TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED

1 x 800 MW NORTH CHENNAI TPP STAGE III-FGD

TECHNICAL SPECIFICATION FOR

ELEVATORS

SPECIFICATION NO.: PE-TS-485-502-A001

BHARAT HEAVY ELECTRICALS LIMITED
(A Govt. of India Undertaking)
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA, U.P
INDIA

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3.0) Pre-Bid Clarification/Amendments/Corrigenda
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SECTION – A: SPECIFIC TECHNICAL REQUIREMENT

1.0 Brief Description and Use of Equipment/System

Elevator(s) shall be provided for access to various operating floors / platforms for various buildings listed at s. no. 2.0.3 for North Chennai FGD to facilitate movement of operation & maintenance (O&M) personnel.

2.0 Scope of Equipment Supply and Services

2.0.1 Brief Scope:

Design, Engineering, Manufacture, Inspection & Testing at manufacturer's works or at their sub-vendor's works, Painting, duly packed for transportation to site, delivery to site, storage and handling at site, Erection & Commissioning, carrying out trial run and Acceptance / functional tests at site & final painting and handling over of Passenger Elevators

2.0.2 Codes & Standards: IS: 14665 (Latest edition, all 5 parts).

2.0.3 Technical Data sheet of Elevators:

Sl. No	Building	No of Lifts	Cap.	No of landings	Total Rise	Type	Rated Speed	Type of floor	Operation
1.	FGD Control Room Building	1 No.	680 Kg	0.0M, 3.7M, 8.7M (Three (03) including Ground)	8.7 M	Passenger Elevator Conventional Type.	1 m/s	Vitrified ceramic tiles of mat finish	Simplex
2	Gypsum Dewatering Building	1 No.	680 Kg	0.0 M, 6.50 M, 12.5 M, 19.5 m (Four (04) including Ground)	19.5	Passenger Elevator Conventional Type	1 m/s	Vitrified ceramic tiles of mat finish	Simplex

Further, Bidder's scope for the Elevators shall include the following:

S. No.	DESCRIPTION	DETAILS
A	LIFT PARTICULARS	
1.	Elevator Location	As per scope of supply ref cl. No. 2.0.3 above
2.	Type of Elevator	
3.	Rated Load on Elevator	
4.	Quantity	
5.	Rated Speed of Lift	
6.	Total Travel	
7.	Nos. of floors to be served	
8.	Design, construction, installation, codes including car size, door size, shaft size, size of platform and car entrance	As per IS: 14665 (all relevant parts) (latest edition).
9.	CAR	
9.1	Size	As per IS: 14665
9.2	Car frame	Structural Steel and bolted construction
9.3	Car enclosure & panels	SS-304, 1.5 mm thick sheet of hairline finish.
9.3.1	Other features / facilities in car enclosure	

9.3.1.1	Isolating cushion between car and car frame	Type of cushion shall be rubber pad or spring as per manufacturer's standard.
9.3.1.2	Lighting & fan	One cabin fan, two recessed LED lamp fittings for lux level: 100. LED lighting with a 5A socket shall be provided at every 3 meters interval in lift well/ hoist way. Light and fan in the Car enclosure shall be separate switch control.
9.3.1.3	Ventilation fan in the car as per IS-14665	Shall be provided for adequate ventilation of the car by elevator supplier. Ventilation fan in car shall be provided with manual and automatic switch through selector.
9.3.1.4	Telephone facility in the lift car	Internal telephone wiring and hands free telephone shall be provided in the car.
9.3.1.5	Automatic rescue device (ARD) with battery drive	Automatic Rescue Device (ARD) with battery drive - Modern advanced electronic drive system of rescuing passenger trapped in an elevator to be provided.
9.3.1.6	Hand rails on 3 sides in car	Mirror finish stainless steel.
9.3.1.7	False ceiling	Powder coated
9.3.1.8	Cabin accessories	i. Recessed LED light fittings on car floor. ii. Car control station iii. Emergency stop switch iv. 5/15A plug socket with switch on top of lift car.
9.4	Car platform/ Flooring of cabin	Vitrified ceramic tiles of mat finish
9.5	Car roof	Car roof shall be covered with sheet metal and shall be provided with LED light fitting & a three pin plug 5/15A, socket with switch on top of lift car.
9.6	Leveling accuracy	+/- 12 mm/ As per IS: 14665.
9.7	Overload sensing device and warning indicator	Every passenger lift shall be provided with an overload device (overload warning indicator), which will prevent the lift from starting in case the lift car is loaded to 110 % of the rated capacity of the lift or more. Lift shall remain stationary with door open. Audio and visual warning device shall be provided to alert the passengers in case of overload.
9.8	Car operating panel	
9.8.1	Type of construction	Partial Height car operating panel (COP), Removable type from Car with SS face plate
9.8.2	Push button	Luminous push buttons with IP 54
9.8.3	Other accessories of car operating panel	Car operating panel with luminous buttons, car position indication in car (both visual and audio), direction arrows, overload warning indicator, battery operated alarm bell, emergency light with suitable battery-battery charger, fan and controls, buzzer, emergency call button, hands free speaker telephone set with suitable battery charger & controls.
9.8.4	Push button and call registered tell -tale lights at each landing	

9.8.4.1	Type of construction	Box type with SS face plate
9.8.4.2	Push Buttons	Luminous push buttons with IP 54
9.8.4.3	Description	Two (2) push buttons, one for upward movement and the other for downward movement at each intermediate landing and one (1) push button at each terminal landing shall be provided in order to call the car.
9.8.5	Car position indicator	Digital car position indicator at all floors & tell-tale lights at all floors shall be provided.
9.8.5.1	Type of construction	As per manufacturer's standard
9.8.5.2	Type of display	7 segment LED display or equivalent
10.	Car, Landing door	
10.1	Type of door	Centre opening, horizontal sliding type. Landing door shall be fire rated for Two (02) hours.
10.2	Door Size	As per IS: 14665.
10.3	Method of operation	Power operated with automatic door opening and closing devices. Door operation shall be automatic. Infrared light curtain type electronic door protection system for opening / closing of car & landing doors and shall be provided for safe operation of door and so that in case there is any obstruction in its path while the door is closing, car & landing door shall return to open position.
10.4	Door Hangers and Tracks	Provided.
10.5	MOC for Car door, landing door & Finishing	SS 304 with hairline finishing.
11.	Buffers	Spring type for car and counterweight on structural framework (no RCC buffer pedestal)
12.	Load Plate	As per manufacturer's standard/as applicable
13.	Counter weight and counter weight frame.	
13.1	Counter weights frame	Fabricated Steel Construction
13.2	Counter weight fillers	Cast Iron.
14.	Guide rails complete with supporting brackets for the car and counter weights.	Provided
15.	Limit switches	
15.1	Location	Bottom & top terminal
16.	Apron / Facia Plate provided as per IS 14665	Yes
17.	Method of control	ACVVVF Control with automatic level adjustment. The controls shall be variable voltage and variable frequency type and shall provide smooth and constant acceleration and retardation under all conditions of operation. Suitable control shall be provided in the machine room.
18.	Position of Machine Room	Directly above the lift Shaft.
19.	Operation	• Selective simplex & duplex collective, automatic operation with and without attendant through illuminated push button station located inside the lift car, with provision for locking control in "auto" or "Attendant" position. Key type lock switch shall

		be provided. • The operation of the elevators shall be through push button station located inside the lift car. Suitable interlock shall be provided so that the elevators shall not move unless the doors are properly closed. The landing doors of any floors shall not open when the elevator is not on that floor. • An electric contact for the car door shall be provided which shall prevent elevator movement away from the landing unless the door is in the closed position. The mechanical interlock with auxiliary's door closing device shall be provided so that elevator can be operated only after the interlock circuit is established. • Two push buttons, one for upward movement and the other for downward movement at each intermediate landing, and one push button at each terminal landing shall be provided in order to call the car. • Push buttons shall be fixed in the car for holding the doors open for any length of the time required. • Fireman's switch shall be provided for each elevator
20.	Car Safety & Governor	
20.1	Stopping distance	As per IS:14665
20.2	Type and mode of operation of Over speed Governor device	Centrifugal action
20.3	Tripping speed and design code conforming to	As per IS 14665
20.4	Location	At machine room
21.	Power supply : a) Power b) Lighting & fan	As per elevator requirement. Only two (3 phase) supply feeders per elevator shall be provided one feeder shall be dedicated to elevator motor and other 3 phase supply feeder shall be provided by BHEL for air conditioner, machine room and shaft lighting and maintenance / installation requirement. Power supply mains shall be lockable as per requirements of IS: 1860.
22.	Motor details	
22.1	Type	The motors will be squirrel cage induction type suitable for operation at 415V (+10% to -10% variation), 3 ph, 4 wire, 50 Hz (+3% to -5% variation) supply. The motors will be provided with class-F insulation with temperature rise limited to class-B.

		The motors will generally conform to IS-325 and suitable for AC variable voltage variable frequency (VVVF) application.
22.2	(Type of Duty	Lift Duty
22.3	(Motor Duty	S4
22.4	Applicable standard	IS:325
22.5	Direction of rotation	Both Clockwise & Anticlockwise
22.6	Class of Insulation	F insulation with temperature rise limited to class-B.
22.7	Method of Starting	AC Variable Voltage Variable Frequency
22.8	Type of enclosures	IP55
23.	Door Motor	
23.1	Equipment driven by Motor	Door (car and landing)
23.2	Direction of rotation	Bidirectional
23.3	Type of enclosures	IP54
24.	Cables & Wiring	a) All the cables except trailing cables shall be as per IS 1554-1 or IS 7098-1. The PVC outer sheath of these cables shall be flame retardant, low smoke (FRLS) type. b) Trailing cable: The circular trailing cables shall be either in accordance with IS 4289 Part-I (elastomer insulated) or IS 4289 Part II (PVC insulated). The flat type trailing cables if offered shall be in accordance with IEC 60227-6. All wiring/ cabling between the equipment's in the lift machine room and that between the machine room and equipment's in the lift well and at the landings shall be wired in HDP conduits/ galvanized steel conduits to be supplied by the elevator supplier. Alternatively armored cables may be used.
25.	Earthing	The elevator structures and all equipment including metal conduits shall be effectively earthed with earth conductors provided in the machine room as per IS 3043.
26.	Metallic Wire Mesh between Car & Counter Weight	Yes, by package supplier
27.	Fire Man Switch	Yes, by package supplier
28.	Announcement of floor level	To be provided.
29.	Hall Lantern and Car Arrival Chimes	Hall lantern and car arrival chimes shall be provided for facilitating movement of visually & hearing impaired persons.
30.	Trailing cables	FRLS type.
31.	Protection class	Protection class for main control panel and other equipment shall be IP-54.
32.	AC for Machine room	Split air conditioner of 2T capacity shall be provided for each elevator.
33.	Fire extinguisher	½ Kg CO2 fire extinguisher in elevator car with suitable fixing arrangement.
34.	Fire detection & alarm system	to be provided
35.	Maintenance Tool Kit	With each lift the vendor shall supply a maintenance

		tool kit which shall be kept in machine room.
36.	Other details	Other details shall be as per Elevator vendor's standard proven design and complying specification requirement along with pre-award agreements.
37.0	FUNCTIONAL GUARANTEE	
37.1	Functional Guarantee Test	The Functional Guarantee Test shall be carried out at site as per IS: 14665 (latest edition) as follows: 1. Over speed test 2. Over load test 3. Travel 4. Hoist speed checks
38	Ropes for hoisting	To be provided. Factor of safety for rope shall be 12 (min) or as per IS: 14665, whichever is higher.
39	Fixing/ Fasteners/ Embedment	All fixing materials require fixing rails, brackets, equipment including nuts and bolts. All steel embedment for fixing landing doors / indicators etc. to the elevator well shaft and fascia plate shall be supplied by the bidder.
40	Statutory requirement	All prevailing requirement(s) of statutory and regulatory body shall be included by bidder in their scope. Bidder shall be responsible for obtaining all necessary approval from statutory and regulatory body and lift inspector. However, Purchaser will furnish required information, as and when required.

2.0.4 The Elevators shall be complete with all fittings and accessories including the following:

- Hoisting machine including motor
- Over speed governor
- Brakes
- Limit switches.
- Guide rails, guide bracket and wall inserts
- Machinery support structure / beams
- Steel beams of raft for machine and pulleys
- Safety grips
- Buffers and any associated steelworks
- Steel wire ropes
- Enclosed vestibule with framing
- Hoist way entrances, doors and door tracks
- Car enclosure with door and door hangers
- Car frame and platform construction
- Supporting steel works for horizontal sliding doors and frames for hinged doors
- Pit screen to counter weight
- All steel embedment for fixing landing doors and equipment.
- Steel ladder for access to pit
- Car operating panel with controls, indications and protections
- Landing call station with call registering push buttons and call registered indication
- Load plate
- Intercom for three way communication
- Controller panel

- VVFD for main motor
- VVFD for door motor
- Battery operated emergency light
- Disconnecting switch
- Power and control cables
- Galvanized steel conduits, cable glands/ lugs and terminations
- Earthing system
- Lighting panel
- Lighting for hoist well
- Light & fan for car
- Telephone with all communication cable for communication during an emergency
- Emergency stop switch on top of car
- Emergency stop switch in the pit
- Car and counterweight buffer switch
- Water Sensor" in pit. (This shall prevent the passage of elevator to the lower most floor in case of Water clogging in pit)
- Erection material
- Touch up paint
- First charge of lubricants and consumables
- Startup and commissioning spare parts
- Special tools and tackles required for maintenance of equipment

2.0.5 Commissioning and Start-up Spares:

Bidder to include in the main supply**.**

2.0.6 Exclusion

1) Complete civil works for hoist way, machine room, pit complete with the side enclosure (Brick / RCC), interconnecting platform (if any) and monorail beam.

   Minor civil work including grouting for foundation bolts and supporting structure/ beams at RCC pedestals in the machine room, as required shall be taken care of by bidder during installation of elevator.
2) Trap door along with fixing arrangement and Electric hoist with travelling trolley of 3T capacity to facilitate handling of equipment in the machine room.
3) Power supply cable (AC 415 V, 3 Ph, 50 Hz) up to machine room level. Further cabling (all cables including power, control and instrumentation as per tender specification) shall be provided by the bidder.
4) Supply & fixing of Shaft reduction channel, if any.

2.0.7 Terminal Points & Other Requirements:

1) BHEL / Customer will provide the elevator shaft complete with foundation and brick walls around the elevator shaft together with overhead machine room. The machine room will be provided with RCC floor slab with necessary pockets for anchor bolts and slots.

2) Dummy landing/s, as required in case travel between two consecutive landings is more than 10 m, shall be considered by bidder in their offer.

2.0.8 List of Tools & tackles for Elevator (Bidder to include in Main Supply)

Sl. No.	Description	Qty.	Remarks
1	Spanner of all sizes required for maintenance	1 Set	
2	Adjustable Spanner	1 No.	
3	Allen Key set all sizes required for maintenance	1 Set	
4	Screw driver set	1 No.	
5	Cutting plier	1 No.	
6	Grease gun	1 No.	
7	Nose plier	1 No.	
8	Grip plier	1 No.	
9	Hook spanner	1 No.	
10	Box spanner	1 No.	
11	Oil can	1 No.	
12	Measurement Taps	1 No.	
13	Paint brush 1/4,1/2,3/4 inch	1 No. of each	
14	Line tester	1 No.	
15	Multimeter	1 No.	
16	Soldering iron	1 No.	
17	Torch Light	1 No.	
18	Knife cutter	1 No.	
19	Steel rule	1 No.	
20	Wire Striper	1 No.	
21	Tube Spanner Combination	1 No.	
22	Hammer 1/2 Kg	1 No.	
23	Dial wrench	1 No.	

2.0.9 List of Mandatory Spares for Elevator (Refer Price Schedule)

		for Gypsum Dewatering Building Elevator	for FGD Control Room Building Elevator
Sl. No.	**Description**	**Quantity (Units)**	**Quantity (Units)**
a	**Brakes**		
1	Tool to brake	1 No.	1 No.
2	Fan	1 No.	1 No.
3	Magnet coil with housing pads	2 Nos.	2 Nos.
4	Brake pads	6 Nos.	6 Nos.
5	Adjusting sleeve	2 Nos.	2 Nos.
6	Fixed brake disc	2 Nos.	2 Nos.
b	**Worm Gear**		
1	Worm gear	1 no.	1 no.
2	'O' ring	2 nos. of each type	2 nos. of each type
3	Sealing ring	2 nos. of each type	2 nos. of each type
c	**Door Front**		
1	Bearing	2 Nos.	2 Nos.
2	Roller	3 Nos.	3 Nos.
3	Bushing	2 Nos.	2 Nos.
d	**Limit Cams**		
1	Sensor	1 No.	1 No.
2	Switch	2 Nos.	2 Nos.
3	Switch arm	2 Nos.	2 Nos.
e	**CAD**		
1	Guide roller	50 % of the total ones installed	50 % of the total ones installed each

		each type or minimum 1 no. whichever is higher	type or minimum 1 no. whichever is higher
2	Switch	1 no.	1 no.
f	**Sliding Door**		
1	Rollers	4 nos. of each type	4 nos. of each type
g	**Machinery**		
1	Guide roller	2 Nos.	2 Nos.
2	Pinion	1 no.	1 no.
3	Rubber inserts	6 nos.	6 nos.
4	Grove ring	6 nos.	6 nos.
5	Brake motor	1 no.	1 no.
h	**Cable trolley**		
1	Ball bearing	2 nos. of each type	2 nos. of each type

* One set means one complete replacement for one equipment.

3.0 Painting / Details of Special Treatment of Elevator:

All items shall be treated with anticorrosive epoxy based paint for the ferrous metal items except for the items of SS construction, which shall not be painted.

Painting shall be carried out by an approved process. Pre-treatment shall conform to applicable standard. The equipment shall be subject to a coat of red oxide primer paint. All inside and outside surface shall be painted with synthetic enamel paint other than stainless steel surface. The final thickness of paint film on steel shall not be less than 50 microns. Final shade will be informed to the successful Bidder during award of the contract. Sufficient quantity of touch-up paint shall be furnished for application at site.

4.0 Input Drawings by BHEL:

Sl. No.	Drawing/ Document Title	Drawing No.
1.	Engg. Input Drawing for 680 KG Capacity Elevator for ESP Control Room	PE-DG-485-502-A001
2.	Engg. Input Drawing for 680 KG Capacity Elevator for Gypsum Dewatering Building	PE-DG-485-502-A002

5.0 Master Drawing List (MDL) and Submission Schedule:

Preparation of all necessary drawings / data sheets / documents / calculations as required for obtaining necessary local administration permits / approval from statutory authority and make arrangement for inspection and tests required thereby for necessary approval on behalf of the customer. Fees (as required) for obtaining approval from statutory bodies shall also be included in the scope of work of the bidder.

All drawings shall be prepared as per BHEL's title block and bear BHEL's drawing No. and customer / consultant's drawing no; which will be forwarded to the successful bidder during detail engineering stage. Bidder to submit revised drawings complete in all respects incorporating all comments. Any incomplete drawing submitted shall be treated as non-submission with delays attributable to bidder's account.

Sl. No.	BHEL Doc No.	Drawing Title	Time**
1	PE-V0-485-502-A001	TECHNICAL DATA SHEET OF GDW BUILDING ELEVATOR	2
2	PE-V0-485-502-A002	GA, M/C ROOM LAYOUT, SCOPE & BOM AND DIMENSIONAL DETAILS OF GDW BUILDING ELEVATOR	2
3	PE-V0-485-502-A005	O&M MANUAL FOR ELEVATOR	10
4	PE-V0-485-502-A006	WIRING DIAGRAM & POWER DISTRIBUTION SCHEMATIC	4
5	PE-V0-485-502-A007	QUALITY PLAN FOR ELEVATORS	2

*Except Sl No. 4 & 5, other drawings will be in Approval category and considered in delay analysis.
** Schedule of Submission in No. of weeks from date of LOA/ PO.

Refer GCC for modalities of Engineering Documents Submission.
Every repeat submission by Supplier: Within one (1) week.
Response time by BHEL: Within three (3) weeks after receiving of drawing.
Delay beyond the stipulated duration shall be considered in delay analysis.

After final acceptance of individual equipment/ system by the BHEL/ Customer, the bidder will update all original drawings and documents for the equipment/ system to “as built” conditions and submit to BHEL/ Customer.

The number of copies/prints/CD-ROMs/manuals to be furnished for various types of document is given in the table below:

Sl. No.	Description of Drgs. / Docs.	No. of Prints	No. of Portable Hard Disk
1	**Drawings/ Documents**		
1.1	First submission and submission with major changes	4	-
1.2	Final (Directly to site)	6	2
1.3	“As Built” (Directly to site)	6	2
2	Operation & Maintenance manual i) First Submission ii) Final Submission (Directly to site)	 1 set 4 sets	 2

6.0 Electrical Specification:

i) Electrical scope between BHEL and Bidder is enclosed as Annexure-1.

ii) Electric Motor

The driving motors shall be squirrel cage induction type conforming to IS: 325 and suitable for variable voltage variable frequency (VVVF) operation at 415 V (+/- 10% variation), 3 Phase, 3 wire, 50 Hz (+3% to -5% variation) supply. For the purpose of

design of equipment/systems, an ambient temperature of 50 °C and relative humidity of 95% (at 40 deg C) shall be considered. The equipment shall operate in a highly polluted environment. Motors shall be provided with class F insulation & temp rise limited to class 130 (B). Protection class for motor shall be IP 54.

iii) Controls

The control shall be variable voltage and variable frequency type and shall provide smooth and constant acceleration and retardation under all conditions of operation. Suitable control panels shall be provided in the machine room. The lift will be automatically stopped by upper and lower terminal switches. The elevators will have an emergency stop switch, limit switches and other safety devices according to statutory rule.

iv) Cables and Wirings

All the cables except trailing cables shall be as per IS:1554-1 or IS-7098-I. the PVC outer sheath of these cables shall be flame retardant, low smoke (FRLS) type with the following FRLS properties.

(i) Oxygen index of min. 29 (as per IS:10810 Part-58)
(ii) Acid gas emission of max. 20% (as per IEC-754-I)
(iii) Smoke density rating shall not be more than 60% (as per ASTM D 2843)

The circular trailing cables shall be either in accordance with IS 4289 Part-I (elastomer insulated) or IS 4289 Part-II (PVC insulated). The flat type trailing cables if offered shall be in accordance with IEC 60227-6. The voltage grade shall be 1100V.

All wiring / cabling between the equipments in the lift machine room and that between the machine room and equipment in the lift well and at the landing shall be wired in HDP conduits / galvanised steel conduits to be supplied by the bidder. Alternatively, armoured cables may be used.

v) CAR ELECTRICAL ACCESSORIES

The following accessories shall be provided:

1) LED light fittings for illumination level of 100 lux on car floor.
2) Portable light and alarm bell with battery and charger ventilation fan with control.
3) Car control station with position indicator inside the car and at landing platforms (both visual and audio).
4) Emergency stop switch.
5) 5/15A, 3 pin plug socket with switch on top of lift car.
6) Hand free speaker telephone set connected to plant network.
7) AUTOMATIC RESCUE DEVICE (ARD)-(BATTERY DRIVE) :
8) Contractor to provide a modern Advanced electronic drive system of “RESCUING Passenger Trapped in a ELEVATOR”.
9) EMERGENCY SAFETY DEVICES : The lift shall be provided with safety Device attached to the lift car frame and placed beneath the car. The safety device shall be capable of stopping and sustaining the lift car up at governor tripping speed with full rated load in car.

vi) OPERATIONAL REQUIRMENTS:

a. Contractor shall provide car operating panel with luminous buttons, car position indication in car (both visual and audio) combined with direction arrows, overload warning indicator, battery operated alarm bell and emergency light and fan & hands free speaker telephone set with suitable battery, charger & controls.

b. Contractor shall provide emergency indicator to indicate the location of elevator in case of elevator being stuck up between the floors through automatic flashers (both audio & visual).
c. Contractor shall provide electronic door detector (Infra red curtain type).
d. Digital hall position indicator at all floors, tell lights at all floors shall also be provided by the Contractor.
e. For facilitating the movement of visually & hearing impaired persons, hall lantern and car arrival chimes shall be provided
f. All fixtures shall be in stainless steel face plates.
g. Push buttons shall be fixed in the car for holding the doors open for any length of the time required.
h. All other safety/protection/operation interlocks as required by IS:14665 (latest edition).

vii) Earthing

The elevator structures and all electrical equipments, including metal conduits shall be effectively earthed with the earth conductors provided in the machine room as per IS: 3043.

7.0.0 GENERAL REQUIREMENTS

a) The elevator installation under this Specification shall be carried out in conformity with the local acts / rules with latest amendments which are in force, including the rules of fire lifts, as will be required by the bidder to obtain license for the elevators from PWD Inspector, Maharashtra State (Inspector of lifts) as specified.

b) The bidder shall obtain and pay for necessary Municipal or State inspections and permits as required including license fees for installation and inspection of elevators equipment, also make such tests as called for by the regulations of such authorized representatives of such authorities as well as in the present of the Owner's representative. The bidder shall be responsible to obtain license for operating the elevators at site.

8.0.0 OTHER TECHNICAL REQUIREMENTS

a) Dust protective equipment shall be provided on brake; controller cabinet (totally enclosed); selector; limit switches; hall button fixtures with signals; car operating panel; car position indicator in car; hall position indicator at each landing; safety operating switch; wiring materials; and car door switches.

b) Fungicidal treatment shall be provided on equipment such as Machine; Brake; Motor; MG Set; Controller and Selector to withstand the hot humid and tropical atmosphere.

c) The machine shall be pressurized to supply reasonable clean filtered air to minimize dust in the machine room.

9.0.0 ELEVATOR OPERATIONS

a) Microprocessor based simplex selective- collective operation with/without automatic operation by means of one button in the car for each landing level served and by up-and down buttons at the landings, wherein all stops registered by the momentary actuation of car made as defined under non-selective automatic operation but wherein the stops registered by the momentary actuation of the landing buttons are made in the order in which the landings are reached in each direction of travel (irrespective of the sequence in which the buttons have been actuated.

b) With this type of operative all' up' landing calls are answered when the car is traveling in the up direction and all 'down' landing calls are answered when the car is traveling in the down direction except in the case of the uppermost or lowermost calls which are answered as soon as they are reached in-respective of the direction of travel of the car.

c) A by-pass button (non-stop button) shall also be provided inside the car to enable the attendant position. The operation of the cars shall be identical with that described for automatic operations except that closing of doors and starting of cars shall be initiated by the car buttons only and landing by-pass shall be effective.

d) The control circuit shall be designed to the type of elevator specified for safety operation. It shall not be possible to start the car unless all the car and landing doors are fully closed and landing doors locked. The circuit shall have an independent fuse protection for fault and over loads and be arranged so that earth fault or an open circuit shall not create unsafe condition.

e) The circuit shall be so arranged that for the stoppage of the car at specified landing or for actuation of a contactor by emergency switches or operation of safety gears the system shall not depend upon the completion or maintenance of an electrical circuit to cut off power supply and apply the brakes.

f) Door open and close push button shall be provided in the car. It shall be possible to stop or reverse the door closing through the door open button in the elevator car. Door close button shall allow the door to be closed for a call. The following buttons shall also be provided in the car operating panel in addition to standard buttons.

-Emergency Stop
-Attendant Transfer Switch/Key
-Alarm

g) When the car door panel is touched by a person or object while the car door is closing, the car and Hoist way doors shall return to their open position. The doors shall remain open until expiration of a pre-determined interval and then close automatically.

h) Elevator shall have means to cut off power from the motor, whenever an excessive descending speed is reached, and apply the normal brake prior to the application of the safety brake.

i) Overload of the elevator shall be sensed by improvised sensing devices such as strain gauge, load cell and shall be precise and accurate. The elevator car and landing door shall not close on overload condition and shall remain open till the over load cease to exist. Audiovisual alarm for overload shall be provided inside the car.

j) Elevator shall be provided with a self-leveling feature that will automatically bring the car to floor landings. This self-leveling shall, within its zone, be entirely automatic and independent of the operating device and shall be self-correcting for over-travel or under-travel and rope stretch.

k) Elevator shall have auto recorded audio annunciation system which shall annunciate for arrival of each landing, improper closing of doors and any other required for the elevator.

l) Elevator shall be equipped with an automatic stopping device, arranged to bring the car to a stop at the terminal landings independently of the regular operating device in the

car. Final limit switches shall be provided in the hoist way, operated by the car and arranged to stop the car and prevent normal operation should it travel beyond the zone of the normal stopping device.

10.0.0 Performance/ Functional Guarantees / Tests:

Trial operation, commissioning, performance/ demonstration guarantee tests shall be carried out at site as follows:

A. Rated capacity of the Elevator.
B. Travel and hoist Speed of the Elevator.
C. Accurate positioning of the Elevator.
D. Over Load test of the Elevator as per IS:14665 (Latest edition)

11.0.0 Quality and Inspection:

Quality Plan has been provided in this specification for reference. Bidder shall submit the Quality Plan for BHEL/ Customer approval after award of the contract during detailed engineering stage without any commercial & delivery implication to BHEL.

12.0.0 Packing, Transportation and Site Handling:

The complete material shall be supplied in suitable lockable sealed container. All elevator material will be packed in wooden box except guide rail and the wooden box will be placed in the container for dispatch. Site handling is in bidder's scope and preservation of elevator components shall be taken care by bidder suitably.

13.0.0 List of makes of components of Elevators:

SN.	Item	Name of Supplier	Place	Remarks
1.	WIRE ROPES	USHA MARTIN	RANCHI	
		BHARAT WIRE ROPE	MUMBAI.	
2.	TRAILING CABLE	GEBAUR & GRILLER- AUSTRIA		
		DAETWYLER (THELMA) CABLES	SWITZERLAND	
		LAPP	GERMANY	
		UNIVERSAL	-	
		INCABSTEP	-	
3.	BUFFER SPRINGS	INDUSTRIAL STEEL SPRING	-	
		ALL INDIA STEEL SPRING MANUFACTURING COMPANY	-	
		KOLKATA SHAW COMPANY	KOLKATA	
		SUPER INDIA SPRINGS	KOLKATA	
		MESCO SPRING.	MUMBAI.	
4.	GEAR INTERNALS	PREMIMUM ENERGY TRANSMISSION LTD	PUNE	
		SICOR S.P.A.	ITALY	
		OEM		
5.	DRIVER MOTOR	SIEMENS	MUMBAI	

SN.	Item	Name of Supplier	Place	Remarks
		ABB	FARIDABAD	
		BHARAT BIJILI	-	
		CGL	-	
		KIRLOSKER ELECTRIC CO LTD	-	
		OEM	-	
		NGEF		
		MARATHON		
		GE POWER		
		RAJINDRA ELECT INDUSTRIES		
		LAXMI HYDRAULICS PVT. LTD.		
6.	STAINLESS STEEL	SAIL	-	
		MINOX METAL	-	
		JINDAL	-	
7.	CR SHEET	ARCELOR MITTAL/ NIPPON STEEL	-	
		TATA STEEL BSL LIMITED	-	
8.	CABLES	DELTON	-	
		NICCO	-	
		UNIVERASL	-	
		FINOLEX	-	
		CCI	-	
		MACROTHREM	-	
		VARSHA CABLES	-	
		KEI.	-	
		PARAMOUNT	-	
		POLYCAB	-	
9.	RELAYS	SIEMENS	-	
		SCHNEIDER TELEMECHANIQUE	-	
		SALZER	-	
		SCHNIDER ELECTRIC	-	
10.	CONTACTORS	SIEMENS	-	
		L&T	-	
		GE	-	
		SCHNEIDER TELEMECHANIQUE	-	
11.	TRANSFORMERS	SHARP ELECTRONICS	-	
		MELCON CONTROLS	CHENNAI	
		LOGITECH	-	
		GUNHAWA ELECTRIC CO LTD.	-	
12.	INVERTOR (V3F)	YASKAWA	GERMANY	
		TOSHIBA	JAPAN.	
13.	T GUIDES	SAVERA	CHINA	
		D.D HITECH	-	
14.	CAR DOOR OPERATOR	WITTUR GMBH	AUSTRIA	
		FERMATOR	-	
		OEM	-	
15.	INFRARED DOOR CURTAIN	MEMCO	UK	
		WECO	-	

SN.	Item	Name of Supplier	Place	Remarks
		TLJONES	-	
16.	BATTERY (LEAD ACID)	EXIDE		
		HBL POWER SYSTEM	HYDERABAD	
		AMAR RAJA	TIRUPATI	
		AMCO SAFT INDIA LTD	BANGALORE.	

Note:

1. The sub-vendor list above is indicative and is subject to BHEL/ Customer approval during detailed engineering stage without any commercial & delivery implication to BHEL.

   Bidder to propose sub vendor within 4 weeks of placement of LOA. Thereafter, no request for additional sub-vendor shall be entertained.

2. In case of assembled imported elevator, makes of BOIs shall be subject to BHEL/ Customer approval during detail engineering stage without any commercial implication at contract stage.

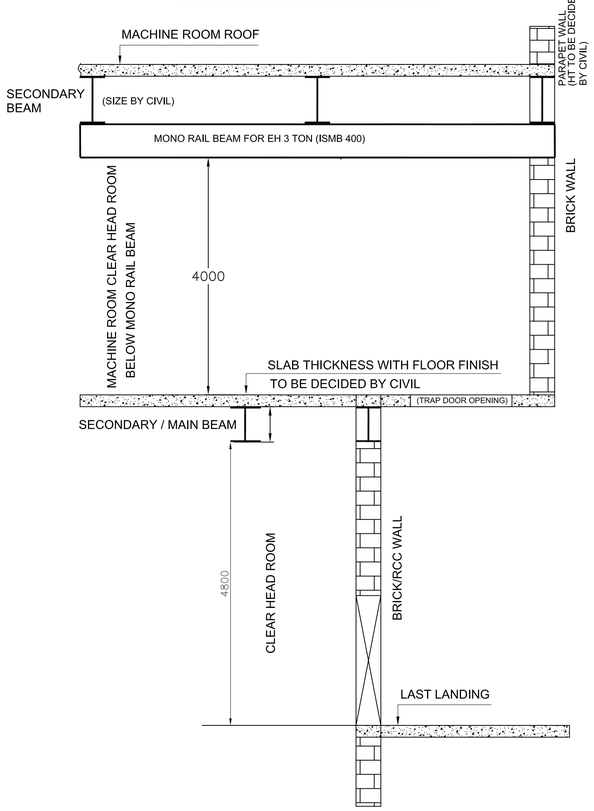
3. Dealers are not acceptable for any item of the package. Bidder shall procure all items including plates, structural etc. from approved sub vendor only.

ANNEXURE-1: STANDARD ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR

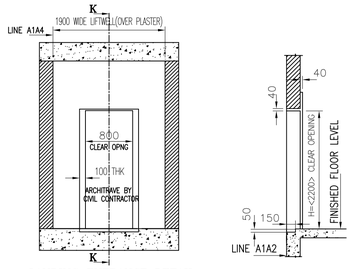
S. NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
1	Isolating Switch	Vendor	Vendor	BHEL will provide two number 415 V (3ph, 4W) supply feeder only up to isolating switches for elevators. Any other voltage level (AC/DC) required will be derived by the vendor. Motor starter shall be part of elevator control panel.
2	Power cables, control cables, screened control cables and any special cables (if required) between equipment supplied by vendor.	Vendor	Vendor	Cable from supply feeder to isolating switch shall be in BHEL scope.
3	Cabling material (cable trays, accessories, cable tray supporting system, conduits etc).	Vendor	Vendor	Local cabling from nearby main route cable tray (BHEL scope) to equipment terminal (vendor's scope) shall be through 100/ 50 mm. cable trays/ conduits/ Galvanised steel cable troughs, as per approved layout drawing during contract stage.
4	Equipment Earthing	Vendor	Vendor	All equipment metallic enclosures / frames, metal structure etc. shall be grounded at two points each to the nearest grounding points / risers provided by BHEL.
5	Motors	Vendor	Vendor	Makes shall be subject to customer/ BHEL approval at contract stage.
6	Cable glands and lugs for equipment supplied by vendor	Vendor	Vendor	1. Double compression Ni-Cr plated brass cable glands 2. Solder less crimping type heavy duty tinned copper lugs for power & control cables.
7	a) Input cable schedules (C & I) b) Cable interconnection details for above c) Cable block diagram	Vendor Vendor Vendor	- - -	Cable listing for Control and Instrumentation Cable in enclosed excel format shall be submitted by vendor during detailed engineering stage.
8	Equipment layout drawings	Vendor	-	
9	Electrical Equipment GA drawing	Vendor	-	For necessary interface review.

STANDARD DETAILS OF SHAFT

ELEVATION ON MACHINE ROOM

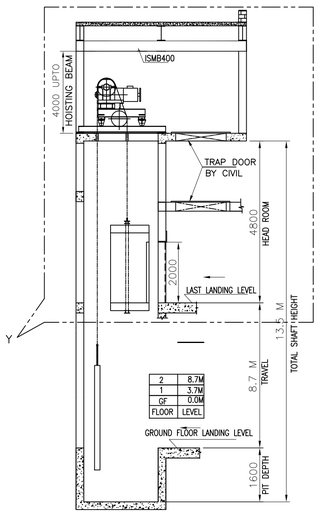


DETAIL–Y



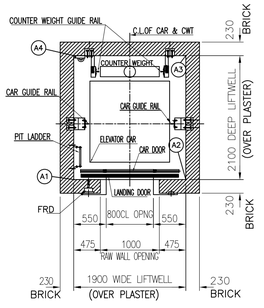
LANDING ENTRANCE DETAIL
(VIEW FROM LIFT WELL OUTSIDE)
(TYPICAL FOR ALL FLOORS)

SECTION–KK

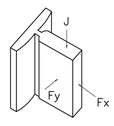


ELEVATIONAL DETAILS
(NOT FOR SCALE)

STANDARD DETAILS OF PIT

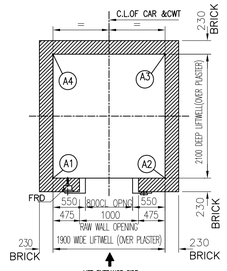


FORCES ON CAR & CWT GUIDE RAIL	
Fx	700 N
Fy	600 N
J	19000 N

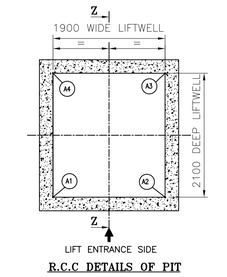


GUIDE RAIL FORCES

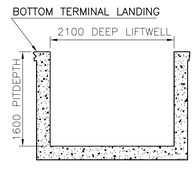
PLAN ON LIFTWELL– TYPICAL LOCATION OF GUIDERAILS FOR CAR & COUNTERWEIGHT



PLAN ON LIFTWELL

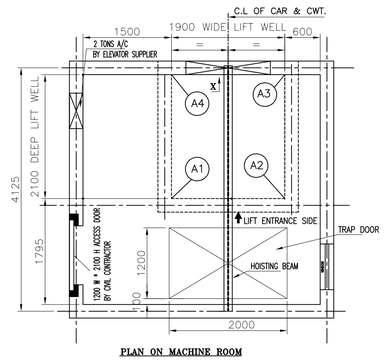


R.C.C DETAILS OF PIT

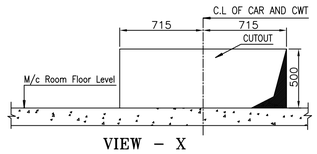


SECTION ZZ

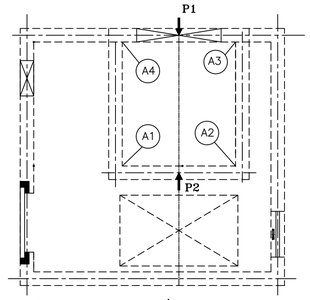
STANDARD DETAILS OF MACHINE ROOM



PLAN ON MACHINE ROOM

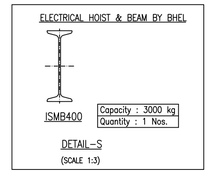


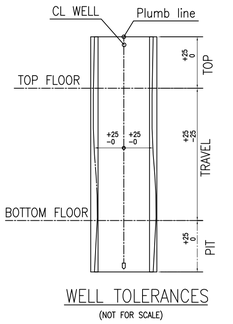
VIEW – X



LOAD POSITION ON M/C ROOM PLAN

Point	Dynamic Load (Kg)
P1	15000
P2	6000





WELL TOLERANCES
(NOT FOR SCALE)

S.NO	AREA	SCOPE	DESCRIPTION OF WORK	AGENCY
1	PIT	CIVIL	PIT LADDER AND SCAFFOLDING IN ELEVATOR SHAFT.	BY VENDOR
2	PIT	CIVIL	PIT SHALL BE MADE DRY AND WATER PROOF.	BY CIVIL CONTRACTOR
3	PIT	CIVIL	BARE PIT SHALL BE PROVIDED. SUPPORTING MS STRUCTURE FOR CAR & CW BUFFER SHALL BE PROVIDED BY VENDOR.	BY VENDOR
4	PIT	CIVIL	PIT SLAB SHALL BE CASTED TO TAKE CARE OF CAR & COUNTERWEIGHT BUFFER LOADS (MAX. LOAD OF 21T) AS THE POSITION OF LOAD & STRUCTURED BUFFER IS VENDOR SPECIFIC . HENCE, CIVIL CONTRACTOR SHALL SIZE THE SLAB THICKNESS ACCORDINGLY WRT TOTAL LOAD OF 21T.	BY CIVIL CONTRACTOR
5	ELEVATOR CAR	ELECTRICAL	ELEVATOR CAR LIGHTING	BY VENDOR
6	ELEVATOR CAR	MECHANICAL	1/2 Kg CO / SUITABLE TYPE FIRE EXTINGUISHER ALONG WITH FIXING ARRANGEMENT.	BY VENDOR
7	AT EVERY LANDING	CIVIL	POCKET CUTTING / HOLES FOR LOP, FRD, LANDING DISPLAY & ANY OTHER FOR EVERY LANDING LEVEL SHALL BE DONE BY VENDOR.	BY VENDOR
8	AT EVERY LANDING	CIVIL	GROUTING FOR LOP, FRD, LANDING DISPLAY & ANY OTHER FOR FIXATION AT EVERY LANDING LEVEL SHALL BE DONE BY VENDOR.	BY VENDOR
9	ELEVATOR SHAFT	CIVIL	SHAFT WHITE WASHING.	BY CIVIL CONTRACTOR
10	ELEVATOR SHAFT	CIVIL	ALL ANCHOR BOLTS FOR FIXING GUIDE BRACKET AND BEAMS IN MACHINE ROOM.	BY VENDOR
11	ELEVATOR SHAFT	CIVIL	LIFT SHAFT HAS TO BE IN THE PLUMB LINE WITH A LIMIT OF -0 +25MM.	BY CIVIL CONTRACTOR
12	ELEVATOR SHAFT	ELECTRICAL	BULK HEAD FITTINGS OF MINIMUM 60 WATTS/ 18W CFL SHALL BE PROVIDED AT EVERY 3 METERS AND A PLUG POINT 15A/5A, 3 PIN AT EVERY 6 METERS-ADJACENT TO THE BULK HEAD FITTINGS. THE POSITION SHOULD BE AT ANY CORNER OF THE WALL OF COUNTER WEIGHT.	BY VENDOR
13	ELEVATOR SHAFT	ELECTRICAL	FIREMAN SWITCH & PIT SWITCHES.	BY VENDOR
14	ELEVATOR SHAFT	MECHANICAL	WIRE MESH BETWEEN CAR & COUNTER WEIGHT.	BY VENDOR
15	MACHINE ROOM	CIVIL	ELEVATOR MACHINE ROOM SHALL BE DESIGNED AS PER THE LOAD REQUIREMENTS GIVEN IN THE ENGG. INPUTS DRAWING FOR ELEVATOR.	BY CIVIL CONTRACTOR
16	MACHINE ROOM	CIVIL	PROVIDE THE REQUIRED HOLES/ POCKETS FOR MAIN ROPES / OSG ROPES/ SHAFT ELECTRIFICATION IN THE MACHINE ROOM FLOOR AS PER THE DIMENSIONS GIVEN IN THE ENGG. INPUTS DRAWING FOR ELEVATOR.	BY CIVIL CONTRACTOR
17	MACHINE ROOM	CIVIL	THE MONORAIL BEAM (3 TONS) FOR HOISTING THE MACHINE & HOIST TO BE PROVIDED AS PER THE ENGG. INPUTS DRAWING FOR ELEVATOR.	BY CIVIL CONTRACTOR (SUPPLY & ERECTION OF MONORAIL BEAM SHALL BE DONE BY CIVIL CONTRACTOR)
18	MACHINE ROOM	CIVIL	TRAP DOOR SHALL BE PROVIDED AS PER ENGG. INPUTS DRAWING FOR ELEVATOR.	BY CIVIL CONTRACTOR
19	MACHINE ROOM	CIVIL	SECONDARY BEAM ARRANGEMENT SHALL BE PERPENDICULAR TO MONORAIL BEAM.	BY CIVIL CONTRACTOR
20	MACHINE ROOM	CIVIL	STANDARD MACHINE ROOM DIMENSIONS AS REQUIRED ARE INDICATED IN THE DRAWING, TO SUIT CIVIL DESIGN WRT CIVIL STRUCTURE STABILITY, MACHINE ROOM SIZE CAN BE INCREASED (AS PER CIVIL REQUIREMENT) AND THEN SIZE OF MONORAIL BEAM(ISMB 400) AS MENTIONED IN DETAIL-Y VIEW SHALL BE FINALIZED BY CIVIL AGENCY.	BY CIVIL CONTRACTOR
21	MACHINE ROOM	CIVIL	PROPER ACCESS TO THE MACHINE ROOM SHALL BE PROVIDED AND IT SHOULD BE SAFE AND RIGID WITH HANDRAILS FOR ADEQUATE GRIP.	BY CIVIL CONTRACTOR
22	MACHINE ROOM	ELECTRICAL	THE MACHINE ROOM SHALL BE ADEQUATELY ILLUMINATED. THE MACHINE ROOM SHALL HAVE MINIMUM 200 LUX ILLUMINATION AT THE FLOOR LEVEL.	BY VENDOR
23	MACHINE ROOM	ELECTRICAL	CONVENIENT OUTLET (15A /5A) IN THE MACHINE ROOM TO BE PROVIDED FOR POWER TOOL USAGE.	BY VENDOR
24	MACHINE ROOM	ELECTRICAL	ONLY TWO (3 PHASE) SUPPLY FEEDERS PER ELEVATOR SHALL BE PROVIDED ONE FEEDER SHALL BE DEDICATED TO ELEVATOR MOTOR AND OTHER 3 PHASE SUPPLY FEEDER SHALL BE PROVIDED BY BHEL FOR AIR CONDITIONER, MACHINE ROOM AND SHAFT LIGHTING AND MAINTENANCE /INSTALLATION REQUIREMENT. VENDOR SHALL PROVIDE CT FOR STEPPING DOWN THE VOLTAGE AS PER THEIR REQUIREMENT.	BY ELECTRICAL CONTRACTOR (VENDOR TO CONSIDER CT IN THEIR SCOPE FOR STEPPING DOWN THE VOLTAGE AS PER THEIR REQUIREMENT)
25	MACHINE ROOM	ELECTRICAL	THE TERMINATION & TERMINATION BOX FOR THE FEEDERS SHALL BE PROVIDED.	BY VENDOR
26	MACHINE ROOM	ELECTRICAL	THE EARTHING LEADS / EARTH STRIPS SHALL BE PROVIDED NEAR ELEVATOR SHAFT AT GROUND FLOOR BY ELECTRICAL CONTRACTOR AND FROM GROUND FLOOR TO MACHINE ROOM SHALL BE ROUTED BY VENDOR.	BY ELECTRICAL CONTRACTOR & BY VENDOR
27	MACHINE ROOM	ELECTRICAL	EPABX CONNECTIVITY SHALL BE PROVIDED TILL MACHINE ROOM BY ELECTRICAL CONTRACTOR & FROM MACHINE ROOM TO ELEVATOR BY VENDOR	BY ELECTRICAL CONTRACTOR & BY VENDOR
28	MACHINE ROOM	MECHANICAL	SPLIT AC (MIN 2 TONS) TO BE PROVIDED IN THE EACH ELEVATOR MACHINE ROOM.	BY VENDOR
29	ELEVATOR SHAFT	CIVIL	ELEVATOR SHAFT SHALL BE OF CLAY BRICK (MIN. 230MM THK) OR R.C.C ONLY. (FLY ASH BRICKS NOT TO BE USED), LINTEL BEAM AT EVERY 2.3 M TO 2.5 M SHALL BE PROVIDED FOR COUNTER WEIGHT & CAR BRACKET FIXING.	BY CIVIL CONTRACTOR
30	ELEVATOR SHAFT	CIVIL	LIFT ENTRANCE SIDE WALL (ON ALL FLOORS) SHALL BE KEPT ON HOLD & SHALL BE CONSTRUCTED AFTER ORDERING/ RECEIVING INPUT FROM FINALLY SELECTED BIDDER. UPON LIFTING HOLD, FINAL WALL CONSTRUCTION SHALL BE DONE BY CIVIL CONTRACTOR ONLY.	BY CIVIL CONTRACTOR
31	ELEVATOR SHAFT	CIVIL	CLEAR HEADROOM OF 4.8M IS REQUIRED ABOVE LAST LANDING LEVEL OF ELEVATOR (EXCLUDING MACHINE ROOM SLAB THICKNESS & SECONDARY BEAM (IF ANY)), THE SAME IS TO BE ENSURED ACCORDINGLY BY CIVIL CONTRACTOR.	BY CIVIL CONTRACTOR
32	ELEVATOR SHAFT	CIVIL	IN CASE OF DUPLEX ARRANGEMENT OF ELEVATORS, WHERE ELEVATORS ARE PLACED SIDE BY SIDE, BRACKET OF GUIDE RAILS FOR BOTH THE ELEVATORS SHALL BE FIXED ON THE COMMON WALL BETWEEN BOTH LIFT SHAFTS. HENCE, THIS WALL MAY BE SUITABLY DESIGNED/ STRENGTHENED SO AS TO SUSTAIN REQUIRED GUIDE RAIL LOADS AS THIS WALL SHALL BE SUBJECT TO GUIDE RAIL FORCES FROM BOTH SIDES.	BY CIVIL CONTRACTOR
33	ELEVATOR SHAFT	CIVIL	DUMMY LANDING/S, ARE REQUIRED IN CASE TRAVEL BETWEEN TWO CONSECUTIVE LANDINGS IS MORE THAN 10 M, AS PER CODAL REQUIREMENT. HENCE, CORRESPONDING LANDING PLATFORMS & SUITABLE ACCESS LADDER/ STAIRS FOR DUMMY LANDING PLATFORMS ARE ALSO TO BE PROVIDE ACCORDINGLY.	BY CIVIL CONTRACTOR
34	ELEVATOR SHAFT	CIVIL	CIVIL LOADS SHALL BE TRANSFERRED TO WALLS (TYPICAL LOCATION AS SHOWN IN DRAWING), WALLS SHALL BE DESIGNED ACCORDINGLY.	BY CIVIL CONTRACTOR
35	MACHINE ROOM	CIVIL	CLEAR HEIGHT OF 4M IS REQUIRED IN THE ELEVATOR MACHINE ROOM BELOW MONORAIL BEAM (I.E. EXCLUDING MONORAIL BEAM (FOR ELECTRIC HOIST), SECONDARY BEAMS (IF ANY) & SLAB THICKNESS), HENCE, ELEVATION OF TOP OF MACHINE ROOM ROOF TO BE CALCULATED ACCORDINGLY BY CIVIL CONTRACTOR.	BY CIVIL CONTRACTOR
36	MACHINE ROOM	CIVIL	TRAP DOOR IS TO BE PLACED IN MACHINE ROOM TOWARDS ELEVATOR LANDING SIDE CONSIDERING THAT NO EQUIPMENTS/ OBJECTS SHALL BE LOCATED BELOW THE SAME AT LAST LANDING LEVEL FLOOR, ELSE IT WOULD CAUSE HINDRANCE IN MOVEMENT OF ELEVATOR MACHINERY OUT OF THE MACHINE ROOM DURING MAINTAINENCE.	BY CIVIL CONTRACTOR
37	PIT, SHAFT & MACHINE ROOM	CIVIL	NO PROJECTIONS ARE ALLOWED INSIDE THE LIFT SHAFT / PIT AND MACHINE ROOM. HENCE PLEASE ENSURE THAT ANY COLUMN / COLUMN FOUNDATIONS/ PLINTH BEAMS/ FLOOR SUPPORTING BEAMS SHOULD NOT BE PROJECTED INSIDE THE LIFT SHAFT/ PIT & ELEVATOR MACHINE ROOM.	BY CIVIL CONTRACTOR
38	MACHINE ROOM	CIVIL	MINIMUM REQUIREMENT OF MACHINE ROOM ALONG WITH TRAP DOOR ARE INDICATED HERE. HOWEVER PROJECT SPECIFIC REQUIREMENTS SHALL BE DISCUSSED ON CASE TO CASE BASIS.	BY CIVIL CONTRACTOR

NOTE: ALL DIMENSIONS ARE IN MM

QTY OF ELEVATOR: 1 NO.

CUSTOMER:	TANGEDCO ----
CONSULTANT:	FICHTNER CONSULTING ENGINEERS (INDIA) PVT. LTD.
PROJECT:	1X800 MW NORTH CHENNAI III FGD

JOB NO. 485 ----
STATUS CONTRACT
DISTRIBUTION

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA

REV.	DATE	ALTD	CHD	APPD

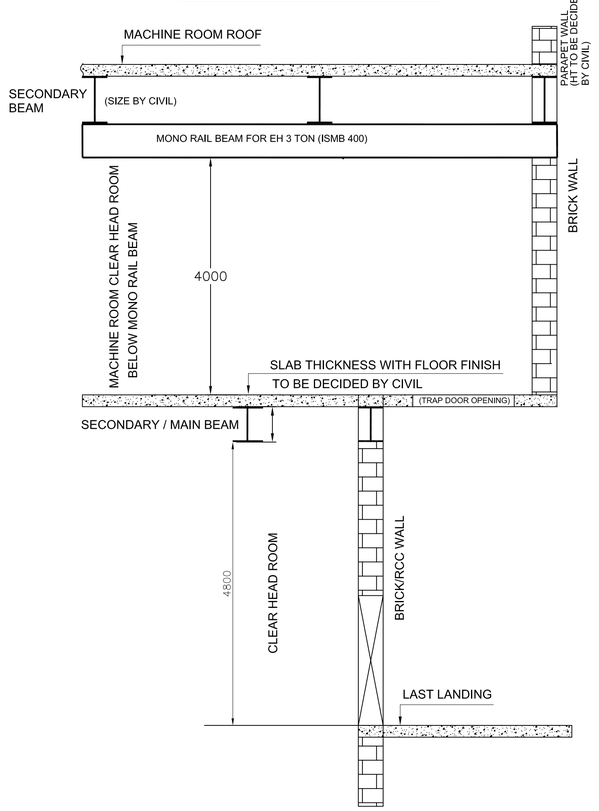
DEPT CODE	DRN	NAME	SIGN	DATE
	DESN	RG		24.08.22
	CHD	VVH		24.08.22
	APPD	RR		24.08.22

TITLE ENGG. INPUTS DRAWING FOR 10 PASS. (680KG) ELEVATOR-FGD CONTROL ROOM

DEPT. | SCALE | SIGN | DRAWING NO. PE-DG-485-502-A001 | SHEET 01 OF 01 | REV. 02

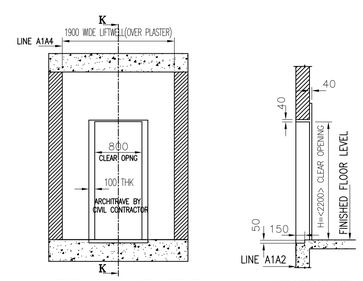
SIZE – A0

ELEVATION ON MACHINE ROOM



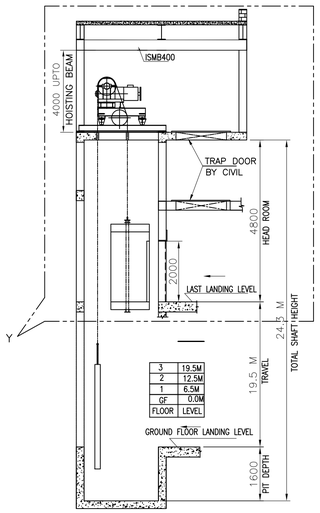
DETAIL–Y

STANDARD DETAILS OF SHAFT



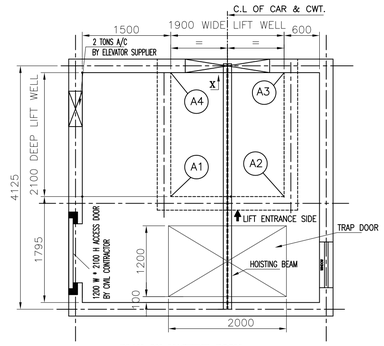
LANDING ENTRANCE DETAIL
(VIEW FROM LIFT WELL OUTSIDE)
(TYPICAL FOR ALL FLOORS)

SECTION–KK

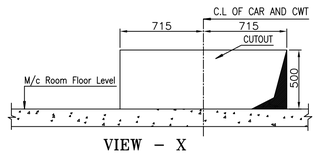


ELEVATIONAL DETAILS
(NOT FOR SCALE)

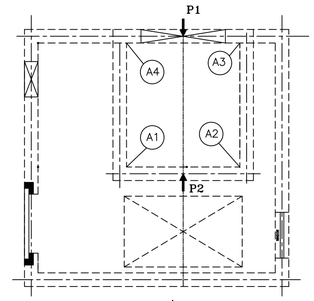
STANDARD DETAILS OF MACHINE ROOM



PLAN ON MACHINE ROOM

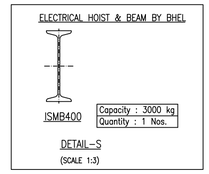


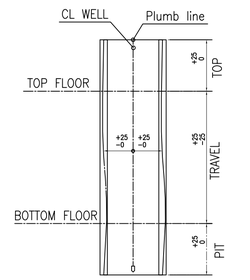
VIEW – X



LOAD POSITION ON M/C ROOM PLAN

Point	Dynamic Load (Kg)
P1	15000
P2	6000



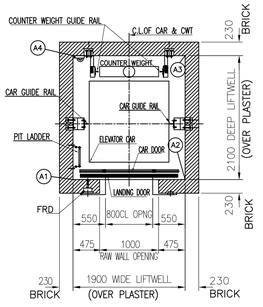


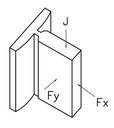
WELL TOLERANCES
(NOT FOR SCALE)

S.NO	AREA	SCOPE	DESCRIPTION OF WORK	AGENCY
1	PIT	CIVIL	PIT LADDER AND SCAFFOLDING IN ELEVATOR SHAFT.	BY VENDOR
2	PIT	CIVIL	PIT SHALL BE MADE DRY AND WATER PROOF.	BY CIVIL CONTRACTOR
3	PIT	CIVIL	BARE PIT SHALL BE PROVIDED. SUPPORTING MS STRUCTURE FOR CAR & CW BUFFER SHALL BE PROVIDED BY VENDOR.	BY VENDOR
4	PIT	CIVIL	PIT SLAB SHALL BE CASTED TO TAKE CARE OF CAR & COUNTERWEIGHT BUFFER LOADS (MAX. LOAD OF 21T) AS THE POSITION OF LOAD & STRUCTURED BUFFER IS VENDOR SPECIFIC . HENCE, CIVIL CONTRACTOR SHALL SIZE THE SLAB THICKNESS ACCORDINGLY WRT TOTAL LOAD OF 21T.	BY CIVIL CONTRACTOR
5	ELEVATOR CAR	ELECTRICAL	ELEVATOR CAR LIGHTING	BY VENDOR
6	ELEVATOR CAR	MECHANICAL	1/2 Kg CO / SUITABLE TYPE FIRE EXTINGUISHER ALONG WITH FIXING ARRANGEMENT.	BY VENDOR
7	AT EVERY LANDING	CIVIL	POCKET CUTTING / HOLES FOR LOP, FRD, LANDING DISPLAY & ANY OTHER FOR EVERY LANDING LEVEL SHALL BE DONE BY VENDOR.	BY VENDOR
8	AT EVERY LANDING	CIVIL	GROUTING FOR LOP, FRD, LANDING DISPLAY & ANY OTHER FOR FIXATION AT EVERY LANDING LEVEL SHALL BE DONE BY VENDOR.	BY VENDOR
9	ELEVATOR SHAFT	CIVIL	SHAFT WHITE WASHING.	BY CIVIL CONTRACTOR
10	ELEVATOR SHAFT	CIVIL	ALL ANCHOR BOLTS FOR FIXING GUIDE BRACKET AND BEAMS IN MACHINE ROOM.	BY VENDOR
11	ELEVATOR SHAFT	CIVIL	LIFT SHAFT HAS TO BE IN THE PLUMB LINE WITH A LIMIT OF -0 +25MM.	BY CIVIL CONTRACTOR
12	ELEVATOR SHAFT	ELECTRICAL	BULK HEAD FITTINGS OF MINIMUM 60 WATTS/ 18W CFL SHALL BE PROVIDED AT EVERY 3 METERS AND A PLUG POINT 15A/5A, 3 PIN AT EVERY 6 METERS-ADJACENT TO THE BULK HEAD FITTINGS. THE POSITION SHOULD BE AT ANY CORNER OF THE WALL OF COUNTER WEIGHT.	BY VENDOR
13	ELEVATOR SHAFT	ELECTRICAL	FIREMAN SWITCH & PIT SWITCHES.	BY VENDOR
14	ELEVATOR SHAFT	MECHANICAL	WIRE MESH BETWEEN CAR & COUNTER WEIGHT.	BY VENDOR
15	MACHINE ROOM	CIVIL	ELEVATOR MACHINE ROOM SHALL BE DESIGNED AS PER THE LOAD REQUIREMENTS GIVEN IN THE ENGG. INPUTS DRAWING FOR ELEVATOR.	BY CIVIL CONTRACTOR
16	MACHINE ROOM	CIVIL	PROVIDE THE REQUIRED HOLES/ POCKETS FOR MAIN ROPES / OSG ROPES/ SHAFT ELECTRIFICATION IN THE MACHINE ROOM FLOOR AS PER THE DIMENSIONS GIVEN IN THE ENGG. INPUTS DRAWING FOR ELEVATOR.	BY CIVIL CONTRACTOR
17	MACHINE ROOM	CIVIL	THE MONORAIL BEAM (3 TONS) FOR HOISTING THE MACHINE & HOIST TO BE PROVIDED AS PER THE ENGG. INPUTS DRAWING FOR ELEVATOR.	BY CIVIL CONTRACTOR (SUPPLY & ERECTION OF MONORAIL BEAM SHALL BE DONE BY CIVIL CONTRACTOR)
18	MACHINE ROOM	CIVIL	TRAP DOOR SHALL BE PROVIDED AS PER ENGG. INPUTS DRAWING FOR ELEVATOR.	BY CIVIL CONTRACTOR
19	MACHINE ROOM	CIVIL	SECONDARY BEAM ARRANGEMENT SHALL BE PERPENDICULAR TO MONORAIL BEAM.	BY CIVIL CONTRACTOR
20	MACHINE ROOM	CIVIL	STANDARD MACHINE ROOM DIMENSIONS AS REQUIRED ARE INDICATED IN THE DRAWING. TO SUIT CIVIL DESIGN WRT CIVIL STRUCTURE STABILITY, MACHINE ROOM SIZE CAN BE INCREASED (AS PER CIVIL REQUIREMENT) AND THEN SIZE OF MONORAIL BEAM(ISMB 400) AS MENTIONED IN DETAIL-Y VIEW SHALL BE FINALIZED BY CIVIL AGENCY.	BY CIVIL CONTRACTOR
21	MACHINE ROOM	CIVIL	PROPER ACCESS TO THE MACHINE ROOM SHALL BE PROVIDED AND IT SHOULD BE SAFE AND RIGID WITH HANDRAILS FOR ADEQUATE GRIP.	BY CIVIL CONTRACTOR
22	MACHINE ROOM	ELECTRICAL	THE MACHINE ROOM SHALL BE ADEQUATELY ILLUMINATED. THE MACHINE ROOM SHALL HAVE MINIMUM 200 LUX ILLUMINATION AT THE FLOOR LEVEL.	BY VENDOR
23	MACHINE ROOM	ELECTRICAL	CONVENIENT OUTLET (15A /5A) IN THE MACHINE ROOM TO BE PROVIDED FOR POWER TOOL USAGE.	BY VENDOR
24	MACHINE ROOM	ELECTRICAL	ONLY TWO (3 PHASE) SUPPLY FEEDERS PER ELEVATOR SHALL BE PROVIDED ONE FEEDER SHALL BE DEDICATED TO ELEVATOR MOTOR AND OTHER 3 PHASE SUPPLY FEEDER SHALL BE PROVIDED BY BHEL FOR AIR CONDITIONER, MACHINE ROOM AND SHAFT LIGHTING AND MAINTENANCE /INSTALLATION REQUIREMENT. VENDOR SHALL PROVIDE CT FOR STEPPING DOWN THE VOLTAGE AS PER THEIR REQUIREMENT.	BY ELECTRICAL CONTRACTOR (VENDOR TO CONSIDER CT IN THEIR SCOPE FOR STEPPING DOWN THE VOLTAGE AS PER THEIR REQUIREMENT)
25	MACHINE ROOM	ELECTRICAL	THE TERMINATION & TERMINATION BOX FOR THE FEEDERS SHALL BE PROVIDED.	BY VENDOR
26	MACHINE ROOM	ELECTRICAL	THE EARTHING LEADS / EARTH STRIPS SHALL BE PROVIDED NEAR ELEVATOR SHAFT AT GROUND FLOOR BY ELECTRICAL CONTRACTOR AND FROM GROUND FLOOR TO MACHINE ROOM SHALL BE ROUTED BY VENDOR.	BY ELECTRICAL CONTRACTOR & BY VENDOR
27	MACHINE ROOM	ELECTRICAL	EPABX CONNECTIVITY SHALL BE PROVIDED TILL MACHINE ROOM BY ELECTRICAL CONTRACTOR & FROM MACHINE ROOM TO ELEVATOR BY VENDOR	BY ELECTRICAL CONTRACTOR & BY VENDOR
28	MACHINE ROOM	MECHANICAL	SPLIT AC (MIN 2 TONS) TO BE PROVIDED IN THE EACH ELEVATOR MACHINE ROOM.	BY VENDOR
29	ELEVATOR SHAFT	CIVIL	ELEVATOR SHAFT SHALL BE OF CLAY BRICK (MIN. 230MM THK) OR R.C.C ONLY. (FLY ASH BRICKS NOT TO BE USED). LINTEL BEAM AT EVERY 2.3 M TO 2.5 M SHALL BE PROVIDED FOR COUNTER WEIGHT & CAR BRACKET FIXING.	BY CIVIL CONTRACTOR
30	ELEVATOR SHAFT	CIVIL	LIFT ENTRANCE SIDE WALL (ON ALL FLOORS) SHALL BE KEPT ON HOLD & SHALL BE CONSTRUCTED AFTER ORDERING/ RECEIVING INPUT FROM FINALLY SELECTED BIDDER. UPON LIFTING HOLD, FINAL WALL CONSTRUCTION SHALL BE DONE BY CIVIL CONTRACTOR ONLY.	BY CIVIL CONTRACTOR
31	ELEVATOR SHAFT	CIVIL	CLEAR HEADROOM OF 4.8M IS REQUIRED ABOVE LAST LANDING LEVEL OF ELEVATOR (EXCLUDING MACHINE ROOM SLAB THICKNESS & SECONDARY BEAM (IF ANY)). THE SAME IS TO BE ENSURED ACCORDINGLY BY CIVIL CONTRACTOR.	BY CIVIL CONTRACTOR
32	ELEVATOR SHAFT	CIVIL	IN CASE OF DUPLEX ARRANGEMENT OF ELEVATORS, WHERE ELEVATORS ARE PLACED SIDE BY SIDE, BRACKET OF GUIDE RAILS FOR BOTH THE ELEVATORS SHALL BE FIXED ON THE COMMON WALL BETWEEN BOTH LIFT SHAFTS. HENCE, THIS WALL MAY BE SUITABLY DESIGNED/ STRENGTHENED SO AS TO SUSTAIN REQUIRED GUIDE RAIL LOADS AS THIS WALL SHALL BE SUBJECT TO GUIDE RAIL FORCES FROM BOTH SIDES.	BY CIVIL CONTRACTOR
33	ELEVATOR SHAFT	CIVIL	DUMMY LANDING/S, ARE REQUIRED IN CASE TRAVEL BETWEEN TWO CONSECUTIVE LANDINGS IS MORE THAN 10 M, AS PER CODAL REQUIREMENT. HENCE, CORRESPONDING LANDING PLATFORMS & SUITABLE ACCESS LADDER/ STAIRS FOR DUMMY LANDING PLATFORMS ARE ALSO TO BE PROVIDE ACCORDINGLY.	BY CIVIL CONTRACTOR
34	ELEVATOR SHAFT	CIVIL	CIVIL LOADS SHALL BE TRANSFERRED TO WALLS (TYPICAL LOCATION AS SHOWN IN DRAWING). WALLS SHALL BE DESIGNED ACCORDINGLY.	BY CIVIL CONTRACTOR
35	MACHINE ROOM	CIVIL	CLEAR HEIGHT OF 4M IS REQUIRED IN THE ELEVATOR MACHINE ROOM BELOW MONORAIL BEAM (I.E. EXCLUDING MONORAIL BEAM (FOR ELECTRIC HOIST), SECONDARY BEAMS (IF ANY) & SLAB THICKNESS). HENCE, ELEVATION OF TOP OF MACHINE ROOM ROOF TO BE CALCULATED ACCORDINGLY BY CIVIL CONTRACTOR.	BY CIVIL CONTRACTOR
36	MACHINE ROOM	CIVIL	TRAP DOOR IS TO BE PLACED IN MACHINE ROOM TOWARDS ELEVATOR LANDING SIDE CONSIDERING THAT NO EQUIPMENTS/ OBJECTS SHALL BE LOCATED BELOW THE SAME AT LAST LANDING LEVEL FLOOR, ELSE IT WOULD CAUSE HINDRANCE IN MOVEMENT OF ELEVATOR MACHINERY OUT OF THE MACHINE ROOM DURING MAINTAINENCE.	BY CIVIL CONTRACTOR
37	PIT, SHAFT & MACHINE ROOM	CIVIL	NO PROJECTIONS ARE ALLOWED INSIDE THE LIFT SHAFT / PIT AND MACHINE ROOM. HENCE PLEASE ENSURE THAT ANY COLUMN / COLUMN FOUNDATIONS/ PLINTH BEAMS/ FLOOR SUPPORTING BEAMS SHOULD NOT BE PROJECTED INSIDE THE LIFT SHAFT/ PIT & ELEVATOR MACHINE ROOM.	BY CIVIL CONTRACTOR
38	MACHINE ROOM	CIVIL	MINIMUM REQUIREMENT OF MACHINE ROOM ALONG WITH TRAP DOOR ARE INDICATED HERE. HOWEVER PROJECT SPECIFIC REQUIREMENTS SHALL BE DISCUSSED ON CASE TO CASE BASIS.	BY CIVIL CONTRACTOR

NOTE: ALL DIMENSIONS ARE IN MM

STANDARD DETAILS OF PIT

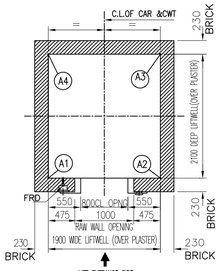




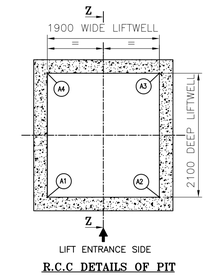
FORCES ON CAR & CWT GUIDE RAIL	
Fx	700 N
Fy	600 N
J	19000 N

GUIDE RAIL FORCES

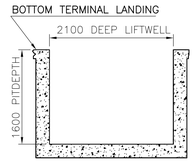
PLAN ON LIFTWELL– TYPICAL LOCATION OF GUIDERAILS FOR CAR & COUNTERWEIGHT



PLAN ON LIFTWELL



R.C.C DETAILS OF PIT



SECTION ZZ

QTY OF ELEVATOR: 1 NO.

CUSTOMER:	TANGEDCO
CONSULTANT:	FICHTNER CONSULTING ENGINEERS (INDIA) PVT. LTD.
PROJECT:	1X800 MW NORTH CHENNAI III FGD

JOB NO. 485 ----
STATUS CONTRACT
DISTRIBUTION

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA

REV.	DATE	ALTD	CHD	APPD

DEPT CODE	DRN.	NAME	SIGN	DATE
	DESN	RG		24.08.22
	CHD	VVH		24.08.22
	APPD	RR		24.08.22

TITLE ENGG. INPUTS DRAWING FOR 10 PASS. (680KG) ELEVATOR-GYPSUM DEWATERING BUILDING

DEPT. | SCALE | DRAWING NO. PE-DG-485-502-A002
SIGN | SHEET 01 OF 01 | REV. 02

SIZE–A0

QUALITY ASSURANCE PLAN

	MANUFACTURING QUALITY PLAN M/S (_____)	PROJECT: PACKAGE: ITEM: ELEVATOR BHEL REF. NO.:	Q.P/FQP. NO & REV: DATE: PAGE: 1 of 4 JOB NO:

1	2	3	4	5	6	7	8	9	10				11
Sr. No.	COMPONENT& OPERATION	CHARATERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMATE OF RECORD		AGENCY			REMARKS
									D	VE	M	B	
A. Boughtout Items :													
1	Raw materials, Round Hexagon & Structurals. Type : EN-8/EN-8D to EN-9,B and En-24	A: Chemical Composition	Major	Analysis	Sample	IS/BS : 970	IS/BS : 970	O.S.L/ T.C		V	V	V	
		B: Mechanical Properties	Major	Hardness	Sample	IS/BS : 970	IS/BS : 970	QA REG.		V	V	V	
		C: Dimensional Checks	Major	Measurement	100%	DRG.	DRG.	D.I.R/Q.C.R		V	w	V	
2	Raw material Rounds, En-8, EN-9, EN-24	Crack Detection	Major	Ultrasonic testing	100%	ASTM-388	ASTM -388	QA/FMT/03		V	W	V	
3	Casting : a. C.I. Graded Castings	A: Chemical Composition	Major	Analysis	Sample	IS-vendor DRG	AS PER DRG.	S.T.C	√	V	V	V	
		B: Mechanical Properties	Major	Hardness on traction sheave	Sample	vendor-DRG IS : 210	vendor-DRG IS : 210	S.T.C	√	V	V	V	
		C: Dimensional Checks	Major	Measurement	Sample	vendor-DRG	vendor-DRG	QA/FMT/02		-	W	-	
		D: Blow Holes	Major	Visual	100%	—	-	QA/REG		-	W	-	
4	Suppliers Item :												
	a. Manufactured Items	Dimensional Check	Major	Measurement	100%	vendor/DRG.	vendor/DRG.	D.I.R		-	W	-	
	b. Moldings Rubber Items (ABSORBER)	A: Dimensional Checks	Major	Measurement	100%	vendor-DRG.	vendor/DRG.	QA/FMT/02		-	W	-	
		B: Hardness	Major	Compression Test	Sample	vendor-DRG.	vendor-DRG.	QA/FMT/02		-	W	-	
	c. Springs (Buffer)	A: Dimensional Check	Major	Measurement	100%	vendor-DRG.	vendor-DRG.	QA/FMT/02		-	W	-	
		B: Spring Constant compression.	Major	Compression	Sample	vendor-DRG.	vendor-DRG.	S.T.C	√	V	V	V	
	d. Guide Rail.	A.Chemical Test.	Major	Analysis	Sample	vendor- DRG	vendor -DRG	S. T.C	√	V	V	V	
		B. Dimension check.	Major	Measurement	Sample	vendor-DRG.	vendor-DRG.	QA/FMT/02		V	W	V	
	e. Wire rope	A: Dimensional Check	Major	Measurement of O.D/ Const.	Sample	IS/2365 &	IS/2365 &	QA/FMT/02		-	W	-	
		B: Mechanical Properties.	Major	Measurement	Correlate S.T.C	IS : 2266	IS : 2266	S.T.C	√	V	V	V	

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*U.E.R. =Ultra Sonic Examinitation Record .

MANUFACTURER SEAL AND SIGN	CONTRACTOR SIGN AND SEAL .	NAME & SIGN OF APPROVING AUTHORITY & SEAL

1 2 3 4 5 6 7 8 9 10 11

Sr. No.	COMPONENT& OPERATION	CHARATERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMATE OF RECORD		AGENCY			RMARKS
									D	VE	M	B	
	f. Power & control (PVC)cable	a- FRLS ,	Major	Electrical	Sampling	IS - 694	IS - 694	S.T.C	√	V	V	V	
		b- Insulation resistance.	do	do	do	do	do	do	√	V	V	V	
5	Raw material for motor. (1) Enameled wire.	a) Dimension Check	Major	Measurement	Sample	vendor -STD	vendor -STD	D.I.R		V	W	V	
		b) High voltage test	Major	Elect.	One Sample each roll	IS:4800	IS:4800	D.I.R		V	W	V	
	(2) Copper base (Flat)	Chemical check	Major	Analysis	Sample	Cu=min 99.5%	Cu=min 99.5%	O.S.L / T.C		V	V	V	
6	Finished Manufactured Components	Plating thickness control	Major	Measurement	Sample	vendor-STD.	vendor-STD.	vendor-STD		V	W	V	
B. Inspection During mfg.													
1	Machine Shop :	A: Dimensional Check	Major	Measurement	100%	vendor-DRG.	vendor-DRG.	QA/FMT/01		-	W	-	
		B: Crack detection Motor bodies	Major	D.P. Test	100%	vendor-STD.	vendor-STD.	-		-	W	-	
		C: Surface check	Major	Visual	100%	vendor-STD.	vendor-STD.	-		-	W	-	
2	Fabrication Shop :	Dimensional Checks of critical items	Major	Measurement	100%	vendor-DRG.	vendor-DRG.	Q.C.R		-	W	-	
		Welding	minor	Visual	Sampling	do	do	.		.	W	.	Welding by approved welder
C. Assembly Inspection.		A- Back lash of gears& Maching	Major	Measurement	100%	vendor	vendor	QA/FMT/11		V	W	-	
1	Winding gear.	contact.				INSP NORMS	INSP NORMS						
		B- Vibration .	Major	Measurement	100%	vendor	vendor	do		V	W	-	
						INSP NORMS	INSP NORMS						
		C- Noise level.	Major	Measurement	100%	vendor	vendor	do		V	W	-	
						INSP NORMS	INSP NORMS						
		D- Visual .	Oil leckage	Visual	100%	vendor	vendor	do		V	W	-	
						INSP NORMS	INSP NORMS						

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MANUFACTURER SEAL AND SIGN

CONTRACTOR SIGN AND SEAL .

NAME & SIGN OF APPROVING AUTHORITY & SEAL /HPGCIL

1	2	3	4	5	6	7	8	9	10				11
Sr. No.	COMPONENT& OPERATION	CHARATERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMATE OF RECORD		AGENCY			REMARKS
									D	VE	M	B	
2	Motor Assembly :	A-Winding Insulation test.	Major	High Volt. Test	100%	I S :325-96 1.5 KV for 5 SEC	I S :325-96 1.5 KV for 5 SEC.	D.I.R QA/FMT/13		V	W	V	
		B-Insulation Resistance	Major	Measurement	100%	> 10 mega ohms	> 10 mega ohms	Test report		V	W	V	
		C-Motor testing for elect. Pmt.	Major	Elect.	100%	IS : 325	IS : 325	Test report		V	W	V	
		D-Vibration measurement & noise lev	Major	Measurement	100%	vendor - Norms	vendor -Norms	Test report		V	W	.	
3	Speed Governor Assembly :	Tripping speed Easy Run test	Major	Function Check	100%	I S : 9878 LCH -112	I S : 9878 LCH - 112	T.C IN Pant.		V	W	V	
4	Controller Assembly / VVVF Unit.	1. Visual Inspection	Major	Visual	100%	vendor Norms	vendor Norms	T.C		V	W	V	
		2. Electrical Checks (Routine Test).	do	Electrical	100%	do	do	do		V	W	V	
		3. Functional Checks	do	Function	100%	do	do	do		V	W	V	
		4. Pretreatment in seven tank for sheet & paint thickness.	Major	Measurement + Visual	Sampling	do	do	vendor - FMT.		V	W	V	

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MANUFACTURER SEAL AND SIGN

CONTRACTOR SIGN AND SEAL.

NAME & SIGN OF APPROVING AUTHIRITY & SEAL.

1	2	3	4	5	6	7	8	9	10				11
Sr. No.	COMPONENT& OPERATION	CHARATERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMATE OF RECORD		AGENCY			REMARKS
									D	VE	M	B	
5	Mechanical assembly :	Cage assembly .	Major	Measurement	100%	Appd. L/o DRG. vendor-INSP. Norms	Appd. L/o DRG. vendor-INSP. Norms	QA/FMT/15		V	W	V	
6	Painting	Parts & Components	Major Major	Cross Hatch Test Powder Coating Thickness Test	Sampling Sampling	vendor-INSP. Norms vendor-INSP. Norms	vendor-INSP. Norms vendor-INSP. Norms	QA / REG. QA / REG.		V V	W W	V V	
6	Electrical Assembly	1- Break assembly .	Minor	Function check	Sampling	vendor- NORMS	vendor - NORMS	TC		V	W	V	

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MANUFACTURER SEAL AND SIGN

CONTRACTOR SIGN AND SEAL.

NAME & SIGN OF APPROVING AUTHORITY & SEAL

PACKING REQUIREMENT

	COMMON GUIDELINES FOR PACKING
1	**GENERAL:**
1.1	The Components/Assemblies need to be packed suitably to avoid physical damage & corrosion during transit & storage. This packing shall be suitable for different handling operations and for the adverse conditions during transportation and during indoor / outdoor storage of materials.
1.2	All the equipment shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at site till the time of erection. The Contractor shall be responsible for all loss or damage during transportation, handling and storage due to improper packing.
1.3	The identification marking indicating the name and address of the consignee shall be clearly marked in indelible ink on two opposite sides and top of each of the packages. In addition the Contractor shall include in the marking gross and net weight, outer dimension and cubic measurement.
1.4	Each package shall be accompanied by a packing note quoting specifically the name of the Contractor, the number and date of contract and names of the office placing the contract, nomenclature of contents and Bill of Material.

2.	**TYPES OF PACKING:**
	The following 5 types of packing have been standardized for packing of General Components/ Assemblies.
a	**OP**' - Open Type.
b	**PP**' - Partially Packed.
c	**CP**' – Crate/Box Packing - Components/Equipment requiring physical protection.
d	'**CQ**' - Case Packing – Machined components-Small & Medium Components/ Assemblies/ Equipment which require corrosion & physical protection.
e	**'CR'** - Case Packing – Electrical/Electronic Components/ Assemblies, which require special packing viz. Water Proof, Shock Proof etc…

3.	**DESCRIPTION OF TYPES OF PACKING:**
	The various types of packing, as standardized above, are described below.

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

3.2	**PP' - Partially Packed**
3.2.1	Components which need special protection at selected portions only shall be despatched partially packed. Machined surfaces should not be allowed to come directly in contact with the wood. Such surfaces should be protected with 100GSM(Colourless) Multi Layered Cross Laminated Polyethylene
3.2.2	Film. All sharp corners and edges shall be protected by rubber mats to prevent damage to the polyethylene film.

3.3	**'CP' - Crate Packing**
	Assemblies/Components which need only physical protection from the point of view of handling shall be despatched duly packed in crates.

3.4	**'CQ' - Case Packing -** Machined Components/Assemblies/Equipment
3.4.1	Small and medium sized components/assemblies/equipment due to size/weight and to avoid handling and pilferage problems shall be packed in Case/Containers. Wherever required adequate quantity of silica gel or VCI Powder/Tablets, packed in thin muslin cloth cotton bags shall be suitably placed. Small machines/components of less weight shall be provided with suitable cushioning by Rubberised coir. The components inside the case shall be entirely covered with100GSM(Colourless) Multi Layered Cross Laminated Polyethylene Film, wherever required. This may be prescribed for electronic parts/critical machined components/surfaces.
3.4.2	For mechanical product like valves where motors are separately securely wrapped in polyethylene, the requirement of individual component wrapping shall be exempted.

3.5	**CR' - Case Packing** - Electrical & Electronic Components/Assemblies
	Delicate components likely to be damaged e.g. Gauges, Instruments etc. are to be wrapped in waxed paper or polyethylene air bubble film and packed in cartons. Adequate quantity of Silica gel packed in cotton bags of 100grams each are to be suitably placed in the cartons. The cartons shall be entirely covered with 100GSM(Colourless) Multi Layered Cross Laminated Polyethylene Film before being packed in the cases. VCI Powder/Tablets can be used as an alternative to Silica Gel.

4	**PREPARATION OF PACKING CASES**
4.1	**DIMENSIONS:**
a)	Thickness of planks for Front, rear, top and bottom sides and binding, jointing battens shall be 25/20mm +2/-3 mm as per applicable drawings of the respective units/manufacturers.
b)	Width of all planks including the tongue shall be more than 125mm and after plaining it shall be minimum 100mm.

c)	Minimum number of planks shall be used for a shook.
d)	Horizontal, vertical, diagonal planks shall be given for binding (number of such planks depend on the dimension of panel.
e)	Width of binding planks shall be minimum 100mm.
f)	Distance between any 2 binding planks shall be less than 750mm.
g)	diagonal planks shall be used in between vertical binding planks when distance between inner to inner of vertical planks is more than 750mm
h)	Distance of the outer edges of these planks from the edge of case shall be less than 250mm.
i)	Diagonal planks are not required for top planks and width side, if the width of pallet is less than 750mm.

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

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

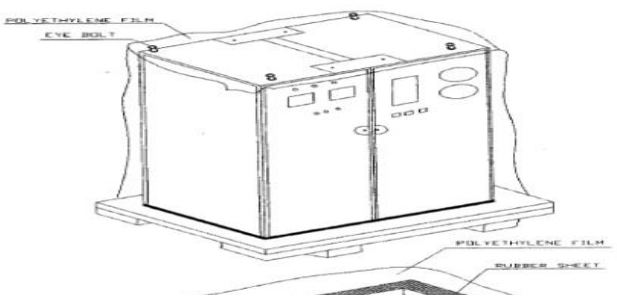
4.4	**MULTI LAYERED CROSS LAMINATED POLYTHELENE FILM**
	100GSM (Colourless) Multi Layered Cross Laminated Polythelene Film are used to make covers to the jobs individually. The cross lamination gives qualities of extra toughness, together with flexibility and lightness coupled with good weather resistance to ultra violet rays.

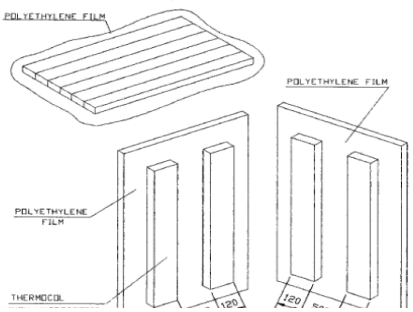
4.5	**RUBBERISED COIR:**
	The rubberized coir is used as cushioning material. For the packing of loose items, items are to be arrested by using rubberized coir. For the packing of cubicles rubberized coir of thickness 25mm and width 75mm shall be used.

5	**MULTI LAYER CROSS LAMINATED POLY FILM WHILE PACKING OF CUBICLES/CASING**
5.1	The inner surface of 4 sides of shook's shall be nailed with Multi-layer cross laminated poly film (as per 4.4) using blue nails wherever 2 pieces of Cross laminated poly film are used, the joint shall have an overlap of minimum 20mm.
5.2	The inner surface of top cover shall be nailed with Multi-layer cross laminated poly film. This sheet shall project outside on 4 sides by at least 100mm and shall be nailed properly on sides. Joining of sheets should have overlap of minimum 20mm.
5.3	The cubicles shall be covered with Multi-layer cross laminated poly film.

6	**PACKING OF LOOSE ITEMS/SPARES**
6.1	Inner surfaces of all 6 sides shall be lined with Multi Layered Cross Laminated Polythelene Film (as per clause 5.4) using blue nails.
6.2	Rubberized coir of minimum 25mm thickness and 100 mm width shall be nailed to inner surfaces of bottom and 4 sides of box.
6.3	Internal packing: Items that go into the box shall be packed using 100GSM, (Colourless) Multi Layered Cross Laminated Polyethylene Film. Any space left between the job and the sides and the top of the box shall be filled with rubberized coir to get proper cushioning effect.
6.4	Certain items like transformers, reactors, breakers, etc., shall be bolted to the bottom of the box using bolts, nuts and washers.
6.5	Silica gel held in cotton bags shall be kept at proper places in the box.
6.6	Packing slip kept in polyethylene bag shall be placed in the box.
6.7	Two numbers of hoop iron strips shall be strapped tightly on the case using clips.
6.8	Stencil marking of various details and marking of various symbols shall be done as per BHEL instructions using indelible/non-washable marking ink.
6.9	Loose items to be kept inside the cubicle/casing
	- Other items which are given loose in addition to cubicle shall be packed in separate boxes.

7	**TYPICAL PATTERN OF WOODEN BOX**





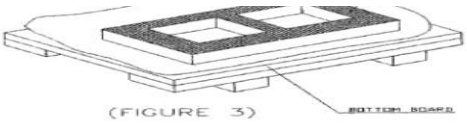


Figure 2

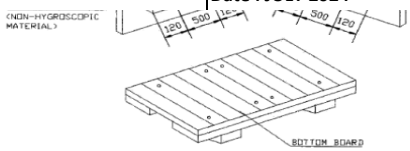


Figure 1

8	**SEALED PACKING:**
	Components sub-assemblies and assemblies sensitive to climatic conditions shall be packed seal tight. All the openings of the sensitive components, sub-assemblies and assemblies shall be blanketed to prevent the ingress of dust and moisture. The components sub-assemblies and assemblies are completely covered with 2 layers of polyethylene sheet. All sharp corners and edges are to be protected by

9	**MARKINGS/STENCILINGS**
9.1	**"HANDLE WITH CARE", "FRAGILE DO NOT TURN OVER".**
9.2	Besides the caution signs the product information's shall be stencilled of letters with 13mm to 50mm height.
9.3	In case of consignment consists of more than one package, each package shall carry its package no as given in shipping list. All caution signs shall be stencilled in high quality full glossy out door finishing paint red in colour (AA56126). All other markings shall be carried out in black enamel.
9.4	Caution signs & other markings shall be stencilled on both the end shooks & the side shooks.
9.5	Caution sign (for slinging) shall be stencilled only on side shooks at the appropriate place.
9.6	In case the size of package is small for using the stencils, then hand written letters/figures shall be allowed.

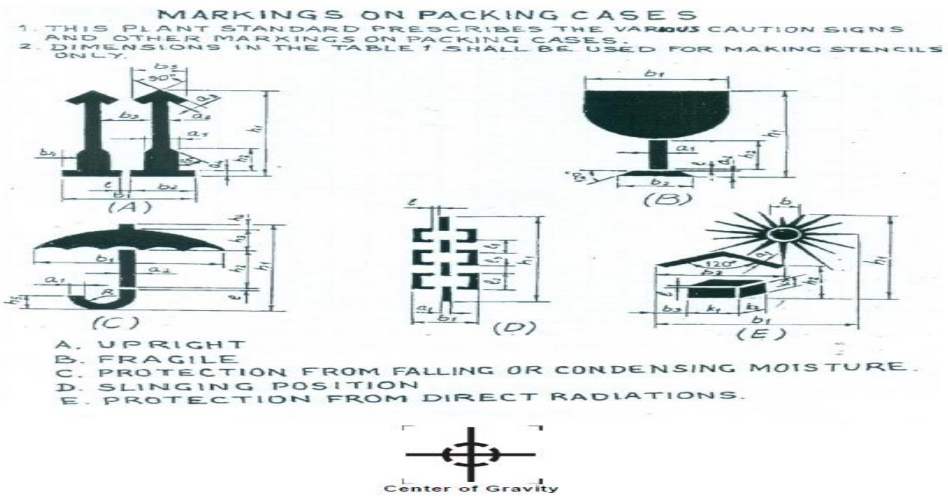


Figure 3

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

Figure 4 – TYPICAL MARKING PLATE (225 X 170)

Figure 5

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

10 STANDARD METHOD OF PACKING

Table 1 - Standard Method of Packing

S. No.	DESCRIPTION	CASE	CRATE	BUNDLE	BARE	DRUM
1	FAB STRUCTURALS, GIRDER				O	
2	FAB STRUCTURALS, GIRDER				O	
3	SUPPORTING STRUCTURALS				O	
4	STRUCTURE SUB ASSEMBLY, CRAB, END CARRIAGE, END STOPPERS, ROPE DRUM				O	
5	RAIL				O	
6	STAIR CASES				O	
7	HANDRAILS/ PLATFORMS/ LADDERS/ CAGE				O	
8	FASTENERS, RAIL CLAMPS AND FIXING ACCESSORIES	O				
9	BEARING BLOCKS	O				
10	FANS	O				
11	GASKETS	O	O			
12	FLANGES	O	O			
13	PAINT TINS		O			
14	PAINT DRUMS					O
15	MOTORS, TRANSMFORMERS, VVVFD, LIMIT SWITCHES, ELECTRIC HOIST ASSEMBLY, RELAYS, FUSES, LIGHTING FIXTURES, PENDANT, ISOLATING SWITCH, RRC, TRANSMITTERS AND OTHER ELECTRICAL ACCESORIES	O				
16	SWITCH BOARDS, DISTRIBUTION BOARDS, STARTERS, JUNCTION BOXES, PANELS,		O			
17	INDICATORS, VIBRATOR SWITCHES	O				
18	CABLE TRAYS, CABLE RACKS, EARTHING MATERIAL,		O			
19	OPERATIONAL SPARES , MAINTENANCE TOOLS AND TACKLES	O				
20	ALL OTHER LOOSE ITEMS	O				

Note

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

SITE STORAGE AND PRESERVATION GUIDELINES

CONTENT

1. SCOPE OF THE DOCUMENT

This guideline is prepared in intent to provide proper site storage and preservation of the Mechanical, Electrical and C & I items / equipment supplied under various bought out packages/items. This storage procedure shall be followed at different power plant sites by concerned agency for storage and preservation from the date of equipment received at site until the same are erected and handed over to the customer.

2. PURPOSE OF STORAGE & PRESERVATION

Many of the items may be required to be kept in stores for long period. It shall therefore be essential that proper methods of storage and preservation be applied so that items do not deteriorate, loose some of their properties and become unusable due to atmospheric conditions and biological elements.

3. MEASURES TO BE TAKEN FOR STORAGE, HANDLING & PRESERVATION

a) GENERAL STORAGE REQUIREMENTS

1. To the extent feasible, materials should be stored near the point of erection. The storage areas should have adequate unloading and handling facilities with adequate passage space for movement of material handling equipment such as cranes, fork lift trucks, etc. The storage of materials shall be properly planned to minimise time loss during retrieval of items required for erection.
2. The outdoor storage areas as well as semi-closed stores shall be provided with adequate drainage facilities to prevent water logging. Adequacy of these facilities shall be checked prior to monsoon.
3. The storage sheds shall be built in conformity with fire safety requirements. The stores shall be provided with adequate lights and fire extinguishers. 'No smoking' signs shall be placed at strategic locations. Safety precautions shall be strictly enforced.
4. Adequate lighting facility shall be provided in storage areas and storage sheds and security personnel positioned to ensure enforcement of security measures to prevent theft and loss of materials.
5. Adequate number of competent stores personnel and security staff shall be deployed to efficiently store and maintain the equipment / material.
7. The equipment shall be stored in an orderly manner, preserving their identification slips, tags and instruction booklets, etc., required during erection. The storage of materials shall be equipment-wise. Loose parts shall be stored in sheds on racks,

preserving the identification marks and tags in good condition. The group codes shall be displayed on the racks

6. At no time shall any materials be stored directly on ground. All materials shall be stored minimum 200 mm above the ground preferably on wooden sleepers

b) GENERAL PRESERVATION REQUIREMENTS

1. All special measures to prevent corrosion shall be taken like keeping material in dry condition, avoiding the equipment coming in contact with corrosive fluid like water, acid etc.
2. Materials which carry protective coating shall not be wrapped in paper, cloth, etc., as these are liable to absorb and retain moisture. The material shall be inspected and in case of signs of wear or damages to protective coating, that portion shall be cleaned with approved solution and coated with an approved protective paint. Complete record of all such observations and protective measures taken shall be maintained.
3. Generally equipment supplied at site are properly greased or rust protective oil is applied on machined/ fabricated components. However periodic inspection shall be carried out to ensure that protection offered is intact.
4. While handling the equipment, no dragging on the ground is permitted. Avoid using wire rope for lifting coated components. Use polyester slings (if possible) otherwise protective material (e.g. clothes, wood block etc.) should be used while handling the components with rope / slings
5. For Equipment supplied with finished paint, touch paint shall be done in case any surface paint gets peeled off during handling. Otherwise such surfaces shall necessarily be wrapped with polythene to avoid any corrosion. Further for equipment wherein finish coat is to be applied at site, site to ensure that equipment is received with primer coat applied.
6. It shall be ensured by periodic inspection that plastic inserts are intact in tapped holes, wherever applicable.
7. Pipes shall be blown with air periodically and it shall be ensured that there is no obstruction.
8. Silica gel or approved equivalent moisture absorbing material in small cotton bags shall be placed and tied at various points on the equipment, wherever necessary.
9. Heavy rotating parts in assembled conditions shall be periodically rotated to prevent corrosion/jamming due to prolonged storage.

10. All the electrical equipment such as motors, generators, etc. shall be tested for insulation resistance at least once in three months and a record of such measured insulation values shall be maintained.

11. Following preservatives/preservation methods can be used depending upon type of equipment

    a. Rust preventive fluid (RPF)

    b. Rust protective paints

    c. Tarpaulin covers, in case of outdoor storage

    d. De-oxy aluminate for weld-ments

c) GENERAL INSPECTION REQUIREMENTS

1. Period inspection of materials with specific reference to –

    - Ingress of moisture and corrosion damages.
    - Damage to protective coating.
    - Open ends in pipes, vessels and equipment -
        - In case any open ends are noticed, same shall be capped.

2. Any damages to equipment / materials.

    - In case of any damages, these shall be promptly notified and in all cases, the repairs / rectification shall be carried out.
    - Any items found damaged or not suitable as per project requirements shall be removed from site. If required to store temporarily, they shall be clearly marked and stored separately to prevent any inadvertent use.

4. TYPE OF STORAGE FOR VARIOUS EQUIPMENT

The types of storage are broadly classified under the following heads:

i **Closed storage with dry and dust free atmosphere**. (C)

The closed shed can be constructed by using cold-rolled / tubular components for structure and corrugated asbestos sheets / galvanised iron sheets for roofing. Brick walls / asbestos sheets can be used to cover all the sides. The floor of the shed can be finished with plain cement concrete suitably glazed. The shed shall be provided with proper ventilation and illumination.

ii **Semi-closed storage**. (S)

The semi closed shed can be constructed by using cold-rolled / tubular components for structure and corrugated / asbestos sheets for roofing. The floor shall be brick paved. If required a small portion of sides can be covered to protect components from rainwater splashing onto the components.

iii Open storage (O)

The open yard shall be levelled, well consolidated to achieve raised ground with the provision of feeder roads for crane approach along with access roads running all sides. One part of the open yard shall be stone pitched, levelled and consolidated with raised ground suitable for storing / stacking heavier and critical components with due space to handle them by cranes etc . Adequate number of sleepers, concrete block etc. to be provided to make raised platforms to stack critical materials.

A separate yard to be identified as “scrap yard” slightly away from main open yard to store wooden/steel scraps, which are to be disposed off. This is required to avoid mix up with regular components as well as to avoid fire hazard.

Some of the components, which are having both machined & un-machined surfaces and are bulky, shall be stored in open storage area on a raised ground and suitably covered with water proof / fire retardant tarpaulin.

The equipment listed below shall be stored and inspected as per requirement mentioned in the table below.

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
Raw material /mechanical items like pipes, plates, structure sections etc.)				
1.	Steel pipes (lined/unlined)	S	Damage , paint, corrosion, rubber lining peeling	Provide end cap
2.	MS Plates	S	Damage, paint, corrosion	
3.	SS Plates	S	Damage	
4.	Non-metallic pipes	S	Damage, cracks	Provide end cap
5.	Stainless steel pipes	S	Damage ,	Provide end cap
6.	MS sections, beams	S	Damage, paint, corrosion	
7.	Cable trays	S	Damage, condition of preservations	
8.	Insulation sheets	S	Damage	
9.	Insulation	C	Damage, packing	
10.	Hangers Rods	S	Damage, paint, packing	
11.	Tubes	S	Damage, paint , packing	Provide end cap
12.	Hume pipes	O	Damage	
13.	Castings	O	Damage, paint, corrosion	
Fabricated mechanical items (pressure vessels, tanks etc.)				
14.	Pressure vessels (unlined)	O	Damage, paint, corrosion,	Covered nozzles
15.	Atmospheric storage tanks (unlined)	O	Damage, paint, corrosion	Covered nozzles

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
16.	Pressure vessels (lined)	S	Damage, paint, corrosion, rubber lining	
17.	Atmospheric storage tanks(lined)	S	Damage, paint, corrosion, rubber lining	
18.	Support structures	O	Damage , paint, corrosion	
19.	Flanges	C	Damage , paint, corrosion	
20.	Fabricated pipes	S	Damage , paint, corrosion	Provide end cap
21.	Vessels internals	C	Damage , paint, corrosion ,packing	
22.	Grills	S	Damage , paint, corrosion	
23.	Angles	S	Damage , paint, corrosion	
24.	Bridge mechanism/clarifier mechanism	O	Damage , paint, corrosion	
25.	Cranes, rails	S	Damage , paint, corrosion	
26.	Stair cases	O	Damage , paint, corrosion	
27.	Ladders/handrails	O	Damage , paint, corrosion	
28.	Fabricated ducts	S	Damage , paint, corrosion	
29.	Isolation Gates	O	Damage , paint, corrosion	
30.	Fabricated boxes/panels	S	Damage , paint, corrosion	
Mechanical components like valves, fittings, cables glands, spares etc.)				
31.	Valves	S	Damage , packing	

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
32.	Fittings	S	Damage , packing	Provide end cap
33.	Cable glands	C	Damage , packing	
34.	Tools & tackles	C	Damage , packing	
35.	Nut , bolts, washers,	C	Damage , packing	
36.	Gasket & Packings	C	Damage , packing	
37.	Copper tubes	C	Damage , packing, corrosion	Provide end cap
38.	SS tubing	C	Damage , packing	Provide end cap
Rotating assemblies (pumps, blowers, stirrers, fans, compressors etc.)				
39.	Pumps	S	Damage , packing, corrosion	Shaft rotation
40.	Blowers/Compressors	S	Damage , packing, corrosion	Shaft rotation
41.	Agitators/stirrers/radial launders	C	Damage , packing, corrosion	Shaft rotation
42.	Rollers for chlorine tonner mounting	C	Damage , packing, corrosion	
43.	Centrifuge	S	Damage , packing,	
44.	Gear box	C	Damage , packing, corrosion	
45.	Bearings	C	Damage , packing, corrosion	
46.	Fans	S	Damage , packing, corrosion	
47.	Dosing skids	S	Damage , packing, corrosion	
48.	Pump assemblies	S	Damage , packing, corrosion	
49.	Air washers(INTERNALS)	S	Damage , packing	
50.	Air conditioners (split)	C	Damage , packing	

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
51.	Elevators(CONTAINERIZED)	O	Damage , packing, corrosion	
52.	Chillers/VA machines	S	Damage , packing	
53.	Air handling Unit/Package unit	S	Damage , packing	
54.	Chlorinators & Evaporators	C	Damage , packing	
55.	Ejectors	C	Damage , packing	
56.	Electrolyser	C	Damage , packing	
Miscellaneous items like chain pulley blocks, hoists etc.				
57.	Chain pulley blocks	S	Damage, Packing	
58.	Electric hoists	S	Damage, Packing	
59.	Fire extinguishers	C	Damage, expiry date	
60.	Fork Lift Truck	S	Damage, Packing	
61.	Hydraulic Mobile Crane	O	Damage, Packing	
62.	Mobile Pick Up & Carry Crane	O	Damage, Packing	
63.	Motor boats	O	Damage, Packing	
64.	Safety showers	S	Damage, Packing	
65.	Diffusers/dampers	S	Damage, Packing	
Chemicals and consumables (acid, alkali, paints, oils, reagents and special chemicals)				
66.	Hydro Chloric Acid (HCl)	Store in canes/ storage tank in dyke area	Date of production/ leakage/fumes	hazardous chemical
67.	Sulphuric acid (H_2SO_4)	Store in canes/ storage tank in dyke area	Date of production/ leakage/fumes	hazardous chemical

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
68.	Sodium hydroxide (NaOH)	Store in canes/ storage tank in dyke area	Date of production/ leakage/ fumes/ breather	hazardous chemical ,breather to be checked for air ingress
69.	Sodium hypo chlorite	To be stored under shed	Date of production/ leakage/ fumes	hazardous chemical ,self-life normally 15-30 days after which strength of chemical decays
70.	Ammonia	S	Date of production/ leakage/ fumes	Store in closed storage tanks, hazardous chemical
71.	CW treatment chemicals	S	Date of production , Self-life	Store in closed canes
72.	RO/UF cleaning chemicals	S	Date of production , Self-life	Store in closed canes
73.	Lime	C	Damage to packing , seepage	Prevent moisture, rain
74.	Alum bricks	C	Damage to packing	Prevent moisture, rain
75.	Poly electrolyte	S		Store in closed storage tanks
76.	Laboratory chemicals(powder)	C	Damage, Packing self-life	
77.	Laboratory chemicals(liquid)	C	Damage, Packing self-life	
78.	Lubrication oils	C	Leakage	
79.	Paints	S	Leakage ,air tightness	
80.	Sand	O	Damage of packing	No hooks
81.	Salt (NaCl)	C	Damage of packing, water ingress	Prevent moisture, rain
82.	Anthracite	S	Damage of packing	
83.	Activated carbon	S	Damage of packing	

Sl. No.	**Description of the equipment**	**Type of Storage**	**Check for**	**Remarks**
84.	Thermal insulation	S	Damage of packing	
85.	Cement	C	Damage of packing	Prevent moisture, rain
86.	Gravels	O	Damage of packing	
87.	ION exchange resins	C	Damage , packing	Refer manufacturer guidelines
88.	RO membranes	C	Damage , packing	Refer manufacturer guidelines
89.	UF membranes	C	Damage , packing	Refer manufacturer guidelines
90.	Cleaning chemicals	C	Damage , packing	Refer manufacturer guidelines
91.	Chemicals for analysers/calibration	C	Damage , packing	Refer manufacturer guidelines
Electrical and C & I items (motors, cables etc.)				
92.	Motors	C	Damage , packing	
93.	Cable drums	O	Damage	
94.	Control Panel /control desk, UPS ,JB	S	Damage, Packing	
95.	Instruments(gauges/analysers)	C	Damage	
Special items		As per Manufacturer's item, like Hydrogen cylinders, Ozonator, Analyser, Chlorine dioxide generators etc.		

5. CONCLUSION

Concerned storage agency at site should make sure that loss in equipment performance and wear & tear are minimised through proper storage and preservation. The above are broad guidelines and cover major equipment / materials. However specific storage practices shall be followed as per manufacturer recommendation. All the necessary measures even in addition to the ones mentioned above, if found necessary, should be taken to achieve the objective.

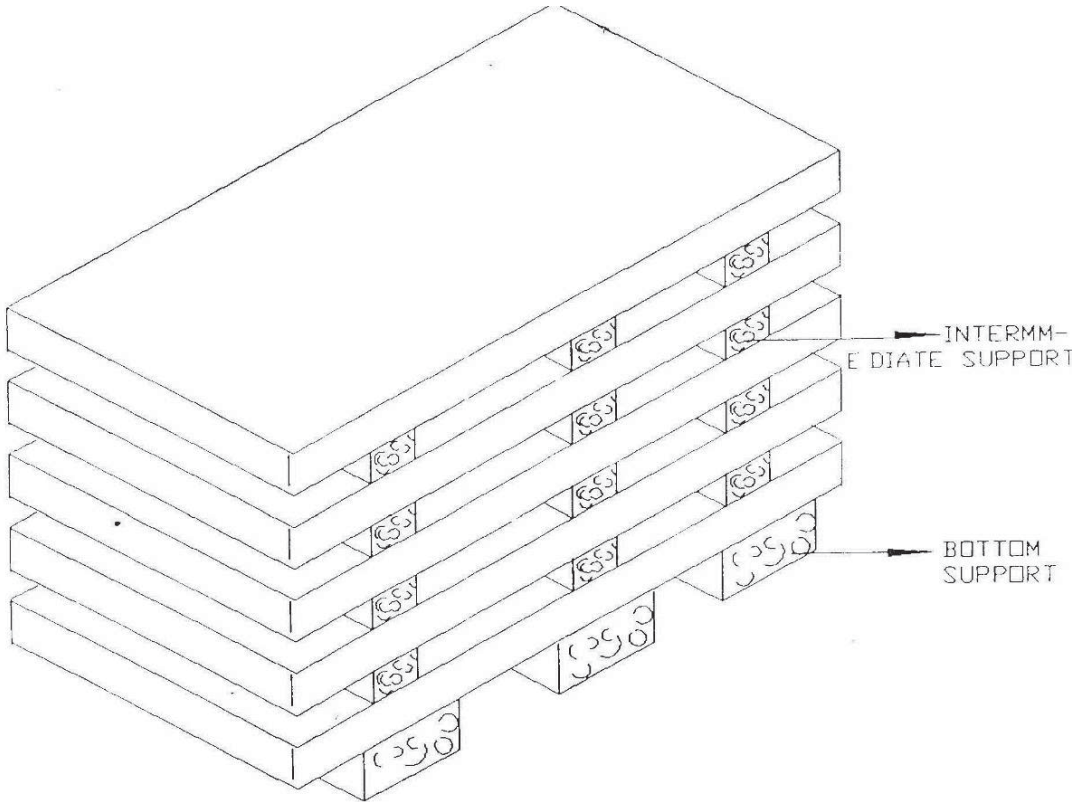


Figure – 1 – PLATE STACKING ARRANGEMENT

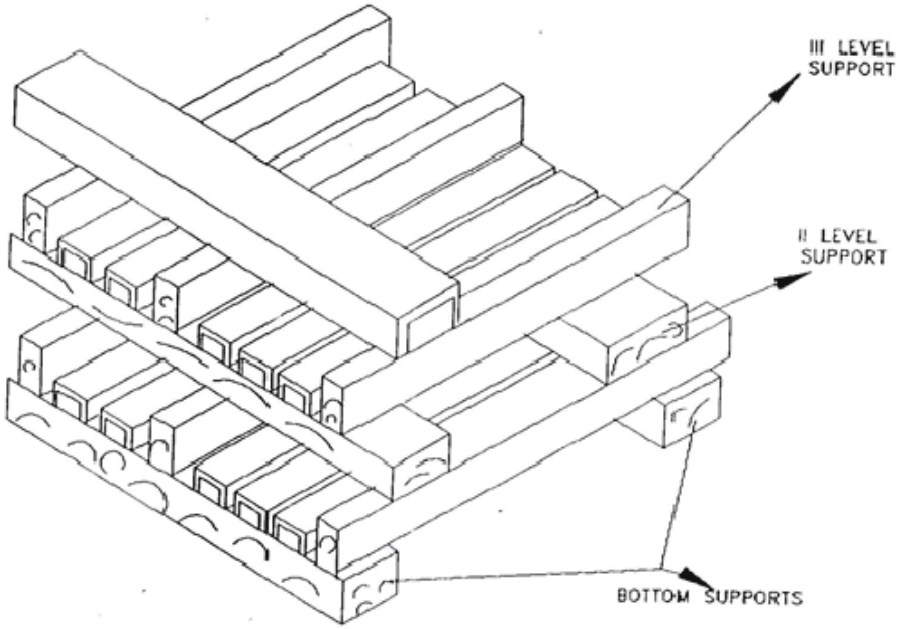


Figure – 2 – STRUCTURAL STEEL STACKING ARRANGEMENT

DRAWINGS / DOCUMENTS TO BE SUBMITTED WITH THE BID

Bidder shall submit the following drawings / documents along with their bid:

a) PQR documents
b) Un-priced copy of price format indicating quoted/ not quoted against each row/column
c) Signed/ Stamped copy of Compliance cum Confirmation Certificate
d) No deviation certificate

OFFER WILL BE CONSIDERED AS INCOMPLETE IN ABSENCE OF ANY OF ABOVE DOCUMENTS. DOCUMENT OTHER THAN ABOVE, IF ANY, SUBMITTED WITH THE OFFER WILL NOT FORM PART OF CONTRACT AND WILL NOT BE CONSIDERED FOR BID EVALUATION.

COMPLIANCE CUM CONFIRMATION CERTIFICATE

The bidder shall confirm compliance with following by signing / stamping this compliance certificate (every sheet) and furnish same with the offer.

a) The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusions, other than those mentioned under "exclusion and those resolved as per 'Schedule of Deviations', with regard to same.

b) There are no other deviations w.r.t. specifications other than those furnished in the 'Schedule of Deviations'. Any other deviation, stated or implied, taken elsewhere in the offer stands withdrawn unless specifically brought out in the 'Schedule of Deviations'

c) Bidder shall submit QP in the event of order based on the guidelines given in the specification & QP enclosed therein. QP will be subject to BHEL / CUSTOMER approval & customer hold points for inspection / testing shall be marked in the QP at the contract stage. Inspection / testing shall be witnessed as per same apart from review of various test certificates/ Inspection records etc. This is within the contracted price without any extra implications to BHEL after award of the contract.

d) All drawings/ data-sheets / calculations etc. submitted along with the offer shall not be taken cognizance off.

e) The offered materials shall be either equivalent or superior to those specified in the specification & shall meet the specified / intended duty requirements. In case the material specified in the specifications is not compatible for intended duty requirements then same shall be resolved by the bidder with BHEL during the pre-bid discussions, otherwise BHEL / Customer's decision shall be binding on the bidder whenever the deficiency is pointed out.
For components where materials are not specified, same shall be suitable for intended duty, all materials shall be subject to approval in the event of order.

f) The commissioning spares shall be supplied on 'As Required Basis' & prices for same included in the base price itself.

g) All sub vendors shall be subject to BHEL / CUSTOMER approval in the event of order.

h) Guarantee for plant/equipment shall be as per relevant clause of GCC / SCC / Other Commercial Terms & Conditions

i) In the event of order, all the material required for completing the job at site shall be supplied by the bidder within the ordered price even if the same are additional to approved billing break up, approved drawing or approved Bill of quantities within the scope of work as tender specification. This clause will apply in case during site commissioning, additional requirements emerges due to customer and / or consultant's comments. No extra claims shall be put on this account

j) Schedule of drawings submissions, comment incorporations & approval shall be as stipulated in the specifications. The successful bidder shall depute his design personnel to BHEL's / Customer's / Consultant's office for across the table resolution of issues and to get documents approved in the stipulated time.

k) As built drawings shall be submitted as and when required during the project execution.

l) The bidder has not tempered with this compliance cum confirmation certificate and if at any stage any tempering in the signed copy of this document is noticed then same shall be treated as breach of contract and suitable actions shall be taken against the bidder.

m) Successful bidder shall furnish detailed erection manual for each of the equipment supplied under this contract at least 3 months before the scheduled erection of the concerned equipment / component or along with supply of concerned equipment / component whichever is earlier.

n) Document approval by customer under Approval category or information category shall not absolve the vendor of their contractual obligations of completing the work as per specification requirement. Any deviation from specified requirement shall be reported by the vendor in writing and require written approval. Unless any change in specified requirement has been brought out by the vendor during detail engineering in writing while submitting the document to customer for approval, approved document (with implicit deviation) will not be cited as a reason for not following the specification requirement.

o) In case vendor submits revised drawing after approval of the corresponding drawing, any delay in approval of revised drawing shall be to vendor's account and shall not be used as a reason for extension in contract completion.

LOAD TITLE	RATING (KW)		UNIT (U)/STN (S)	Nos.		VOLTAGE CODE*	FEEDER CODE**	EMER. LOAD (Y)	CONT.(C)/ INTT.(I)	STARTING TIME >5 SEC (Y)	LOCATION	BOARD NO.	CABLE		BLOCK CABLE DRG. No.	CONTROL CODE	REMARKS	LOAD No.
	NAME PLATE	MAX. CONT. DEMAND (MCR)		RUNNING	STANDBY								SIZE CODE	NOs				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
GYPSUM DEWATERING BUILDING ELEVATOR																		
ELEVATOR MOTOR	16.5		S	1	0	D	S	-	C		Gypsum Dewatering Building Elevator Machine Room							
SPLIT AIR-CONDITIONER FOR GYPSUM DEWATERING BUILDING ELEVATOR M/C ROOM AND LIGHTING FOR ELEVATOR M/C ROOM & SHAFT AND MAINTENANCE AND INSTALLATION REQUIREMENT	7		S	1	0	D	S	-	C		Gypsum Dewatering Building Elevator Machine Room							
FGD CONTROL ROOM BUILDING ELEVATOR																		
ELEVATOR MOTOR	16.5		S	1	0	D	S	-	C		FGD Control room Building Elevator Machine Room							
SPLIT AIR-CONDITIONER FOR GYPSUM DEWATERING BUILDING ELEVATOR M/C ROOM AND LIGHTING FOR ELEVATOR M/C ROOM & SHAFT AND MAINTENANCE AND INSTALLATION REQUIREMENT	7		S	1	0	D	S	-	C		FGD Control room Building Elevator Machine Room							

Note:

1) No other single phase or 3 phase supply shall be provided for elevator erection / operation etc.
2) Only two (3 phase) supply feeders per elevator shall be provided one feeder shall be dedicated to elevator motor and other 3 phase supply feeder shall be provided by BHEL for air conditioner, machine room and shaft lighting and maintenance / installation requirement. Bidder to consider CT in their scope for stepping down the voltage as per their requirement.

Bidder to note: Feeder of indicated rating shall be provided by BHEL. If motor rating is lesser than the provided feeder rating, bidder shall provide protection against over current

NOTES:

1. COLUMN 1 TO 12 & 18 SHALL BE FILLED BY THE REQUISITIONER (ORIGINATING AGENCY); REMAINING COLUMNS ARE TO BE FILLED UP BY PEM (ELECTRICAL)

2. ABBREVIATIONS : * VOLTAGE CODE (7):- (ac) A=11 KV, B=6.6 KV, C=3.3 KV, D=415 V, E=240 V (1 PH), F=110 V (DC): G=220 V, H=110 V, J=48 V, K=+24V, L=-24 V

: ** FEEDER CODE (8):- U=UNIDIRECTIONAL STARTER, B=BI-DIRECTIONAL STARTER, S=SUPPLY FEEDER, D=SUPPLY FEEDER (CONTACTER CONTROLLED)

BHEL	**LOAD DATA (ELECTRICAL)**	**JOB NO.**	**485**	**ORIGINATING AGENCY**		**PEM (ELECTRICAL)**
		PROJECT TITLE	**1X800 MW NORTH CHENNAI FGD**	**NAME**		**DATA FILLED UP ON**
		SYSTEM / S	**ELEVATORS**	**SIGN.**		**DATA ENTERED ON**
		DEPTT. / SECTION	**MAUX / MH**	**SHEET 1 OF 1**	**REV. 00**	**DE'S SIGN. & DATE**