building	d = delete	zugehörige Bühne / BG assembly group	free	free	free	area line [m] [m²]	Lastsumme in "kN" (LL & AL) sum of load in "kN" x [kN]	y [kN]	z [kN]	Kontrollbemerkung commen of control
9715104001	0	LP	a	H-guiding Y-direction	19800	-23600			11518	11518	351	0	6	0						1		104				0	0	6	0	
9715104001	0	LP	a	H-guiding Y-direction	19800	-23600			11518	11518	352	0	-6	0						1		104				0	0	-6	0	
9715104001	0	LP	a	H-guiding Y-direction	19800	-23600			11518	11518	431	0	76	0						1		104				0	0	76	0	
9715104001	0	LP	a	H-guiding Y-direction	19800	-23600			11518	11518	441	0	-76	0						1		104				0	0	-76	0	
9715104001	1	LP	a	H-guiding Y-direction	19800	-23600			11518	11518	613	0	13	0						1		104				0	0	13	0	
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9715104002	0	LP	a	H-guiding X-direction	22300	-25500			11518	11518	351	6	0	0						1		104				0	6	0	0	
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9715113031	0	LP	a	H-guiding X-direction	22300	-21700			45468	45468	351	2	0	0							1		113				0	2	0	0	
9715113031	0	LP	a	H-guiding X-direction	22300	-21700			45468	45468	352	-2	0	0							1		113				0	-2	0	0	
9715113032	0	LP	a	H-guiding Y-direction	24700	-23600			45468	45468	351	0	2	0							1		113				0	0	2	0	
9715113032	0	LP	a	H-guiding Y-direction	24700	-23600			45468	45468	352	0	-2	0							1		113				0	0	-2	0	
9715114033	0	LP	a	H-guiding Y-direction	19800	-23600			49668	49668	351	0	7	0							1		114				0	0	7	0	
9715114033	0	LP	a	H-guiding Y-direction	19800	-23600			49668	49668	352	0	-7	0							1		114				0	0	-7	0	
9715114033	0	LP	a	H-guiding Y-direction	19800	-23600			49668	49668	431	0	108	0							1		114				0	0	108	0	
9715114033	0	LP	a	H-guiding Y-direction	19800	-23600			49668	49668	441	0	-108	0							1		114				0	0	-108	0	
9715114033	1	LP	a	H-guiding Y-direction	19800	-23600			49668	49668	613	0	13	0							1		114				0	0	13	0	
9715114033	1	LP	a	H-guiding Y-direction	19800	-23600			49668	49668	614	0	-13	0							1		114				0	0	-13	0	
9715114034	0	LP	a	H-guiding X-direction	22300	-25500			49668	49668	351	7	0	0							1		114				0	7	0	0	
9715114034	0	LP	a	H-guiding X-direction	22300	-25500			49668	49668	352	-7	0	0							1		114				0	-7	0	0	
9715114034	0	LP	a	H-guiding X-direction	22300	-25500			49668	49668	411	95	0	0							1		114				0	95	0	0	
9715114034	0	LP	a	H-guiding X-direction	22300	-25500			49668	49668	421	-95	0	0							1		114				0	-95	0	0	
9715114034	1	LP	a	H-guiding X-direction	22300	-25500			49668	49668	611	13	0	0							1		114				0	13	0	0	
9715114034	1	LP	a	H-guiding X-direction	22300	-25500			49668	49668	612	-13	0	0							1		114				0	-13	0	0	
9715114035	0	LP	a	H-guiding X-direction	22300	-21700			49668	49668	351	7	0	0							1		114				0	7	0	0	
9715114035	0	LP	a	H-guiding X-direction	22300	-21700			49668	49668	352	-7	0	0							1		114				0	-7	0	0	
9715114035	0	LP	a	H-guiding X-direction	22300	-21700			49668	49668	411	95	0	0							1		114				0	95	0	0	
9715114035	0	LP	a	H-guiding X-direction	22300	-21700			49668	49668	421	-95	0	0							1		114				0	-95	0	0	

9715114035	1	LP	a	H-guiding X-direction	22300	-21700			49668	49668	611	13	0	0							1		114			0	13	0	0	
9715114035	1	LP	a	H-guiding X-direction	22300	-21700			49668	49668	612	-13	0	0							1		114			0	-13	0	0	
9715114036	0	LP	a	H-guiding Y-direction	24700	-23600			49668	49668	351	0	7	0							1		114			0	0	7	0	
9715114036	0	LP	a	H-guiding Y-direction	24700	-23600			49668	49668	352	0	-7	0							1		114			0	0	-7	0	
9715114036	0	LP	a	H-guiding Y-direction	24700	-23600			49668	49668	431	0	108	0							1		114			0	0	108	0	
9715114036	0	LP	a	H-guiding Y-direction	24700	-23600			49668	49668	441	0	-108	0							1		114			0	0	-108	0	
9715114036	1	LP	a	H-guiding Y-direction	24700	-23600			49668	49668	613	0	13	0							1		114			0	0	13	0	
9715114036	1	LP	a	H-guiding Y-direction	24700	-23600			49668	49668	614	0	-13	0							1		114			0	0	-13	0	
9715115037	0	LP	a	H-guiding Y-direction	19800	-23600			56493	56493	351	0	3	0							1		115			0	0	3	0	
9715115037	0	LP	a	H-guiding Y-direction	19800	-23600			56493	56493	352	0	-3	0							1		115			0	0	-3	0	
9715115038	0	LP	a	H-guiding X-direction	22300	-25500			56493	56493	351	3	0	0							1		115			0	3	0	0	
9715115038	0	LP	a	H-guiding X-direction	22300	-25500			56493	56493	352	-3	0	0							1		115			0	-3	0	0	
9715115039	0	LP	a	H-guiding X-direction	22300	-21700			56493	56493	351	3	0	0							1		115			0	3	0	0	
9715115039	0	LP	a	H-guiding X-direction	22300	-21700			56493	56493	352	-3	0	0							1		115			0	-3	0	0	
9715115040	0	LP	a	H-guiding Y-direction	24700	-23600			56493	56493	351	0	3	0							1		115			0	0	3	0	
9715115040	0	LP	a	H-guiding Y-direction	24700	-23600			56493	56493	352	0	-3	0							1		115			0	0	-3	0	
9715116041	0	LP	a	H-guiding Y-direction	19800	-23600			59468	59468	351	0	2	0							1		116			0	0	2	0	
9715116041	0	LP	a	H-guiding Y-direction	19800	-23600			59468	59468	352	0	-2	0							1		116			0	0	-2	0	
9715116042	0	LP	a	H-guiding X-direction	22300	-25500			59468	59468	351	2	0	0							1		116			0	2	0	0	
9715116042	0	LP	a	H-guiding X-direction	22300	-25500			59468	59468	352	-2	0	0							1		116			0	-2	0	0	
9715116043	0	LP	a	H-guiding X-direction	22300	-21700			59468	59468	351	2	0	0							1		116			0	2	0	0	
9715116043	0	LP	a	H-guiding X-direction	22300	-21700			59468	59468	352	-2	0	0							1		116			0	-2	0	0	
9715116044	0	LP	a	H-guiding Y-direction	24700	-23600			59468	59468	351	0	2	0							1		116			0	0	2	0	
9715116044	0	LP	a	H-guiding Y-direction	24700	-23600			59468	59468	352	0	-2	0							1		116			0	0	-2	0	
9715117045	0	LP	a	H-guiding Y-direction	19800	-23600			64543	64543	351	0	3	0							1		117			0	0	3	0	
9715117045	0	LP	a	H-guiding Y-direction	19800	-23600			64543	64543	352	0	-3	0							1		117			0	0	-3	0	
9715117045	0	LP	a	H-guiding Y-direction	19800	-23600			64543	64543	431	0	37	0							1		117			0	0	37	0	
9715117045	0	LP	a	H-guiding Y-direction	19800	-23600			64543	64543	441	0	-37	0							1		117			0	0	-37	0	
9715117045	1	LP	a	H-guiding Y-direction	19800	-23600			64543	64543	613	0	13	0							1		117			0	0	13	0	
9715117045	1	LP	a	H-guiding Y-direction	19800	-23600			64543	64543	614	0	-13	0							1		117			0	0	-13	0	
9715117046	0	LP	a	H-guiding X-direction	22300	-25500			64543	64543	351	3	0	0							1		117			0	3	0	0	
9715117046	0	LP	a	H-guiding X-direction	22300	-25500			64543	64543	352	-3	0	0							1		117			0	-3	0	0	
9715117046	0	LP	a	H-guiding X-direction	22300	-25500			64543	64543	411	33	0	0							1		117			0	33	0	0	
9715117046	0	LP	a	H-guiding X-direction	22300	-25500			64543	64543	421	-33	0	0							1		117			0	-33	0	0	
9715117046	1	LP	a	H-guiding X-direction	22300	-25500			64543	64543	611	13	0	0							1		117			0	13	0	0	
9715117046	1	LP	a	H-guiding X-direction	22300	-25500			64543	64543	612	-13	0	0							1		117			0	-13	0	0	
9715117047	0	LP	a	H-guiding X-direction	22300	-21700			64543	64543	351	3	0	0							1		117			0	3	0	0	
9715117047	0	LP	a	H-guiding X-direction	22300	-21700			64543	64543	352	-3	0	0							1		117			0	-3	0	0	
9715117047	0	LP	a	H-guiding X-direction	22300	-21700			64543	64543	411	33	0	0							1		117			0	33	0	0	
9715117047	0	LP	a	H-guiding X-direction	22300	-21700			64543	64543	421	-33	0	0							1		117			0	-33	0	0	
9715117047	1	LP	a	H-guiding X-direction	22300	-21700			64543	64543	611	13	0	0							1		117			0	13	0	0	
9715117047	1	LP	a	H-guiding X-direction	22300	-21700			64543	64543	612	-13	0	0							1		117			0	-13	0	0	
9715117048	0	LP	a	H-guiding Y-direction	24700	-23600			64543	64543	351	0	3	0							1		117			0	0	3	0	
9715117048	0	LP	a	H-guiding Y-direction	24700	-23600			64543	64543	352	0	-3	0							1		117			0	0	-3	0	
9715117048	0	LP	a	H-guiding Y-direction	24700	-23600			64543	64543	431	0	37	0							1		117			0	0	37	0	
9715117048	0	LP	a	H-guiding Y-direction	24700	-23600			64543	64543	441	0	-37	0							1		117			0	0	-37	0	
9715117048	1	LP	a	H-guiding Y-direction	24700	-23600			64543	64543	613	0	13	0							1		117			0	0	13	0	
9715117048	1	LP	a	H-guiding Y-direction	24700	-23600			64543	64543	614	0	-13	0							1		117			0	0	-13	0	
9715118049	0	LP	a	H-guiding Y-direction	19800	-23600			67693	67693	351	0	4	0							1		118			0	0	4	0	
9715118049	0	LP	a	H-guiding Y-direction	19800	-23600			67693	67693	352	0	-4	0							1		118			0	0	-4	0	
9715118049	0	LP	a	H-guiding Y-direction	19800	-23600			67693	67693	431	0	62	0							1		118			0	0	62	0	
9715118049	0	LP	a	H-guiding Y-direction	19800	-23600			67693	67693	441	0	-62	0							1		118			0	0	-62	0	
9715118049	1	LP	a	H-guiding Y-direction	19800	-23600			67693	67693	613	0	13	0							1		118			0	0	13	0	
9715118049	1	LP	a	H-guiding Y-direction	19800	-23600			67693	67693	614	0	-13	0							1		118			0	0	-13	0	
9715118050	0	LP	a	H-guiding X-direction	22300	-25500			67693	67693	351	4	0	0							1		118			0	4	0	0	
9715118050	0	LP	a	H-guiding X-direction	22300	-25500			67693	67693	352	-4	0	0							1		118			0	-4	0	0	
9715118050	0	LP	a	H-guiding X-direction	22300	-25500			67693	67693	411	55	0	0							1		118			0	55	0	0	
9715118050	0	LP	a	H-guiding X-direction	22300	-25500			67693	67693	421	-55	0	0							1		118			0	-55	0	0	
9715118050	1	LP	a	H-guiding X-direction	22300	-25500			67693	67693	611	13	0	0							1		118			0	13	0	0	
9715118050	1	LP	a	H-guiding X-direction	22300	-25500			67693	67693	612	-13	0	0							1		118			0	-13	0	0	
9715118051	0	LP	a	H-guiding X-direction	22300	-21700			67693	67693	351	4	0	0							1		118			0	4	0	0	
9715118051	0	LP	a	H-guiding X-direction	22300	-21700			67693	67693	352	-4	0	0							1		118			0	-4	0	0	
9715118051	0	LP	a	H-guiding X-direction	22300	-21700			67693	67693	411	55	0	0							1		118			0	55	0	0	
9715118051	0	LP	a	H-guiding X-direction	22300	-21700			67693	67693	421	-55	0	0							1		118			0	-55	0	0	
9715118051	1	LP	a	H-guiding X-direction	22300	-21700			67693	67693	611	13	0	0							1		118			0	13	0	0	
9715118051	1	LP	a	H-guiding X-direction	22300	-21700			67693	67693	612	-13	0	0							1		118			0	-13	0	0	
9715118052	0	LP	a	H-guiding Y-direction	24700	-23600			67693	67693	351	0	4	0							1		118			0	0	4	0	
9715118052	0	LP	a	H-guiding Y-direction	24700	-23600			67693	67693	352	0	-4	0							1		118			0	0	-4	0	
9715118052	0	LP	a	H-guiding Y-direction	24700	-23600			67693	67693	431	0	62	0							1		118			0	0	62	0	
9715118052	0	LP	a	H-guiding Y-direction	24700	-23600			67693	67693	441	0	-62	0							1		118			0	0	-62	0	
9715118052	1	LP	a	H-guiding Y-direction	24700	-23600			67693	67693	613	0	13	0							1		118			0	0	13	0	
9715118052	1	LP	a	H-guiding Y-direction	24700	-23600			67693	67693	614	0	-13	0							1		118			0	0	-13	0	

9715120053	0	LP	a	H-guiding Y-direction	19800	-23600			74518	74518	351	0	3	0							1		120			0	0	3	0	
9715120053	0	LP	a	H-guiding Y-direction	19800	-23600			74518	74518	352	0	-3	0							1		120			0	0	-3	0	
9715120054	0	LP	a	H-guiding X-direction	22300	-25500			74518	74518	351	3	0	0							1		120			0	3	0	0	
9715120054	0	LP	a	H-guiding X-direction	22300	-25500			74518	74518	352	-3	0	0							1		120			0	-3	0	0	
9715120055	0	LP	a	H-guiding X-direction	22300	-21700			74518	74518	351	3	0	0							1		120			0	3	0	0	
9715120055	0	LP	a	H-guiding X-direction	22300	-21700			74518	74518	352	-3	0	0							1		120			0	-3	0	0	
9715120056	0	LP	a	H-guiding Y-direction	24700	-23600			74518	74518	351	0	3	0							1		120			0	0	3	0	
9715120056	0	LP	a	H-guiding Y-direction	24700	-23600			74518	74518	352	0	-3	0							1		120			0	0	-3	0	
9715121057	0	LP	a	H-guiding Y-direction	19800	-23600			78368	78368	351	0	2	0							1		121			0	0	2	0	
9715121057	0	LP	a	H-guiding Y-direction	19800	-23600			78368	78368	352	0	-2	0							1		121			0	0	-2	0	
9715121057	0	LP	a	H-guiding Y-direction	19800	-23600			78368	78368	431	0	72	0							1		121			0	0	72	0	
9715121057	0	LP	a	H-guiding Y-direction	19800	-23600			78368	78368	441	0	-72	0							1		121			0	0	-72	0	
9715121057	1	LP	a	H-guiding Y-direction	19800	-23600			78368	78368	613	0	13	0							1		121			0	0	13	0	
9715121057	1	LP	a	H-guiding Y-direction	19800	-23600			78368	78368	614	0	-13	0							1		121			0	0	-13	0	
9715121058	0	LP	a	H-guiding X-direction	22300	-25500			78368	78368	351	2	0	0							1		121			0	2	0	0	
9715121058	0	LP	a	H-guiding X-direction	22300	-25500			78368	78368	352	-2	0	0							1		121			0	-2	0	0	
9715121058	0	LP	a	H-guiding X-direction	22300	-25500			78368	78368	411	32	0	0							1		121			0	32	0	0	
9715121058	0	LP	a	H-guiding X-direction	22300	-25500			78368	78368	421	-32	0	0							1		121			0	-32	0	0	
9715121058	1	LP	a	H-guiding X-direction	22300	-25500			78368	78368	611	13	0	0							1		121			0	13	0	0	
9715121058	1	LP	a	H-guiding X-direction	22300	-25500			78368	78368	612	-13	0	0							1		121			0	-13	0	0	
9715121059	0	LP	a	H-guiding X-direction	22300	-21700			78368	78368	351	2	0	0							1		121			0	2	0	0	
9715121059	0	LP	a	H-guiding X-direction	22300	-21700			78368	78368	352	-2	0	0							1		121			0	-2	0	0	
9715121059	0	LP	a	H-guiding X-direction	22300	-21700			78368	78368	411	32	0	0							1		121			0	32	0	0	
9715121059	0	LP	a	H-guiding X-direction	22300	-21700			78368	78368	421	-32	0	0							1		121			0	-32	0	0	
9715121059	1	LP	a	H-guiding X-direction	22300	-21700			78368	78368	611	13	0	0							1		121			0	13	0	0	
9715121059	1	LP	a	H-guiding X-direction	22300	-21700			78368	78368	612	-13	0	0							1		121			0	-13	0	0	
9715121060	0	LP	a	H-guiding Y-direction	24700	-23600			78368	78368	351	0	2	0							1		121			0	0	2	0	
9715121060	0	LP	a	H-guiding Y-direction	24700	-23600			78368	78368	352	0	-2	0							1		121			0	0	-2	0	
9715121060	0	LP	a	H-guiding Y-direction	24700	-23600			78368	78368	431	0	72	0							1		121			0	0	72	0	
9715121060	0	LP	a	H-guiding Y-direction	24700	-23600			78368	78368	441	0	-72	0							1		121			0	0	-72	0	
9715121060	1	LP	a	H-guiding Y-direction	24700	-23600			78368	78368	613	0	13	0							1		121			0	0	13	0	
9715121060	1	LP	a	H-guiding Y-direction	24700	-23600			78368	78368	614	0	-13	0							1		121			0	0	-13	0	
9715705061	0	LP	a	H-guiding Y-direction	19800	-23600			81343	81343	351	0	3	0							7		205			0	0	3	0	
9715705061	0	LP	a	H-guiding Y-direction	19800	-23600			81343	81343	352	0	-3	0							7		205			0	0	-3	0	
9715705061	0	LP	a	H-guiding Y-direction	19800	-23600			81343	81343	431	0	38	0							7		205			0	0	38	0	
9715705061	0	LP	a	H-guiding Y-direction	19800	-23600			81343	81343	441	0	-38	0							7		205			0	0	-38	0	
9715705061	1	LP	a	H-guiding Y-direction	19800	-23600			81343	81343	613	0	13	0							7		205			0	0	13	0	
9715705061	1	LP	a	H-guiding Y-direction	19800	-23600			81343	81343	614	0	-13	0							7		205			0	0	-13	0	
9715705062	0	LP	a	H-guiding X-direction	22300	-25500			81343	81343	351	3	0	0							7		205			0	3	0	0	
9715705062	0	LP	a	H-guiding X-direction	22300	-25500			81343	81343	352	-3	0	0							7		205			0	-3	0	0	
9715705062	0	LP	a	H-guiding X-direction	22300	-25500			81343	81343	411	34	0	0							7		205			0	34	0	0	
9715705062	0	LP	a	H-guiding X-direction	22300	-25500			81343	81343	421	-34	0	0							7		205			0	-34	0	0	
9715705062	1	LP	a	H-guiding X-direction	22300	-25500			81343	81343	611	13	0	0							7		205			0	13	0	0	
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9715705063	0	LP	a	H-guiding X-direction	22300	-21700			81343	81343	351	3	0	0							7		205			0	3	0	0	
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9715705063	0	LP	a	H-guiding X-direction	22300	-21700			81343	81343	411	34	0	0							7		205			0	34	0	0	
9715705063	0	LP	a	H-guiding X-direction	22300	-21700			81343	81343	421	-34	0	0							7		205			0	-34	0	0	
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9715706065	1	LP	a	H-guiding Y-direction	19800	-23600			86768	86768	613	0	13	0							7		206			0	0	13	0	
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9715708073	1	LP	a	H-guiding Y-direction	19800	-23600			96218	96218	613	0	13	0						7		208				0	0	13	0	
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9715708076	1	LP	a	H-guiding Y-direction	24700	-23600			96218	96218	613	0	13	0						7		208				0	0	13	0	
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9715709080	0	LP	a	H-guiding Y-direction	24700	-23600			99193	99193	431	0	30	0							7		209				0	0	30	0	
9715709080	0	LP	a	H-guiding Y-direction	24700	-23600			99193	99193	441	0	-30	0							7		209				0	0	-30	0	
9715709080	1	LP	a	H-guiding Y-direction	24700	-23600			99193	99193	613	0	16	0							7		209				0	0	16	0	
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9715710081	0	LP	a	H-guiding Y-direction	19800	-23600			101993	101993	351	0	2	0							7		210				0	0	2	0	
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9715710081	1	LP	a	H-guiding Y-direction	19800	-23600			101993	101993	613	0	16	0							7		210				0	0	16	0	
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9715710082	0	LP	a	H-guiding X-direction	22300	-25500			101993	101993	351	2	0	0							7		210				0	2	0	0	
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9715710082	0	LP	a	H-guiding X-direction	22300	-25500			101993	101993	411	26	0	0							7		210				0	26	0	0	
9715710082	0	LP	a	H-guiding X-direction	22300	-25500			101993	101993	421	-26	0	0							7		210				0	-26	0	0	
9715710082	1	LP	a	H-guiding X-direction	22300	-25500			101993	101993	611	16	0	0							7		210				0	16	0	0	
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9715710083	1	LP	a	H-guiding X-direction	22300	-21700			101993	101993	611	16	0	0							7		210				0	16	0	0	
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9715710084	0	LP	a	H-guiding Y-direction	24700	-23600			101993	101993	351	0	2	0							7		210				0	0	2	0	
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9715710084	0	LP	a	H-guiding Y-direction	24700	-23600			101993	101993	441	0	-30	0							7		210				0	0	-30	0	
9715710084	1	LP	a	H-guiding Y-direction	24700	-23600			101993	101993	613	0	16	0							7		210				0	0	16	0	
9715710084	1	LP	a	H-guiding Y-direction	24700	-23600			101993	101993	614	0	-16	0							7		210				0	0	-16	0	
9715711085	0	LP	a	H-guiding Y-direction	19800	-23600			105143	105143	351	0	2	0							7		211				0	0	2	0	
9715711085	0	LP	a	H-guiding Y-direction	19800	-23600			105143	105143	352	0	-2	0							7		211				0	0	-2	0	
9715711085	0	LP	a	H-guiding Y-direction	19800	-23600			105143	105143	431	0	30	0							7		211				0	0	30	0	
9715711085	0	LP	a	H-guiding Y-direction	19800	-23600			105143	105143	441	0	-30	0							7		211				0	0	-30	0	
9715711085	1	LP	a	H-guiding Y-direction	19800	-23600			105143	105143	613	0	16	0							7		211				0	0	16	0	
9715711085	1	LP	a	H-guiding Y-direction	19800	-23600			105143	105143	614	0	-16	0							7		211				0	0	-16	0	
9715711086	0	LP	a	H-guiding X-direction	22300	-25500			105143	105143	351	2	0	0							7		211				0	2	0	0	
9715711086	0	LP	a	H-guiding X-direction	22300	-25500			105143	105143	352	-2	0	0							7		211				0	-2	0	0	
9715711086	0	LP	a	H-guiding X-direction	22300	-25500			105143	105143	411	26	0	0							7		211				0	26	0	0	
9715711086	0	LP	a	H-guiding X-direction	22300	-25500			105143	105143	421	-26	0	0							7		211				0	-26	0	0	
9715711086	1	LP	a	H-guiding X-direction	22300	-25500			105143	105143	611	16	0	0							7		211				0	16	0	0	
9715711086	1	LP	a	H-guiding X-direction	22300	-25500			105143	105143	612	-16	0	0							7		211				0	-16	0	0	
9715711087	0	LP	a	H-guiding X-direction	22300	-21700			105143	105143	351	2	0	0							7		211				0	2	0	0	
9715711087	0	LP	a	H-guiding X-direction	22300	-21700			105143	105143	352	-2	0	0							7		211				0	-2	0	0	
9715711087	0	LP	a	H-guiding X-direction	22300	-21700			105143	105143	411	26	0	0							7		211				0	26	0	0	
9715711087	0	LP	a	H-guiding X-direction	22300	-21700			105143	105143	421	-26	0	0							7		211				0	-26	0	0	
9715711087	1	LP	a	H-guiding X-direction	22300	-21700			105143	105143	611	16	0	0							7		211				0	16	0	0	
9715711087	1	LP	a	H-guiding X-direction	22300	-21700			105143	105143	612	-16	0	0							7		211				0	-16	0	0	
9715711088	0	LP	a	H-guiding Y-direction	24700	-23600			105143	105143	351	0	2	0							7		211				0	0	2	0	
9715711088	0	LP	a	H-guiding Y-direction	24700	-23600			105143	105143	352	0	-2	0							7		211				0	0	-2	0	
9715711088	0	LP	a	H-guiding Y-direction	24700	-23600			105143	105143	431	0	30	0							7		211				0	0	30	0	
9715711088	0	LP	a	H-guiding Y-direction	24700	-23600			105143	105143	441	0	-30	0							7		211				0	0	-30	0	
9715711088	1	LP	a	H-guiding Y-direction	24700	-23600			105143	105143	613	0	16	0							7		211				0	0	16	0	
9715711088	1	LP	a	H-guiding Y-direction	24700	-23600			105143	105143	614	0	-16	0							7		211				0	0	-16	0	
9715712089	0	LP	a	H-guiding Y-direction	19800	-23600			108118	108118	351	0	2	0							7		212				0	0	2	0	
9715712089	0	LP	a	H-guiding Y-direction	19800	-23600			108118	108118	352	0	-2	0							7		212				0	0	-2	0	
9715712089	0	LP	a	H-guiding Y-direction	19800	-23600			108118	108118	431	0	34	0							7		212				0	0	34	0	
9715712089	0	LP	a	H-guiding Y-direction	19800	-23600			108118	108118	441	0	-34	0							7		212				0	0	-34	0	
9715712089	1	LP	a	H-guiding Y-direction	19800	-23600			108118	108118	613	0	16	0							7		212				0	0	16	0	
9715712089	1	LP	a	H-guiding Y-direction	19800	-23600			108118	108118	614	0	-16	0							7		212				0	0	-16	0	
9715712090	0	LP	a	H-guiding X-direction	22300	-25500			108118	108118	351	2	0	0							7		212				0	2	0	0	
9715712090	0	LP	a	H-guiding X-direction	22300	-25500			108118	108118	352	-2	0	0							7		212				0	-2	0	0	
9715712090	0	LP	a	H-guiding X-direction	22300	-25500			108118	108118	411	30	0	0							7		212				0	30	0	0	
9715712090	0	LP	a	H-guiding X-direction	22300	-25500			108118	108118	421	-30	0	0							7		212				0	-30	0	0	
9715712090	1	LP	a	H-guiding X-direction	22300	-25500			108118	108118	611	16	0	0							7		212				0	16	0	0	
9715712090	1	LP	a	H-guiding X-direction	22300	-25500			108118	108118	612	-16	0	0							7		212				0	-16	0	0	
9715712091	0	LP	a	H-guiding X-direction	22300	-21700			108118	108118	351	2	0	0							7		212				0	2	0	0	
9715712091	0	LP	a	H-guiding X-direction	22300	-21700			108118	108118	352	-2	0	0							7		212				0	-2	0	0	
9715712091	0	LP	a	H-guiding X-direction	22300	-21700			108118	108118	411	30	0	0							7		212				0	30	0	0	
9715712091	0	LP	a	H-guiding X-direction	22300	-21700			108118	108118	421	-30	0	0							7		212				0	-30	0	0	

9715712091	1	LP	a	H-guiding X-direction	22300	-21700			108118	108118	611	16	0	0						7		212				0	16	0	0	
9715712091	1	LP	a	H-guiding X-direction	22300	-21700			108118	108118	612	-16	0	0						7		212				0	-16	0	0	
9715712092	0	LP	a	H-guiding Y-direction	24700	-23600			108118	108118	351	0	2	0						7		212				0	0	2	0	
9715712092	0	LP	a	H-guiding Y-direction	24700	-23600			108118	108118	352	0	-2	0						7		212				0	0	-2	0	
9715712092	0	LP	a	H-guiding Y-direction	24700	-23600			108118	108118	431	0	34	0						7		212				0	0	34	0	
9715712092	0	LP	a	H-guiding Y-direction	24700	-23600			108118	108118	441	0	-34	0						7		212				0	0	-34	0	
9715712092	1	LP	a	H-guiding Y-direction	24700	-23600			108118	108118	613	0	16	0						7		212				0	0	16	0	
9715712092	1	LP	a	H-guiding Y-direction	24700	-23600			108118	108118	614	0	-16	0						7		212				0	0	-16	0	
9715713093	0	LP	a	H-guiding Y-direction	19800	-23600			112143	112143	351	0	4	0						7		213				0	0	4	0	
9715713093	0	LP	a	H-guiding Y-direction	19800	-23600			112143	112143	352	0	-4	0						7		213				0	0	-4	0	
9715713093	0	LP	a	H-guiding Y-direction	19800	-23600			112143	112143	431	0	72	0						7		213				0	0	72	0	
9715713093	0	LP	a	H-guiding Y-direction	19800	-23600			112143	112143	441	0	-72	0						7		213				0	0	-72	0	
9715713093	1	LP	a	H-guiding Y-direction	19800	-23600			112143	112143	613	0	16	0						7		213				0	0	16	0	
9715713093	1	LP	a	H-guiding Y-direction	19800	-23600			112143	112143	614	0	-16	0						7		213				0	0	-16	0	
9715713094	0	LP	a	H-guiding X-direction	22300	-25500			112143	112143	351	4	0	0						7		213				0	4	0	0	
9715713094	0	LP	a	H-guiding X-direction	22300	-25500			112143	112143	352	-4	0	0						7		213				0	-4	0	0	
9715713094	0	LP	a	H-guiding X-direction	22300	-25500			112143	112143	411	63	0	0						7		213				0	63	0	0	
9715713094	0	LP	a	H-guiding X-direction	22300	-25500			112143	112143	421	-63	0	0						7		213				0	-63	0	0	
9715713094	1	LP	a	H-guiding X-direction	22300	-25500			112143	112143	611	16	0	0						7		213				0	16	0	0	
9715713094	1	LP	a	H-guiding X-direction	22300	-25500			112143	112143	612	-16	0	0						7		213				0	-16	0	0	
9715713095	0	LP	a	H-guiding X-direction	22300	-21700			112143	112143	351	4	0	0						7		213				0	4	0	0	
9715713095	0	LP	a	H-guiding X-direction	22300	-21700			112143	112143	352	-4	0	0						7		213				0	-4	0	0	
9715713095	0	LP	a	H-guiding X-direction	22300	-21700			112143	112143	411	63	0	0						7		213				0	63	0	0	
9715713095	0	LP	a	H-guiding X-direction	22300	-21700			112143	112143	421	-63	0	0						7		213				0	-63	0	0	
9715713095	1	LP	a	H-guiding X-direction	22300	-21700			112143	112143	611	16	0	0						7		213				0	16	0	0	
9715713095	1	LP	a	H-guiding X-direction	22300	-21700			112143	112143	612	-16	0	0						7		213				0	-16	0	0	
9715713096	0	LP	a	H-guiding Y-direction	24700	-23600			112143	112143	351	0	4	0						7		213				0	0	4	0	
9715713096	0	LP	a	H-guiding Y-direction	24700	-23600			112143	112143	352	0	-4	0						7		213				0	0	-4	0	
9715713096	0	LP	a	H-guiding Y-direction	24700	-23600			112143	112143	431	0	72	0						7		213				0	0	72	0	
9715713096	0	LP	a	H-guiding Y-direction	24700	-23600			112143	112143	441	0	-72	0						7		213				0	0	-72	0	
9715713096	1	LP	a	H-guiding Y-direction	24700	-23600			112143	112143	613	0	16	0						7		213				0	0	16	0	
9715713096	1	LP	a	H-guiding Y-direction	24700	-23600			112143	112143	614	0	-16	0						7		213				0	0	-16	0	
9715714097	0	LP	a	H-guiding Y-direction	19800	-23600			115118	115118	351	0	3	0						7		214				0	0	3	0	
9715714097	0	LP	a	H-guiding Y-direction	19800	-23600			115118	115118	352	0	-3	0						7		214				0	0	-3	0	
9715714098	0	LP	a	H-guiding X-direction	22300	-25500			115118	115118	351	3	0	0						7		214				0	3	0	0	
9715714098	0	LP	a	H-guiding X-direction	22300	-25500			115118	115118	352	-3	0	0						7		214				0	-3	0	0	
9715714099	0	LP	a	H-guiding X-direction	22300	-21700			115118	115118	351	3	0	0						7		214				0	3	0	0	
9715714099	0	LP	a	H-guiding X-direction	22300	-21700			115118	115118	352	-3	0	0						7		214				0	-3	0	0	
9715714100	0	LP	a	H-guiding Y-direction	24700	-23600			115118	115118	351	0	3	0						7		214				0	0	3	0	
9715714100	0	LP	a	H-guiding Y-direction	24700	-23600			115118	115118	352	0	-3	0						7		214				0	0	-3	0	
9715715101	0	LP	a	H-guiding Y-direction	19800	-23600			122818	122818	351	0	3	0						7		215				0	0	3	0	
9715715101	0	LP	a	H-guiding Y-direction	19800	-23600			122818	122818	352	0	-3	0						7		215				0	0	-3	0	
9715715101	0	LP	a	H-guiding Y-direction	19800	-23600			122818	122818	431	0	53	0						7		215				0	0	53	0	
9715715101	0	LP	a	H-guiding Y-direction	19800	-23600			122818	122818	441	0	-53	0						7		215				0	0	-53	0	
9715715102	0	LP	a	H-guiding X-direction	22300	-25500			122818	122818	351	3	0	0						7		215				0	3	0	0	
9715715102	0	LP	a	H-guiding X-direction	22300	-25500			122818	122818	352	-3	0	0						7		215				0	-3	0	0	
9715715102	0	LP	a	H-guiding X-direction	22300	-25500			122818	122818	411	47	0	0						7		215				0	47	0	0	
9715715102	0	LP	a	H-guiding X-direction	22300	-25500			122818	122818	421	-47	0	0						7		215				0	-47	0	0	
9715715103	0	LP	a	H-guiding X-direction	22300	-21700			122818	122818	351	3	0	0						7		215				0	3	0	0	
9715715103	0	LP	a	H-guiding X-direction	22300	-21700			122818	122818	352	-3	0	0						7		215				0	-3	0	0	
9715715103	0	LP	a	H-guiding X-direction	22300	-21700			122818	122818	411	47	0	0						7		215				0	47	0	0	
9715715103	0	LP	a	H-guiding X-direction	22300	-21700			122818	122818	421	-47	0	0						7		215				0	-47	0	0	
9715715104	0	LP	a	H-guiding Y-direction	24700	-23600			122818	122818	351	0	3	0						7		215				0	0	3	0	
9715715104	0	LP	a	H-guiding Y-direction	24700	-23600			122818	122818	352	0	-3	0						7		215				0	0	-3	0	
9715715104	0	LP	a	H-guiding Y-direction	24700	-23600			122818	122818	431	0	53	0						7		215				0	0	53	0	
9715715104	0	LP	a	H-guiding Y-direction	24700	-23600			122818	122818	441	0	-53	0						7		215				0	0	-53	0	
9715715105	0	LP	a	Mashinery room	17275	-23600			122818	124318	351	0	10	0						7		215				0	0	10	0	
9715715105	0	LP	a	Mashinery room	17275	-23600			122818	124318	352	0	-10	0						7		215				0	0	-10	0	
9715715105	0	LP	a	Mashinery room	17275	-23600			122818	124318	431	0	51	0						7		215				0	0	51	0	
9715715105	0	LP	a	Mashinery room	17275	-23600			122818	124318	441	0	-51	0						7		215				0	0	-51	0	
9715715105	1	LP	a	Mashinery room	17275	-23600			122818	124318	613	0	48	0						7		215				0	0	48	0	
9715715105	1	LP	a	Mashinery room	17275	-23600			122818	124318	614	0	-48	0						7		215				0	0	-48	0	
9715715106	0	LP	a	Mashinery room	20850	-25500			122818	124318	351	10	0	0						7		215				0	10	0	0	
9715715106	0	LP	a	Mashinery room	20850	-25500			122818	124318	352	-10	0	0						7		215				0	-10	0	0	
9715715106	0	LP	a	Mashinery room	20850	-25500			122818	124318	411	27	0	0						7		215				0	27	0	0	
9715715106	0	LP	a	Mashinery room	20850	-25500			122818	124318	421	-27	0	0						7		215				0	-27	0	0	
9715715106	1	LP	a	Mashinery room	20850	-25500			122818	124318	611	48	0	0						7		215				0	48	0	0	
9715715106	1	LP	a	Mashinery room	20850	-25500			122818	124318	612	-48	0	0						7		215				0	-48	0	0	
9715715107	0	LP	a	Mashinery room	20850	-21700			122818	124318	351	10	0	0						7		215				0	10	0	0	
9715715107	0	LP	a	Mashinery room	20850	-21700			122818	124318	352	-10	0	0						7		215				0	-10	0	0	
9715715107	0	LP	a	Mashinery room	20850	-21700			122818	124318	411	27	0	0						7		215				0	27	0	0	
9715715107	0	LP	a	Mashinery room	20850	-21700			122818	124318	421	-27	0	0						7		215				0	-27	0	0	

9715715107		1	LP	a	Machinery room	20850	-21700			122818	124318	611	48	0	0						7		215				0	48	0	0				
9715715107		1	LP	a	Machinery room	20850	-21700			122818	124318	612	-48	0	0						7		215				0	-48	0	0				
9715715108		0	LP	a	Machinery room	24700	-23600			122818	124318	351	0	10	0						7		215				0	0	10	0				
9715715108		0	LP	a	Machinery room	24700	-23600			122818	124318	352	0	-10	0						7		215				0	0	-10	0				
9715715108		0	LP	a	Machinery room	24700	-23600			122818	124318	431	0	51	0						7		215				0	0	51	0				
9715715108		0	LP	a	Machinery room	24700	-23600			122818	124318	441	0	-51	0						7		215				0	0	-51	0				
9715715108		1	LP	a	Machinery room	24700	-23600			122818	124318	613	0	48	0						7		215				0	0	48	0				
9715715108		1	LP	a	Machinery room	24700	-23600			122818	124318	614	0	-48	0						7		215				0	0	-48	0				
9715715109		0	LL	a	Machinery room	17300	-21700	24700	-21700	122818	124318	131	0	0	-30						7		215				7.5	0	0	-30				
9715715109		0	LL	a	Machinery room	17300	-21700	24700	-21700	122818	124318	311	0	0	-20						7		215				7.5	0	0	-20				
9715715110		0	LL	a	Machinery room	17300	-25500	24700	-25500	122818	124318	131	0	0	-30						7		215				7.5	0	0	-30				
9715715110		0	LL	a	Machinery room	17300	-25500	24700	-25500	122818	124318	311	0	0	-20						7		215				7.5	0	0	-20				
(T-Endg																																	

Bharat Heavy Electricals Limited

HIGH PRESSURE BOILER PLANT, TIRUCHIRAPALLI-620014.

CONTROLS & INSTRUMENTATION

SPECIFICATION FOR

PASSENGER AND GOODS CUM PASSENGER ELEVATOR

REV. NO	DATE	DESCRIPTION	PREPARED SRR	CHECKED RD	APPROVED ENGG. PMV	QAC SD
00	17-07-2003	INITIAL RELEASE	Sd./SRR	Sd./RD	Sd./ PMV	Sd./ SSM
01	25-05-2010	GENERAL REVISION	Sd./SRR	Sd./RD	Sd./ SRC	
02	16-06-2014	GENERAL REVISION	Sd./SKS	Sd./KB	Sd./ DMB	
03	02-01-2015	GENERAL REVISION	Sd./SR	Sd./KB	Sd./ AKP	
04	07-10-2015	GENERAL REVISION				

CLAUSE NO.	TECHNICAL DELIVERY CONDITIONS	
1.0	**SITE CONDITIONS**	
	Altitude above MSL	Less than 1000m.
	Relative humidity	100%.
	Design Ambient Temp.	50 deg.C
	Atmosphere	Tropical, Dusty, Corrosive and highly polluted.
	Wind loads	As per IS-875(Part 3)
2.0	**GENERAL**	
	This specification is intended to cover the design, engineering, manufacture, inspection, delivery, erection, commissioning, maintenance and services before handing over to customer for Passenger Elevator and Goods cum Passenger Elevator in boiler applications. Vendor shall ensure accurate, reliable and trouble-free operation in corrosive, dusty environments.	
3.0	**PRE QUALIFICATION REQUIREMENT (APPLICABLE IN CASE OF OPEN TENDER)**	
	The elevator offered shall be in satisfactory operation for boiler application in fossil fuel fired thermal power plants of unit rating 250MW or above. Vendor shall submit a list of reference thermal plants (with elevator capacity, landing levels and travel) where their elevator is in satisfactory operation for more than one year. Commissioning and service support for the elevator shall be available in India	
4.0	**STATUTORY REQUIREMENTS**	
	Obtaining all the statutory clearances required from the concerned authorities (including payment if any) upto handing over of the elevator shall be the responsibility of the elevator vendor.	
5.0	**REFERENCE STANDARDS**	
	The Elevators shall be designed in line with the recommendation contained in the latest editions of Standards **IS: 14665: 2000 (All Parts)**. The equipment shall comply with latest revision of Indian standard and wherever 'IS' is not available, it shall comply with the generally accepted international codes and practices.	
6.0	**SCOPE OF WORK**	
	i) Design, engineering, manufacture, inspection, delivery, erection, commissioning and handing over. ii) Maintenance & services during guarantee period**.** iii) Necessary erection / commissioning spares and consumables shall be included in vendor scope. iv) Necessary tools and tackles required for maintenance, testing and inspection shall be covered in vendor scope. v) Necessary chain and pulley block along with hand operated geared trolley arrangement for horizontal movement across the monorail, hoist, rope and hook arrangements at the machine room ceiling to carry out the maintenance and erection of equipment shall be supplied by Elevator vendor. The necessary mono-rail beam will be supplied by purchaser (BHEL). vi) A steel ladder for access to the pit shall be supplied by the Elevator vendor. vii) Guard to protect the hoist way including temporary barricades at hoist way openings shall be supplied by Elevator vendor. viii) Scaffolding as per erection requirement shall be provided by the Elevator vendor. After completion of handing over activities, the scaffolding materials may be taken back by the vendor. ix) All the electrical equipment including Lift well, Hoist way & machine room lighting with fittings, Power/control/trailing cables, MCCB/MCB & ELCB for 415 V AC 3ph supply and 240 V AC single phase supply (to receive the incoming feeders provided by customer) shall be included in the Elevator vendor scope. x) The vendor shall assume all responsibility for proper design and operation of each and every component of the elevator as well as the elevator as a whole. Complying with Indian electricity rules & Indian electricity acts and applicable statutory requirements (of Government of India and applicable States) as well as procedural formalities also shall be taken care by the Elevator vendor.	
7.0	**EXCLUSIONS**	
	Works not included in elevator contract, but furnished by others in accordance with local codes and regulations and the approved drawing of the Elevator vendor. i) Civil works associated with the Elevator pit. ii) Furnishing and installation of steel beams (Hoisting beams) in the machine room to lift equipment during installation and to facilitate maintenance. iii) Machine room civil works including concrete flooring. iv) Steel structures for Columns and associated bracings and approach platforms up to landing doors at each level. v) Supporting steel material between hoist way & car will be provided by BHEL.	
8.0	**ELEVATOR PARTICULARS & DESIGN PARAMETERS**	
	i) Passenger Elevator and Goods cum Passenger Elevator shall be provided with 1 no. fireman's switch (Alarm Switch).	

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	ii) The Elevator shall be located on the side of the boiler as indicated in the plant layout drawing which will be provided during detailed engineering. iii) Entry to the Elevator shall be indicated in the enquiry. Foundation plan and elevation with landing levels shall be as per purchaser (BHEL) drawings.		
9.0	**Design Criteria and Equipment specification for Passenger Elevator & Goods Cum Passenger Elevator**.		
	i)	Type of service	Passenger Elevator and Goods cum Passenger Elevator
	ii)	Number required	As per enquiry
	iii)	Load on the Elevator	As per enquiry
	iv)	Rated speed	0.55 meter/ sec for Goods cum Passenger Elevator 1.0 meter/sec for Passenger Elevator.
	v)	Total travel	As per enquiry
	vi)	No. of floors to be served (Landing levels)	As per enquiry
	vii)	Entrances	One number in each floor
	viii)	Method of control Motor Speed Control: Logic Control:	Variable Voltage variable frequency (VVVF) control. Microprocessor based Control with automatic level adjustment. **The control system shall be of field proven design and having satisfactory track record.**
	ix)	Flooring of Car	Chequered plate (6 mm thick). Car floor shall comprise of a smooth non-slip surface.
	x)	Position of Machine room	Directly above the Lift shaft
	xi)	Design, construction and finish of car	MS sheet fabricated, smooth finish, spray painted to approved shade. If SS (ASTM-304 No: 4 Hairline finish) is required as per enquiry vendor to consider the same in their offer.
	xii)	Car door	MS sheet fabricated, smooth finish, spray painted to approved shade. If SS (ASTM-304 No: 4 Hairline finish) is required as per enquiry vendor to consider the same in their offer.
	xiii)	Landing door	MS sheet fabricated, smooth finish, spray painted to approved shade. If SS (ASTM-304 No: 4 Hairline finish) is required as per enquiry vendor to consider the same in their offer.
	xiv)	Car Enclosure	MS sheet fabricated, smooth finish, spray painted to approved shade. If SS (ASTM-304 No: 4 Hairline finish) is required as per enquiry vendor to consider the same in their offer.
	xv)	Lighting and fan in the car	Recessed fluorescent light fittings for illumination level of 100 lux on Car floor shall be provided. Cabin charger ventilation fan with control suitable for operation on 240 V, 50 Hz, AC single phase power supply shall be provided. Portable light shall be provided on Car top. Adequate ventilation and illumination of car to be ensured.
	xvi)	Method of operation of car	Power operated type – automatic, Horizontal Centre opening / closing car and landing doors.
	xvii)	Operation of Elevator	Automatic, simplex, selective, collective with and without attendant, through illuminated pushbutton station located inside the car with provision for locking control in Auto or attendant position.
	xviii)	Signals / Indicator	Car position indicator in car, hall position indicator at all floors, Up & down travel direction position indicator, tell-tale lights at all floors. Soft touch keys and digital luminous display in car operating panel and on all floors landings. Battery operated alarm bell and emergency light with suitable battery and battery charger and controls. Audio annunciation for car position indication shall also be provided inside the car. Overload warning indicator with visual & audio annunciation.
	xix)	Shaft lighting	The Elevator shaft shall be suitably illuminated by providing CFL fittings at every 3m (three metres) from bottom of Lift well.
10.0	**DETAILS OF SPECIAL TREATMENT FOR ELEVATOR**		
	As the Elevators are to be installed in a heavily polluted and dusty area in a thermal power station. All the Elevator components shall be given special corrosion resistant treatment.		
	i)	Cars & Counter weight	Anti-corrosive epoxy paint

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	ii)	Fish plates	Anti-corrosive epoxy paint
	iii)	Car & Counter weight buffer	Anti-corrosive epoxy paint
	iv)	Supports(Buffer)	Anti-corrosive epoxy paint
	v)	Rail Brackets	Anti-corrosive epoxy paint
	vi)	Bracket & rail fasteners	Zinc-passivated with epoxy painted
	vii)	Tie down bolts	Zinc-passivated with epoxy painted
	viii)	Machine	Anti-corrosive epoxy paint
	ix)	Brake adjusting screw & coupling fasteners	Zinc-passivated
	x)	Bracket	Anti-corrosive epoxy paint
	xi)	Controller cabinet	Anti-corrosive epoxy paint as per industry standard.
	xii)	Hall buttons	Dust-proof with stainless steel hardware.
	xiii)	Car operating panel	Dust proof contact & button with aluminium face plate and SS hardware. Main face plate SS.
	xiv)	Governor	Cover and casting epoxy painted. Other components zinc plated.
	xv)	Governor Tension frame	Hot dip galvanised and anti-corrosive epoxy paint with M.S. shaft for sheave.
	xvi)	Car frame, level brace rods and counter weight frame	Epoxy paint as per IS-1477 Part 1 & 2.
	xvii)	Safety equipment (Linkages)	Zinc-plated
	xviii)	Safety switch and car gate switch	IP-65. Dust proof heavily zinc plated arm, stainless steel shaft and housing as per vendor standard.
	xix)	Guide shoe	Zinc-plated
	xx)	Cam bar mountings and channels	Zinc-plated and anti-corrosive epoxy paint
	xxi)	Counter weight frame	Anti-corrosive epoxy paint
	xxii)	Guide shoe with Nylon ribs	Zinc-plated
	xxiii)	Filter weights	Anti-corrosive epoxy paint
	xxiv)	Rope fasteners	Zinc-passivated and chromate dipped
	xxv)	Hoist rope	Greased, Self-lubricating
	xxvi)	Governor rope	Greased, Self-lubricating
	xxvii)	Car enclosure, interior gate, car door and landing door	Anti-corrosive two coats baked enamel paint
	xxviii)	Alarm and door open bells (Electronic hooter)	Painted.
	xxix)	Junction box	Metallic body - dust proof with Anti-corrosive epoxy paint
	xxx)	Hall position indicator and car position indicator	Dust proof with stainless steel enclosure and Face plate.
11.0	**MECHANICAL EQUIPMENT**		
11.1	**ELEVATOR CAR**		
	The car platform frame and sling shall be of steel construction. The platform shall be suitably isolated from its sling. The car shall be enclosed with suitably braced and reinforced sheet metal panel. The sheet metal panel shall have ventilation slots at the base. The car interior, the car doors and the landing doors shall be finished with two coats of baked enamel. All other exposed steel or cast surfaces shall be painted with one coat of suitable metal primer and two coats of machinery enamel paint. The car shall be provided with the following accessories: i) Car control station with position indicator inside the car and at landing platforms. ii) An emergency stop switch (shall have two sets of potential free contact. Second one shall be taken and terminated in machine room for further connection by owner). This is as per IS 14665 Part 2 Amendment 3 Clause 9.6 - ‘‘An emergency stop switch, of manually opened and closed type, shall be provided on top of every lift car and shall be marked conspicuously”. iii) A three pin plug & socket with switch on top of Elevator car for use by persons working there on. iv) Telephone instrument shall be provided inside the car. Connection from the same shall be brought up to the machine room for further connection to plant network by customer. Telephone instrument provided inside the car shall have provision for hands free operation also, i.e. Speaker phone shall be provided for hands free operation. v) For better safety, elevator vendor to provide car top barricade on car top to ensure that service personnel stay inside the car region. A selector switch and a set of push buttons shall be provided on the top above		

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	the ceiling of the car to operate the elevator locally for inspection and maintenance. The selector switch when set to position "inspection" shall exclude control from other places and movement of the car in the desired direction shall be effected by the push buttons. For normal operation of the elevator, the selector switch shall be set to the position working. It shall be possible to operate the elevator only when the appropriate button is kept in pressed condition. The roof shall be strong enough to support at least two persons. vi) Adequate lighting and ventilation shall be provided in the Elevator car. The car shall be fitted with fan of adequate capacity and lighting with decorative fittings. The car platform shall be robust in construction and elegant in appearance. vii) The car shall be provided with an emergency alarm push button inside the Elevator car which shall be clearly marked. The alarm shall be clearly audible outside the Lift way in order to obtain assistance in case of breakdown or failure between the floors. viii) Car shall be equipped with handrails on three sides.
11.2	**CAR DOOR**
	The car door shall be of hollow metal construction minimum 16 gauge thick sheet steel. Sides of the door shall be flush with all seams continuously welded. Guide shoes shall be rubber or roller type designed for operation on un-lubricated guides. The car door shall be provided with locking gear of heavy and robust construction, so arranged mechanically and interlocked that the doors cannot be opened unless the Elevator car is within a particular landing zone. Conversely the Elevator shall not move until all the landing doors are closed and interlocked properly. Width of Car Entrance shall be 1100mm for Goods cum Passenger elevator and Passenger elevator. The live load shall be taken into consideration while designing doors, door frame and hanger tracks. The car doors shall be designed such that their closing and opening is not likely to injure a person. A retractable safety shoe shall extend the full height and project beyond the front edge of the car, to open the closing door if and when it touches a person or an object. Alternatively opening of car by means of optical sensing shall also be provided.
11.3	**LANDING DOORS**
	All landing openings in the Lift well enclosure shall be protected with doors which shall extend the full height and width of the landing opening. The type of door provided shall be similar to the Elevator car door. Every landing door shall be fitted with a locking device. The door shall be suitably interlocked so that they cannot open unless the car is within a particular landing zone. The locking device is closed until the door is closed. The levers operating the locking devices shall not interfere with the landing side or Elevator enclosures. Landing doors of the elevators shall have fire resistance of at least one hour. These doors shall also be smoke tight as far as possible.
11.4	**LOAD PLATE**
	A load plate displaying the rated load of the Elevator in terms of persons and kilograms shall be fitted in the car in a conspicuous position.
11.5	**SUSPENSION ROPES**
	The car and the counter weights shall be suspended by steel wire ropes. Chain shall not be used for suspension. Not less than four independent stranded steel wire suspension ropes shall be used for car or counter weights of the Elevator with traction drive. The minimum diameter of the stranded rope shall not be less than 12.5 mm and minimum factor of safety shall not be less than 12. The suspension ropes shall conform to latest edition of IS 2365 – "Specification for steel wire suspension ropes for Lifts and hoists".
11.6	**SHEAVES AND PULLEYS**
	All driving sheaves and pulleys fixed to and revolving with the shaft shall be fixed by means of sunk keys of sufficient strength and quality. Sheaves and pulleys shall be made of cast iron as per the latest edition of IS 14665 and free from cracks, sand holes and other injurious defects. They shall have suitable flanges and smoothly machined rope grooves. The diameter of the sheave or pulley shall be as specified in the latest edition of IS 14655 or equivalent International Standards.
11.7	**SHAFT**
	Shafts and axles shall be forged steel. They shall have sufficient rigidity and bearing surface. Any shaft when stepped shall be turned to a reasonable radius at the point of reduction.
11.8	**COUNTER WEIGHTS**
	The Elevator shall be provided with suitable counter weights located in the Lift shaft. The counter weight shall be designed for smooth and easy operation of the Elevator and shall be in accordance with Indian Standard (or) equivalent International Standard. Suitable counter weight screen shall be provided in the Elevator shaft. The counter weights shall consist of cast iron weight contained in structural steel frame. The traction should be such that no appreciable slip may occur but that slip shall be free to take place upon the landing of either the car or the counter weights.

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11.9	**GUIDE RAILS**
	Guide rails for the car and counter weights shall be machined 'T' sections and continuous throughout the entire length and shall be provided with adequate steel brackets or equivalent fixing of such design and spacing between brackets shall be such that to avoid any deflection during the normal operation. Guide rails section shall be adequate to withstand the forces resulting from the application of the safety gear when stopping the counter weights or fully loaded car. The guide shoes or their lining shall be easily renewable, adjustable and self-lubricated. Guides shall be of such length that it shall not be possible for any of the car or the counter weight shoes to run off the guides.
11.10	**BUFFERS**
	Sufficient number of buffers of spring loaded type shall be fitted below the Elevator car and counter weights. The buffers shall be capable of stopping the car or counter-weights without permanent damage or deformation to itself or any part of the Elevator equipment. The number of buffers shall be so fixed as to ensure proper sharing of the impact loads by all of them.
11.11	**EMERGENCY SAFETY DEVICES AND BRAKES**
	The Elevator shall be provided with safety device attached to the Elevator car frame and placed beneath the car. The safety device shall be capable of stopping and sustaining the Elevator car up to governor tripping speed with full rated load in car. The application of the safety device shall not cause the Elevator platform to become out of level in excess of 3 cm/m measured in any direction. Slack rope switches, if necessary, shall also be provided. The Elevator vendor shall also provide personnel evacuation system during the power failure to the Elevator. The Machine shall be provided with direct current spring set, solenoid release double shoe brakes of sufficient capacity to stop the car at any position with the design load. These brakes shall be designed in such a way that it gets applied automatically in the event of power failure.
11.12	**AUTOMATIC RESCUE DEVICE (ARD)-(BATTERY DRIVE)**
	Contractor shall provide a modern advanced electronic drive system of "RESCUING Passengers Trapped in an ELEVATOR" in case of power failure. In addition to the above, bell and cranking device to be provided with hand wheel connected with motor shaft for manual lowering of elevator to the nearest landing level. For all Elevators with ARD, an audio & visual indicator shall be provided inside the Elevator car to alert the person trapped inside that he/she is being rescued. Capacity of battery shall be such that minimum three rescue operations can be performed without recharging. ARD panel shall be suitable for floor mounting.
11.13	**OVERLOAD DEVICE**
	Every passenger Elevator shall be provided with an overload device, which will prevent the Elevator from starting in case the Elevator car is loaded to 110 percent of the rated capacity of the Elevator or more. Elevator shall remain stationery with door open. Audio & visual warning device (Load weighing device) shall be provided to alert the passenger in case of overload.
11.14	**OVER SPEED GOVERNOR AND GOVERNOR ROPES**
	Governor shall be located where there is sufficient room for their proper operation and where they cannot be struck by the Elevator car or counter weight in the event of over run. Each governor shall be marked with tripping speed in terms of car speed in m/sec and the motor control and brake control circuit shall be opened before or at the time the governor trips. As per IS 14665 (part4/Sec 4):2001, the nominal rope diameter for over speed governor shall be minimum 6mm. However for elevators where travel height is more than 90 meters, the nominal rope diameter for over speed governor shall be minimum 8mm.
11.15	**LEVELLING DEVICE**
	The Elevator shall be provided with a two way automatic levelling device. The levelling device shall take care of overrun and under run of the car and rope stretch, such that car floor is within 6.0 mm from the landing level at all floors while in operation. Aprons of sufficient depth shall be fitted to the car floor to ensure that no space is permitted between the threshold and the landing while the care is being levelled to floor.
11.16	**MACHINE ROOM AND OVERHEAD STRUCTURES**
	All the overhead machinery shall be supported on beam to be furnished by the contractor. The machinery support beam shall rest on top of or be designed to be framed into the contractor's structural steel frame for the boiler house. The Elevator drive controller and all other apparatus and equipment of Elevator installation, except such apparatus and equipment which function in the machine room shall be located at the top of the Lift well. Adequate machine room and hoist way lighting shall be provided by the Elevator vendor. The maximum loads transmitted by the single heaviest equipment both during erection and maintenance of the Elevator to the machine room floor and other structures like guides etc. shall be furnished by the Elevator vendor within 15 days of placing the award letter. Sound reducing materials below machines in machine room shall be provided.

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	Machine room shall be provided with minimum 200 Lux illumination. **MACHINE ROOM Air conditioning** Machine room shall be provided with 5 tonnes or with 1 No. of two tonne and 2 nos. of 1.5 tonne capacity A/C units (minimum). If higher capacity of A/C is required for proper cooling, the same is to be indicated in the offer.
11.17	**TERMINAL STOPPING AND FINAL LIMIT SWITCHES**
	The Elevator shall be equipped with an automatic stopping device arrangement to bring the car to a stop at the terminal landings independent of the regular operating device in the car. Such stopping device shall act independently of the operating device, the final limit switches and buffer. Final limit switches shall be provided to stop the car automatically within the top and bottom clearance independent of normal operating device and the terminal stopping device. The final limit switch shall act to prevent movement of the car under power in both directions of travel and shall after operating, remain open until the Elevator car has been moved by a hand operating mechanism within the limits of normal travel. Elevator shall be suitable for continuous 24 hours round the clock operation.
12.0	**ELECTRICAL EQUIPMENT AND CONTROLS**
12.1	**OPERATION AND INTERLOCKS**
	The operation of the Elevator shall be simplex, selective, collective, and automatic, with or without operator. The Elevator operation shall conform to the following requirements. i) The operation of the Elevator shall be through a push button station located inside the car. ii) The Elevator shall not move unless the car door, landing door and all other protected openings connected with the control circuit are closed. iii) Two push buttons, one for upward and the other for downward movement at each intermediate landing and one push button at each terminal landing shall be provided in the landing floors in order to call the car. iv) The landing doors shall be interlocked so that the landing door at any floor shall not open when the Elevator is not on that floor. v) Push button shall be fixed in the car for holding the doors open for any length of time required.
12.2	**ELEVATOR DRIVE**
	The Elevator drive shall be equipped with automatic electromagnetic coil type brakes. The Elevator shall be driven by a drive suitable for method of control offered by the Elevator vendor. No friction gearing or clutch mechanism shall be used for connecting the main driving gear to the sheaves.
12.3	**ELECTRIC MOTORS**
	Motors shall be as per IS 325 and suitable for the Variable Voltage Variable Frequency (VVVF) application. All motors shall be squirrel cage induction type, suitable for operation at 415 V (+/- 10% variation), 3 phase, 3 wire, 50HZ (+3% to -5% variation) supply suitable for frequent starting with S4 duty class (S3 duty class also acceptable, if necessary to that application and subject to end user acceptance), CDF 40%, Maximum 150 starts per hour at 50 Deg. C ambient and with IP 54 protection class. Motor pull out torque shall be at least 240% of rated torque. Motor shall be of TEFC type. Motor insulation shall be class F or superior with temperature rise limited to 70 Degree Celsius.
12.4	**CONTROLLERS**
	The controllers shall be designed to start, accelerate, stop and reverse the Elevator when the appropriate push buttons are pressed. It shall be arranged so as to provide maximum convenience to the operator. Contact finger buttons shall be easy to adjust and replace. The speed control device shall be such as to give smooth, easy and accurate speed control. The Elevator controls shall be housed in dust and vermin proof enclosures. The controls shall be wired with stranded copper conductor cables. All equipment mounted shall be neatly labelled as per wiring diagram. Ventilating louvers are to be provided in the panels. Control panel shall be suitable for floor mounting.
12.5	**CABLES AND INTERNAL WIRING**
	Wiring shall be done as required to interconnect all Elevator electrical equipment including all power wiring from the main supply source in the machine room. Power cables shall be 1100 V grade multi core, stranded with XLPE insulation, FRLS type ST2 inner sheathed, galvanised steel wire armoured and overall extruded FRLS, Type ST2 PVC outer sheath. If unarmoured cables are used all the cabling/wiring between the equipments in the lift machine room and between machine room and equipments in the lift well and at the landings shall be wired in HDP conduit/ galvanised steel conduit.

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	The circular trailing cables shall conform to IS 4289 Part-I (Elastomer insulated) or IS 4289 Part II (PVC insulated) / Flat type trailing cable shall conform to IEC 60227-06. All other cables shall conform to latest edition of IS: 7098, IS:1554 & IS:5831. Following FRLS properties shall be complied with. a) Oxygen index of min. 29 (as per IS:10810 Part-58) b) Acid gas emission of max. 20% (as per IEC-754-I). c) Smoke density rating shall not be more than 60% (as per ASTMD-2843).
12.6	**EARTHING**
	Earthing shall be carried out as per IS 14665, IS 3043 and Indian Electricity Rules. The Elevator structures, motor, frames, metal cases and all electrical equipment including conduit, cable armouring and guards shall be properly bonded and earthed by two separate and distinct connection. The earth bus will be connected to the station earth mat by the owner.
12.7	**POWER SUPPLY**
	One three phase 415V, AC, 50 Hz UPS Supply for Elevator main motor, and one single phase 240V, AC, 50Hz supply feeders for lighting, air conditioner and control panels will be provided in the machine room by BHEL. The exact Power requirement in kVA of three phase supply and single phase power supply shall be indicated in the offer itself by the vendor. The junction box having MCCB/MCB/ELCB Isolation of adequate rating shall be arranged by the vendor to receive the above supplies. The Elevator vendor shall also indicate the proposed location of junction box in the machine room. All further distribution, cabling and wiring from the junction box shall be carried out by the Elevator vendor. The vendor shall arrange to tap power supply required for constructional purposes from the point terminated by the owner.
13.0	**OTHER REQUIREMENTS**
	Electric high speed door operators for the opening and closing of the car doors and landing doors shall be furnished and installed. The car and landing doors shall be mechanically connected and shall move simultaneously in opening and closing. The car door and landing door shall be power closed and shall be controlled in opening and closing by oil cushioning mechanism built into the gear unit or alternate arrangement equally / better than this. Necessary lockable switches shall be provided in the Elevator machine room to control the operation of the door. Should the electric power fail, it must be possible for the doors to be opened from within the car, provided the car is exactly at the landing level. Overload relays shall be provided to protect the drive motor against overload or a power failure. Suitable protection shall be provided on the controller to protect the Elevator equipment from phase reversal, low voltage. Suitable arrangement shall be provided to intimate unit control room during emergency in the form of audio-visual alarm. Complete set of special tools and tackles required shall be supplied along with Elevator. Each tool and tackle shall be stamped so as to be identified easily for its use and size. Tools shall be supplied in a steel tool box. The list of tools and tackles shall be furnished along with the offer. One number Fire extinguisher (suitable for electrical fire) shall be provided along with each elevator.
14.0	**SPARES**
	The vendor shall furnish the List of start-up, mandatory and recommended spare parts and indicate separately in the offer with item wise price under the title “Schedule of Spare Parts”. The spares recommended above with unit prices shall be valid for at least for three years of normal consumption for operation of the plant. The vendor shall also indicate the service expectancy for these spare parts under normal operating conditions before the replacement is necessary. All the spares offered shall be strictly interchangeable with the parts for which they are intended for replacement.
15.0	**DRAWINGS / DOCUMENTS**
	The following preliminary documents / drawings should be enclosed along with the offer without fail.

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	i) Detailed description of the system offered. ii) List of thermal power where the offered system is in operation. iii) Performance certificate of the system offered. iv) Write-up on interlocks, controls and safety devices provided. v) General Arrangement of Elevator (including hoist way, pit well etc.) vi) General Arrangement of machine room and equipment in machine room. vii) Electrical control scheme with legend and write-up. viii) Machine room Air-Conditioning details. ix) Foundation and loading details of machine room floor and the concrete structure. x) Filled in vendor data sheet for Elevator, Main motor and Door operator motor. xi) Filled in vendor quality plan. xii) The major components of Elevator with weight details to be indicated by the vendor in the offer itself. xiii) The make, type, capacity, range of all bought out items xiv) Any deviation from the enquiry specification shall be indicated in the "Sub-delivery Enquiry Deviation Format" attached along with the enquiry. No deviations, unless explicitly taken up by vendor in the enquiry stage itself in the said format and accepted by BHEL in writing, shall be considered after firm order. In case no deviations are there, vendor to indicate "No-deviation" in the fully filled up format. The following documents / drawings shall be submitted within 15 days from the firm order. i) Elevator General Arrangement drawings for BHEL/Customer approval. ii) Elevator Technical Datasheet Separate contract-wise drawing approvals shall be obtained by vendor before manufacture of elevators.
16.0	**WARRANTY**
	The Elevator Vendor shall guarantee that the materials, workmanship and performance of the apparatus installed under this specification is perfect in every respect and that they will make good of any defects (not due to careless operation) which may develop within 18 months from the date of formal handing over of the equipment.
17.0	**MAINTENANCE**
	After the completion of the installation, maintenance and service for the equipment furnished under this specification shall be provided by the vendor for a period of eighteen months. This service shall include monthly inspections of the installation during regular working hours by trained employees and shall include all necessary adjustments, greasing and oiling, cleaning, supply of genuine standard parts to keep the equipment in proper operation except any part made necessary by misuse, accidents or negligence caused by others.
18.0	**ACCEPTANCE**
	After erection, the performance of the Elevator shall be tested for ascertaining the conformity with the specification and upon satisfactory completion of the tests, the Elevator will be taken over. The responsibility for obtaining commissioning and handing over protocol signed by the customer lies with the Elevator vendor.
19.0	**QUALITY ASSURANCE AND TESTING**
19.1	**For Contracts with BHEL Inspection**
	i) Vendor shall prepare Quality plan in the BHEL standard Quality Plan format (copy enclosed) along with enquiry. Such a QP shall contain all the required quality checks right from the raw material stage through in process, Assembly, Testing & Final inspection. Any comments given by BHEL shall be incorporated by vendor. ii) In case of order receipt, this QP will be approved by BHEL. iii) Elevators are subject to inspection by BHEL and inspection call shall be given 15 days in advance.
19.2	**For Contracts with BHEL & Customer Inspection:**
	i) All the points covered under Clause no. 19.1 are applicable for this category. ii) The QP will be approved by customer & elevator will be subject to inspection by customer. Any additional points indicated by customer have to be carried out by the vendor.
20.0	**PACKING AND STORAGE**
	Packing and storage at site shall be done as per vendor standard. However the following points to be taken care by the vendor. At the time of shipment equipment shall be clean inside and outside. The vendor shall pack all equipment and materials furnished by him in such a manner as to ensure protection against damage and deterioration during shipment and storage which includes local transportation and site storage. Modules, or electronic equipment shall

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	be wrapped and sealed in plastic to protect from rain and dust. The plastic wrapping shall include, as required, the use of a desiccant to protect the equipment from excessive moisture. The items shall be treated and packed for long storage under the climatic conditions prevailing at site. Each item part shall clearly be marked or labelled on the outside of the packing in single case. The general description of the contents shall be shown on the outside of such cases. All cases, containers and other packages shall be marked suitably and numbered for the purpose of identification. All cases, containers and other packages are liable to be opened for such examination as may be felt reasonable by the purchaser. The vendor shall bear in mind the shipment of the plant having ball or roller type bearings for which the following special provisions shall apply: i) If temporary transit bearings are fitted to such plant, then, additionally, two complete sets of service bearings shall be included and shipped with such plant. ii) If the item of the plant is shipped with service bearings in position, then additionally one complete set of service bearings shall be included and shipped with such plants. In either or both of the above provisions, the cost of the additional sets of bearings shall be included in the offer. iii) If replacement of any bearing is required due to damages during shipment or other causes, the spare bearings shall be used to replace at free of charge.
21.0	**O&M MANUALS**
	Vendor to furnish standard O&M manuals for each capacity of elevator, immediately after the release of first purchase order for BHEL's further use (Two copies of CD-ROM). The O&M manual prepared shall be such that the same shall be usable along with the relevant drawing for each project. Project wise O&M manuals along with project-wise details, if any, has to be updated by vendor and handed over to site (Customer & BHEL/Site, after commissioning of elevator) in necessary format as desired by customer.
22.0	**LIST OF ELEVATOR OPTIONAL PRICES**
	The following optional prices to be indicated along with offer. i) Rate for addition / deletion of 1 number landing. ii) Rate for addition / deletion of 1Mtr. in travel height. iii) Extra price for having 0.75mps & 1mps speed of goods elevator instead of 0.55 mps for 3Ton elevator iv) Extra price for having 0.75mps & 1mps speed of goods elevator instead of 0.55 mps for 2Ton elevator v) Extra price for Car with SS (ASTM 304 No: 4 Hairline finish) for 1) 3 Ton elevator 2) 2 Ton elevator 3) 1 Ton elevator 4) 1088 Kg Passenger Elevator vi) Extra price for Landing door with SS (ASTM 304 No: 4 Hairline finish) for 1) 3 Ton elevator 2) 2 Ton elevator 3) 1 Ton elevator 4) 1088 Kg Passenger Elevator vii) Additional price of Automatic Rescue Device (ARD) for increased height of 15 Mtrs. viii) Audio annunciation in the form of metres ix) Extra price for 1500mm car door clear opening for 2Ton & 3Ton goods elevator x) Extra price for 1800mm car door clear opening for 2Ton & 3Ton goods elevator xi) Extra price for 1500mm landing door clear opening for 2Ton & 3Ton goods elevator xii) Extra price for 1800mm landing door clear opening for 2Ton & 3Ton goods elevator

	Manufacturer Address	QUALITY PLAN FOR Xxxx	QP No.: Rev: yy Date: zz/zz/zz Page 1 of 1	Project: P.O.No.: Date:

Sl. No	Component & Operation	Characteristics	Class	Type of Check	Quantum of check		Ref Doc. & Acceptance STD	Format of record	AGENCY			REMARKS
					M	B/C			M	B	C	
A	**RAW MATERIAL & BOUGHT OUT ITEMS INSPECTION**											

Signature of Manufacturer/Sub-Vendor	**M**- Manufacturer/Sub-Vendor; **B** - BHEL / TPI ; C - Customer / TPI **P** - Perform; **W** - Witness **V** - Verification;	Name & Signature of Customer approving authority	Name & Signature of BHEL approving authority

WANAKBORI 1X800 MW
MANDATORY SPARERS

A- XVI.1	ELEVATORS (Goods,Passenger & Stack)	
1.1	Control Panel	
1.1.1	Copper Contactors	10Nos. of each type/rating & size for each type of Elevator
1.1.2	Carbon Contacts	10Nos. of each type & size for each type of Elevator
1.1.3	Compression Spring	10Nos. of each type & size for each type of Elevator
1.1.4	Interlocking switch	10Nos. of each type for each type of Elevator
1.1.5	Contactors	1Nos. of each type for each type of Elevator
1.1.6	Coils for contactors	2Nos. of each type for each type of Elevator
1.1.7	Relays	2Nos. of each type & model for each type of Elevator
1.1.8	Relay Coils	10Nos. of each type & model for each type of Elevator
1.1.9	Resistors	100% of total quantity In one elevator of each type
1.1.10	Capacitors	100% of total quantity In one elevator of each type
1.1.11	Suppressor Unit	100% of total quantity In one elevator of each type
1.1.12	Control Rectifier	1No. of each type for each type of Elevator
1.1.13	Impulse module	100% each type for each type of Elevator
1.1.14	Electronic Control Card	1No. each Card for each type of Elevator
1.2	Lift Car	
1.2.1	Fixed contact assembly	6Nos. each type & rating for each type of Elevator
1.2.2	Moving contact assembly	6Nos. each type & rating for each type of Elevator
1.2.3	Operating Lever	4Nos. each type for each type of Elevator
1.2.4	Roller & Tyre	5Nos. each type for each type of Elevator
1.2.5	Dry reed switch	1No. each type for each type of Elevator
1.2.6	Cam arrangement	1No. each type for each type of Elevator
1.2.7	Roller assembly	2Nos. for each type of Elevator
1.2.8	Set of Over Travel Limit Switch	2Sets for each type of Elevator
1.3	Entrances	
1.3.1	Fixed contact assembly	10Nos. each type for each type of Elevator
1.3.2	Moving contact assembly	10Nos. each type for each type of Elevator
1.3.3	Lock arm assembly	10Nos. each type for each type of Elevator
1.3.4	Roller tyre	6Nos. for each type of Elevator
1.3.5	Landing push button station C/W push & cover plate	10 Nos. each type for each type of Elevator
1.4	Miscellaneous	
1.4.1	Push button to suit car and landing push stations	12Nos. each type for each type of Elevator
1.4.2	Indicatcr units to suit car and landing indicators	12Nos. each type for each type of Elevator
1.4.3	Emergency battery unit	2Nos. for each type of Elevator
1.5	Winding Unit	
1.5.1	Set of Brake shoe lining with revets	6Sets each type for each type of Elevator
1.5.2	Brake Coil	2Nos. for each type of Elevator
1.5.3	Hoist Motors	1No. each type and rating for each type of Elevator
1.5.4	Set of Bearings for all motors	1Sets for each type of Elevator
1.5.5	Micro switches	2Nos. each type for each type of Elevator
1.5.6	Solenoids	2Nos. each type for each type of Elevator
1.5.7	Trailing Cable	500Mtrs of each type, size & rating of Cables
1.6	Applicable for Rack-Pinion Type Elevator	
1.6.1	Bearing for Guide Roller	1Set
1.6.2	Bearing for Counter Roller	1Set
1.6.3	Drive Pinion	1No.

NNTPP- NEYVELI 2X500 MW TPS
MANDATORY SPARES

1.2.31	**Elevators**	
i)	Machine and brake packing unit	1 in each type
ii)	Brake lining with Rivets	1 in each type
iii)	Door bushings	1 in each type
iv)	Brake oil	1 in each type
v)	Selectors complete	1 in each type
vi)	Hoist way limit switch	2 in each type
vii)	Down/Up limit switch	2 in each type
viii)	Door operator complete with bumper packing, gland, micro switch etc.	1 in each type
ix)	Door hangers complete with bearing, rollers, sockets screw etc.	1 in each type
x)	Hoist way lock complete with spring rollerss, contacts etc.	1 in each type
xi	415V AC 3 phase contactors complete with auxiliary contacts	1 in each type
xii)	DC contactors complete with auxiliary contacts	1 in each type
xiii)	Fuses of each rating-power	6 in each type
xiv)	Fuses of each rating-control	12 in each type
xv)	Switches of each type	1 in each type
xvi)	Control push button	3 in each type
xvii)	Auxiliary relays complete of each type	1 in each type
xviii)	Motor each type & rating	1 in each type
xix)	Bearing of each type & size for each motor	1 in each type
xx)	Car position indicator and direction indicator	1 in each type
xxi)	Indicator at intermediate boards	1 in each type
xxii)	Micro switches of each type	1 in ach type
xxiii)	Landing button	1 in each type
xxiv)	Landing door contact	1 in each type
xxv)	Door safety edge contact	1 in each type
xxvi)	Car button each type	1 in each type
xxvii)	Transformers of each type & function	1 in each type
xxviii)	Electronic cards of each type/function	1 in each type
xxix)	Charger card	1 in each type
xxx)	Rectifier Unit	1 in each type
xxxi)	MCBs of each type and rating	2 in each type
xxxii)	Counter weight guide shoe	8 nos.
xxxiii)	Car guide shoe	8 nos.
xxxiv)	V V V F drive	1 no.
xxxv)	Magnetic brake coil	1 no.

OIPGCL - 2X660 MW
MANDATORY SPARES

A.IV.4	Elevators (Goods & Passenger)	
4.1	Control Panel	
4.1.1	Copper Contactors	10 Nos. of each type/rating & size for each type of Elevator
4.1.2	Carbon Contacts	10 Nos. of each type & size for each type of Elevator
4.1.3	Compression Spring	10 Nos. of each type & size for each type of Elevator
4.1.4	Interlocking switch	10 Nos. of each type for each type of Elevator
4.1.5	Cortactors	1 Nos. of each type for each type of Elevator
4.1.6	Coils for contactors	2 Nos. of each type for each type of Elevator
4.1.7	Relays	2 Nos. of each type & model for each type of Elevator
4.1.8	Relay Coils	10 Nos. of each type & model for each type of Elevator
4.1.9	Resistors	100% of total quantity In one elevator of each type
4.1.10	Capacitors	100% of total quantity In one elevator of each type
4.1.11	Suppressor Unit	100% of total quantity In one elevator of each type
4.1.12	Control Rectifier	1 No. of each type for each type of Elevator
4.1.13	Impulse module	100% each type for each type of Elevator
4.1.14	Electronic Control Card	1 No. each Card for each type of Elevator
4.2	Lift Car	
4.2.1	Fixed contact assembly	6 Nos. each type & rating for each type of Elevator
4.2.2	Moving contact assembly	6 Nos. each type & rating for each type of Elevator
4.2.3	Operating Lever	4 Nos. each type for each type of Elevator
4.2.4	Roller & Tyre	5 Nos. each type for each type of Elevator
4.2.5	Dry reed switch	1 No. each type for each type of Elevator
4.2.6	Cam arrangement	1 No. each type for each type of Elevator
4.2.7	Roller assembly	2 Nos. for each type of Elevator
4.2.8	Set of Over Travel Limit Switch	2 Sets for each type of Elevator
4.3	Entrances	
4.3.1	Fixed contact assembly	10 Nos. each type for each type of Elevator
4.3.2	Moving contact assembly	10 Nos. each type for each type of Elevator
4.3.3	Lock arm assembly	10 Nos. each type for each type of Elevator
4.3.4	Roller tyre	6 Nos. for each type of Elevator
4.3.5	Landing push button station C/W push & cover plate	10 Nos. each type for each type of Elevator
4.4	Miscellaneous	
4.4.1	Push button to suit car and landing push stations	12 Nos. each type for each type of Elevator
4.4.2	Indicatcr units to suit car and landing indicators	12 Nos. each type for each type of Elevator
4.4.3	Emergency battery unit	2 Nos. for each type of Elevator
4.5	Winding Unit	
4.5.1	Set of Brake shoe lining with revets	6 Sets each type for each type of Elevator
4.5.2	Brake Coil	2 Nos. for each type of Elevator
4.5.3	Hoist Motors	1 No. each type and rating for each type of Elevator
4.5.4	Set of Bearings for all motors	1 Sets for each type of Elevator
4.5.5	Micro switches	2 Nos. each type for each type of Elevator
4.5.6	Solenoids	2 Nos. each type for each type of Elevator
4.5.7	Trailing Cable	1 Set of full length of each size / typf of cables as used foor each type of Elelvator
4.6	Applicable for Rack-Pinion Type Elevator	
4.6.1	Bearing for Guide Roller	1 Set
4.6.2	Bearing for Counter Roller	1 Set
4.6.3	Drive Pinion	1 No.