TECHNICAL SPECIFICATION
FOR
FRAMEWORK AGREEMENT
FOR ELEVATOR

SPECIFICATION No. **PE-TS-RC-502-A001**

REV NO. 00

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
BHEL SADAN-NOIDA, INDIA

INDEX

PROJECT INFORMATION

SL.NO	DESCRIPTION	1X800 MW YAMUNANAGAR TPS	3X800 MW TALABIRA STPP	2X800 MW SINGRAULI TPS
1	**CUSTOMER**	HARYANA POWER GENERATION CORPORATION LTD	NLC India Limited (NLCIL)	NTPC Ltd.
2	**CUSTOMER CONSULTANT**	DESEIN PRIVATE LIMITED & DEVELOPMENT CONSULTANTS PVT. LTD.	Development Consultants Private Limited	NA
3	**LOCATION**	Expansion Unit is in the premises of existing 2x300 MW Units at DCRTPP,Kalanaur, Yamuna Nagar.Haryana	Project, is located in the Jharsuguda and Sambalpur districts of Odisha.	The project is located in Sonebhadra district of Uttar pradesh State.
4	**DATA**			
4.1	THE BASIC WIND SPEED “Vb” AT TEN METERS ABOVE THE MEAN GROUND LEVEL.	47 METERS PER SECOND	44 METERS PER SECOND	47 METERS PER SECOND
4.2	THE RISK COEFFICIENT “K1”	1.07		1.07
4.3	CATEGORY OF TERRAIN	Variation with height for Cat-I as per IS 875		Category 2
4.4	OTHER FACTORS	IN LINE WITH IS 875		IN LINE WITH IS 875
4.5	SEISMIC ZONE	ZONE-IV AS PER IS:1893	Zone III as per IS-1893	ZONE-III AS PER IS:1893
4.6	DESIGN AMBIENT TEMPERATURE	50 DEG. CELCIUS	50 degree Celsius	50 degree Celsius
5	**ELECTRICAL DATA**			
5.1	RATED VOLTAGE	415 V	415 V	415 V
5.2	FREQUENCY	50 Hz	50 Hz	50 Hz
5.3	PERMISSIBLE VARIATIONS FOR			
a.	VOLTAGE	+/-10 %	+/-10%	+/-10%
b.	FREQUENCY	(-)5 to (+)3 %	(-)5 to (+)5 %	(-)5 to (+)3 %
c.	COMBINED VOLTAGE & FREQUENCY	10 %	10%	10%
5.4	SYSTEM FAULT LEVEL AT RATED VOLTAGE FOR 1 SEC	-	50KA	50KA
5.5	SHORT TIME RATING FOR TERMINAL BOXES FOR 0.25 SEC	-	50KA	50KA

PROJECT INFORMATION

SL.NO	DESCRIPTION	2X800MW DVC KODERMA TPS PHASE II	1X800MW SIPAT TPS	1X800 MW DARLIPALI TPS
1	**CUSTOMER**	Damodar Valley Corporation (DVC)	NTPC Ltd.	NTPC Ltd.
2	**CUSTOMER CONSULTANT**	Development Consultants Pvt. Ltd.	N.A.	N.A.
3	**LOCATION**	The project is located near Benjhidih Village of Koderma District in Jharkhand.	The project is located in Bilaspur district of Chhattisgarh.	Darlipali Super Thermal Power Station is located in Sundargarh District of Odisha.
4	**DATA**			
4.1	THE BASIC WIND SPEED “Vb” AT TEN METERS ABOVE THE MEAN GROUND LEVEL.	39 METERS PER SECOND	39 METERS PER SECOND	39 METERS PER SECOND
4.2	THE RISK COEFFICIENT “K1”	1.06	1.06	1.06
4.3	CATEGORY OF TERRAIN	CATEGORY 2	CATEGORY 2	CATEGORY 2
4.4	OTHER FACTORS	IN LINE WITH IS 875	IN LINE WITH IS 875	IN LINE WITH IS 875
4.5	SEISMIC ZONE	ZONE-III AS PER IS:1893	ZONE-III AS PER IS:1893	ZONE-III AS PER IS:1893
4.6	DESIGN AMBIENT TEMPERATURE	50 DEG. CELCIUS	50 DEG. CELCIUS	50 DEG. CELCIUS
5	**ELECTRICAL DATA**			
5.1	RATED VOLTAGE	415 V	415 V	415 V
5.2	FREQUENCY	50 Hz	50 Hz	50 Hz
5.3	PERMISSIBLE VARIATIONS FOR			
a.	VOLTAGE	+/-10 %	+/-10 %	+/-10 %
b.	FREQUENCY	(-)5 to (+)3 %	(-)5 to (+)3 %	(-)5 to (+)3 %
c.	COMBINED VOLTAGE & FREQUENCY	10 %	10 %	10 %
5.4	SYSTEM FAULT LEVEL AT RATED VOLTAGE FOR 1 SEC	50 kA	50 kA	50 kA
5.5	SHORT TIME RATING FOR TERMINAL BOXES FOR 0.25 SEC	50 kA	50 kA	50 kA

PROJECT INFORMATION

SL.NO	DESCRIPTION	3X800 MW TELANGANA TPS	2X660 MW MAHAGENCO KORADI TPS	2X660 MW RAGHUNATHPUR TG & SG PKG
1	CUSTOMER	**NTPC**	Maharashtra State Power Generation Co. Ltd	Damodar Valley Corporation (DVC)
2	CUSTOMER CONSULTANT	NA	STEAG Energy Services India Pvt. Ltd.	DCPL KOLKATA
3	LOCATION	Telangana STPP, Stage-II of capacity 2400 MW, comprising (3x800 MW) as extension of existing Stage-I, Village-Ramagundam District-Karimnagar, Telengana.	Koradi of Nagpur District in Maharashtra.	Raghunathpur sub-division of Purulia District, West Bengal.
4	**DATA**			
4.1	THE BASIC WIND SPEED “Vb” AT TEN METERS ABOVE THE MEAN GROUND LEVEL.	44 METERS PER SECOND	44 Meters per second	47 Meters per second
4.2	THE RISK COEFFICIENT “K1”	1.07	1.07	1.07
4.3	CATEGORY OF TERRAIN	Variation with height for Category 2 as per IS 875	Variation with height for Cat-I as per IS 875	Category 2
4.4	OTHER FACTORS	IN LINE WITH IS 875	In line with IS 875	In line with IS 875
4.5	SEISMIC ZONE	ZONE-IV AS PER IS:1893	Zone-II as per IS 1893-1984	Zone-III as per IS:1893
4.6	DESIGN AMBIENT TEMPERATURE	50 DEG. CELCIUS	50 DEG. CELCIUS	50 DEG. CELCIUS
5	**ELECTRICAL DATA**			
5.1	RATED VOLTAGE	415 V	415 V	415 V
5.2	FREQUENCY	50 Hz	50 Hz	50 Hz
5.3	PERMISSIBLE VARIATIONS FOR			
a.	VOLTAGE	+/-10 %	+/-10 %	+/-10 %
b.	FREQUENCY	(-)5 to (+)3 %	(-)5 to (+)5 %	(-)5 to (+)3 %
c.	COMBINED VOLTAGE & FREQUENCY	10 %	10 %	10 %
5.4	SYSTEM FAULT LEVEL AT RATED VOLTAGE FOR 1 SEC	-	-	45 kA
5.5	SHORT TIME RATING FOR TERMINAL BOXES FOR 0.25 SEC	-	-	45 kA

PROJECT INFORMATION

SL.NO	DESCRIPTION	2X660 MW CSPGCL KORBA WEST TPP	3x800 MW MEJA TPS
1	**CUSTOMER**	Chhattisgarh State Power Generation Co. Ltd.	NTPC Ltd.
2	**CUSTOMER CONSULTANT**	NTPC Ltd.	N.A.
3	**LOCATION**	The Hasdeo Thermal Power Station project is located at Korba Village in Korba District of Chhattisgarh.	The project is located near Kohdar, Mai khurd and PataiDandi villages of Meja Tehsil in Allahabad district of Uttar Pradesh,
4	**DATA**		
4.1	THE BASIC WIND SPEED “Vb” AT TEN METERS ABOVE THE MEAN GROUND LEVEL.	44 METERS PER SECOND	47 m/sec
4.2	THE RISK COEFFICIENT “K1”	1.07	1.07
4.3	CATEGORY OF TERRAIN	CATEGORY 2	Cat-2
4.4	OTHER FACTORS	IN LINE WITH IS 875	
4.5	SEISMIC ZONE	ZONE-III AS PER IS:1893	Zone II to V
4.6	DESIGN AMBIENT TEMPERATURE	50 DEG. CELCIUS	50 DEG. CELCIUS
5	**ELECTRICAL DATA**		
5.1	RATED VOLTAGE	415 V	415 V
5.2	FREQUENCY	50 Hz	50 Hz
5.3	PERMISSIBLE VARIATIONS FOR		
a.	VOLTAGE	+/-10 %	+/-10 %
b.	FREQUENCY	(-)5 to (+)3 %	(-)5 to (+)3 %
c.	COMBINED VOLTAGE & FREQUENCY	10 %	10 %
5.4	SYSTEM FAULT LEVEL AT RATED VOLTAGE FOR 1 SEC	50 kA	45 kA
5.5	SHORT TIME RATING FOR TERMINAL BOXES FOR 0.25 SEC	50 kA	45 kA

SCOPE

SCOPE OF THIS PACKAGE COVERS THE FOLLOWING:

SL.NO	PARAMETERS	REQUIREMENT
1	Supply Including Design, Engineering, Manufacturing Of	
a)	Main Supply alongwith spares for erection, startup and commissioning	YES
2	Painting	YES
3	Inspection & Testing	YES
4	Packing	YES
5	Transportation & Delivery To Site	YES
6	Erection & Commissioning	YES
7	Supervision of Erection & Commissioning	NO
8	Performance Guarantee (PG) Test	YES
9	Mandatory Spares	YES
10	O & M Service	NO
11	O & M Spares	NO
12	Storage	YES

	EXCLUSIONS	
1	Complete civil works for elevator shaft, machine room, pit complete with the side enclosure (Brick / RCC), interconnecting platform (if any) and monorail beam, shaft reduction channel if required.The machine room will be provided with RCC floor slab with necessary pockets for anchor bolts and slots. 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	Two number 415 V, 3 Phase power supply from feeders (one feeder for elevator motor and other feeder for air conditioner, machine room and shaft lighting and maintenance / installation requirement) up to isolating switches (vendor's scope) in elevator machine room. Any other voltage level (AC/DC) required will be derived by the vendor with suitable transfomer, MCCB/MCB, cables. Motor starter shall be part of elevator control panel.	
4	EPABX : External connection.	

	GENERAL TECHNICAL REQUIREMENT
1.0	It is not the intent to specify herein all the details of design and manufacturing. Bidder shall ensure that the offered equipment confirms in all respects to high standards of design, engineering and workmanship.
2.0	The equipment shall comply with all applicable safety codes and statutory regulations of India as well as of the locality where the equipment is to be installed.
3.0	In the event of any conflict between the codes and standards referred to in the above clauses and the requirement of this specification, the requirement of Technical Specification shall govern.
4.0	The equipment shall conform in all respects to high standards of design, engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to purchaser who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material which in his judgement is not in full accordance herewith.
5.0	Drawing/document submission shall be through web based Document Management System. Bidder would be provided access to the DMS for drg/doc approval and training for the same. Bidder to ensure proper internet connectivity at their end.
6.0	The first revision drawings/ documents submitted by vendor shall be complete in all respects.Any incomplete drawing submitted shall be treated as non- submission with delays attributable to vendor's account. For any clarification/ discussion required to complete the drawings, the bidder shall himself depute his personal to BHEL / Customer's place as per the requirement for across the table discussions/ finalizations/ submissions of drawings.
7.0	In case of any change in codes, standards & regulations between the date of bid opening and the date when vendors proceed with fabrication, the Employer shall have the option to incorporate the changed requirements or to retain the original standard. It shall be the responsibility of the Contractor to bring to the notice of the Employer such changes and advise Employer of the resulting effect.
8.0	Other International/ National standards such as DIN, VDI, BS, GOST etc. shall also be accepted for only material codes and manufacturing standards, subject to the Employer's approval, for which the Bidder shall furnish, adequate information to justify that these standards are equivalent or superior to the standards mentioned above. In all such cases the Bidder shall furnish specifically the variations and deviations from the standards mentioned elsewhere in the specification together with the complete word to word translation of the standard that is normally not published in English.
9.0	In the event of any conflict between the codes and standards referred to in the above clauses and the requirement of this specification, the requirement of Technical Specification shall govern.

10.0	Bidder shall carry out the type tests as listed in the Quality Plan. OR Bidder shall furnish Type Test Certificate of specified Type Test as per quality plan for applicable equipment which has been carried out within last ten/five years(as applicable and mentioned in respective technical data sheet) from bid opening date These reports should be for the tests conducted on the equipment same (model / type / size / rating) to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client. In absence of valid Type Test report vendor to conduct the same without any commercial & delivery implication to BHEL.
11.0	Manufacturing Quality Plan is included for reference in this specification to enable the bidder to understand the extent of inspection and testing requirements to execute this job. The successful bidder has to follow the quality plan's minimum requirement during manufacturing and testing. Further all checks and tests indicated in Quality Assurance Requirement as detailed in Customer's specification etc have to be followed.
12.0	Sub vendor list is attached. Any additional sub - vendors proposed by biddder during contract stage shall be subject to BHEL/ Customer/Customer's Consultant approval.
13.0	Document approval by BHEL / Customer shall not absolve the supplier of their contractual obligations of completing the work as per specification requirement without any commercial and delivery impact.
14.0	**Mandatory Spares (Refer bill of material for spares list)**
14.1	One (1) "Set", "set of each type" is defined as 100% requirement for one elevator for the entire elevators of similar size & capacity.
14.2	All essential spares shall be supplied as per the requirement of the specifications. In case any spare indicated in the specification is not applicable for particular equipment then suitable applicable alternate spare shall be supplied without any commercial implication to BHEL.
14.3	In case spares indicated in the list are not applicable to the particular design offered by the bidder, the bidder should offer spares applicable to offered design with quantities generally in line with the approach followed in the list.
14.4	Any item which is quoted as "not applicable" in the above list and is found to be "applicable" at a later date shall be supplied by the Bidder without any commercial implications. The Bidder shall note that if there in any change/ variation in equipment/ system during detail engineering which causes any change/ variation in the essential spares quantity, the same shall be supplied without any commercial implications.

14.5	Interchangeability and Packings: All spares supplied under this contract shall be strictly interchangeable with the parts for which they are intended for replacements. The spares shall be treated and packed for long storage under the climatic conditions prevailing at the site e.g. small items shall be packed in sealed transparent plastic with desecrator packs as necessary.
14.6	Identification: Each spare shall be clearly marked and labeled on the outside of the packing with its description. When more than one spare part is packed in single case, a general description of the contents shall be shown on the outside of such case and a detailed list enclosed. All cases, containers and other packages must be suitably marked and numbered for the purpose of identification.
14.7	Material Codification: The bidder to provide datasheets/ assembly drawings of the manufacturer/ any other relevant document showing Bill of Material(s), Make, Model Number, Part Number etc. through which mandatory spares to be supplied can be uniquely identified. This would facilitate the Employer to assign a unique code to each of the mandatory spare.
15.0	**SHOP TEST PROCEDURE FOR GEAR BOX**
15.1	Gear Box Running Test: The gear boxes shall be run under no-load condition at the rated speed for minimum four hours in each direction and the following are to be checked:
a	All bolts at the joints remain tight.
b	All gear mesh lines are getting enough lubrication.
c	All bearings are getting enough lubrication.
d	Bearing temperatures after running for four hours shall not exceed 50 deg. Centigrade or 15 deg. centigrade above ambient whichever is higher. Temperature shall be checked after every hour.
e	Vibration : Maximum limit 125 microns (peak to peak)
f	Sound: The gearbox shall not emit unusual sound as obtained under conditions of hard meshing, high spots etc. Maximum sound level shall be 85 dBA at a distance of 1000mm and 91 dBA at a distance of 300 mm.
g	There shall be no Oil leakage at parting lines, bearing housings or inspection covers.
15.2	**In addition to the above specific points, the following general points shall be ensured**:
a	Inspection pockets are provided as required.
b	Gear box casings are provided with at least two fit bolts/dowels at the parting line.
c	Dip sticks with minimum / maximum level markings are provided.
d	Drain plugs are provided at convenient locations preferably at vertical wall of the housing.
e	Breathers are provided.
f	Lifting lugs or eye bolts ar provided as required.

g	Wherever bearings have splash lubrication, oil retainers are provided.
h	Gear boxes are painted as per specification outside and inside. Inside surfaces shall be painted with Oil proof paint.
i	Name plate should provide information eg. Ratio, KW rating, Bearing details and manufacturers name.
16.0	**Testing at site including arranging test load**: Trial operation, commissioning, performance/ demonstration guarantee tests shall be carried out at site as per IS:14665 / IS17900 as follows: i). Rated capacity of the Elevator. ii). Travel and hoist Speed of the Elevator. iii). Accurate positioning of the Elevator. iv). Over Load test of the Elevator
17.0	**Services to be provided by the bidder**
a	Packing, forwarding and transportation to site.
b	Development of storage space including ward & watch of the equipment and handling at site.
c	Unloading, storage and handling at site. The Bidder shall provide means for all unloading and reloading for all consignments of plant; both during transport to Site and on the Site. Consignments shall be unloaded immediately on arrival at Site. The Bidder is required to take the necessary steps in order to provide the carriage, special supporting structures for heavy loads, etc. The following parts shall be stored inside enclosed warehouses:
d	Bolts, pins, packing, tools, insulation materials, electrical parts with electrical devices attached, electric motors and excitation equipment, instruments, welding material and equipment, all small parts and all parts of the ELEVATOR which already have been finally painted. If large parts are stored in the open air, they shall be provided with weather resistant and fire & resistant covers. Electrical parts, which are not packed in heavy duty polyethylene foil and those so packed, but whose packing has been damaged shall be kept in suitable places from the moment of storage to the moment of installation. All insulation materials which will be taken from the warehouse for installation and which are stored temporarily in the station shall be protected from weather or humidity. All the equipment shall be stored as per standard storage and preservation instructions etc. of the suppliers.
e	Erection and Commissioning
f	**Statutory requirement:** Obtaining clearance and acceptance certificate, licence from the concerned competent Authority after site test and as and when required as per Government Norms /Statutory body till the time of final handling over to Customer. Necessary fees/expenditure as required shall be borne by the vendor.
g	Any service mentioned in GCC & SCC as relevant to the package.

TECHNICAL DATA SHEET - A

Sr. No.		DESCRIPTION	TECHNICAL PARTICULARS
1.0.0		**General**	
1.1.0		**Basic Details**	
	a.	Type	1. Passenger Elevator- (i) Conventional Type (ii) Panoramic Type 2. Goods cum passenger elevator
	b.	Location	Various thermal power plant buildings
	c.	Numbers of Elevators	**Refer Bill of Quantity.**
	d.	Outdoor or indoor duty	Indoor
	e.	Rated Capacity (Kg)	**Refer Bill of Quantity.**
	f	No. of landing	Type and capacity of elevators are indicated in price schedule along with total no of landings for elevators of same type and capacity. **Refer Bill of Quantity.**
	g.	Total Travel	Type and capacity of elevators are indicated in price schedule along with total travel for elevators of same type and capacity. **Refer Bill of Quantity.**
	i.	**Operation & control**	
	i)	Operation of elevator	Automatic simplex collective with and without attendant with provision for locking control in “auto” or “Attendant” position. Key type lock switch shall be provided. Push button shall be fixed in the car for holding the doors open for any length of the time required.
	ii)	Logic Controller	Selective Collective Controller with variable voltage variable frequency drive and Microprocessor based software-controlled logic system. The control system shall be of field proven design and having satisfactory track record.
	iii)	Motor speed control	AC Variable Voltage Variable Frequency Microprocessor based Control with automatic level adjustment.
	iv)	Method of operation of car and landing doors.	Power operated with automatic horizontal sliding biparting centre opening & closing car and landing doors. The door of car and landing shall be interlocked in such a way opening & closing of two doors shall be simultaneous and the door will open when the lift is in landing zone.
1.2.0	a.	**Design, manufacturing / fabrication and testing of the Elevator confirm to standard / code**	IS: 14665 / IS :17900
1.2.1	a.	**Elevator body/parts**	
	b.	Car enclosure, car door & landing door	SS 304, min 1.5 mm thick, hairline finish sheet.
	c.	Car Door construction	Hollow metal construction from minimum 16-gauge thick steel sheet
	d	Car roof	Car roof shall be covered with sheet metal.
	e	Car flooring	Passenger elevators: Vitrified ceramic type with matte finish/ PVC tiles to be informed on project to project basis. Good cum passenger elevator: Chequered plate with minimum 6mm thickness.
	f	Car Frame	Material: Mild Steel, Type of construction: Bolted
	g	Handrails in Car	Mirror finish stainless steel at suitable height on three sides of car.
	h	False ceiling in Car	SS 304.
	i	Isolating cushion b/w car and car frame	Rubber pad or spring.
	j	Mesh between Car & counter weight	Mettalic wire type
	k	Counter weight	Frame: Mild steel, fabricated steel construction Fillers: Cast Iron
	l	Fixing / Fasteners / Embedment	i) All fixing materials required for fixing rails, brackets, equipments including nuts and bolts. ii) All steel embedment for fixing landing doors / indicators etc. to elevator well shaft and appron / facia plate. iii) Load bearing plate along with fixing arrangerment (anchor / fasteners) for placement of traction machine frame.

1.3.0		**Elevator shaft & Pit, car size and CAR entrance size**	
	a.	Elevator shaft & Pit size	As per compliance drawing
	b.	Car & Entrance door size	IS: 14665 / IS :17900
	c.	Pit type & buffer pedestals	Bare pit (i.e. without any RCC block / pedestal for buffer for Car & Counter weight).MS structure & buffer for elevator resting shall be provided.
	d.	Type of buffers and number	Spring (helical / coil) buffers for car and counterweight as per IS 14665.
	e.	Ladder in pit	Metallic type
2.0		**Elevator CAR**	
	a.	Car operating panel (COP)	
		i)Type of construction	Partial Height Car Operating Panel (COP), removable type from Car with SS face plate.
		ii) Push Buttons	Box type with SS face plate, Luminous type (IP 54).
	b.	Car position indicator	To be provided (both visual and audio) combined with direction arrows. Car position indicator in car, hall position indicator at all floors, Up and down travel direction position indicator telltale lights at all floors, overload warning indicator, battery operated alarm bell and emergency light and fan and hands-free speaker telephone set with suitable battery, charger and controls. Remote alarm shall be provided.
		i) Type of construction	As per manufacturer's standard
		ii) Type of display	7 segment LED display
	c.	EPABX	Internal telephone wiring and telephone hand set.
3.0		**Electrical Accessories**	
	a.	Fan, Lighting at Machine room, Shaft & pit.	i) One cabin fan, two LED light fittings on car roof. Lux level: 100 min. ii) Light and fan in the Car enclosure shall be separate switch control. iii) LED lighting with a 5A/15 A, 3 pin socket & switches or as required by bidder during erection / maintenance purpose shall be provided on top of car and at every 3 meters' interval inside lift shaft.
	b.	Emergency stop switch	To be provided inside the car,at the lowest landing and the pit floor.
	c.	Braille switch	In Car Operating Panel (COP) & Landing Operating Panel (LOP)
	d.	Floor announcement cum music system	Inside the car
	e.	Emergency light	At the car roof
	f.	Limit switches	
		i) Location	Bottom & top terminal
		ii) Type	Electro-Mechanical
		iii) Operation	Cam operated.
	g.	Fire Man Switch	At ground floor landing near LOP
	h.	Protective devices.	Input Phase Loss, Earth Fault, Over Voltage, Output Short Circuit, Load Loss, Input Transient Protection, Overload, Single phase preventor, reverse phase relay protection etc.
4.0		**Safety Features**	
	a.	Safety device for door operation	Full length Infrared light curtain along with pressure limiter for extra mechanical safety.
	b.	Emergency safety devices	Attached to the car frame and sustaining the lift car upto governor tripping speed with full rated load in car.
	c.	Car Over speed Governor	
		i) Stopping distance	As per IS:14665 / IS :17900
		ii) Type and mode of operation of over	Centrifugal action
		iii) Tripping speed and design code	As per IS: 14665 / IS :17900
		iv) Location	At machine room.
	d.	Automatic Rescue Device (Battery Drive)	Automatic Rescue Device (ARD) with battery drive - Modern advanced electronic drive system of rescuing passenger trapped in an elevator.
	e.	Brakes	DCEM brakes
	f.	Safety Jaw	Yes, complete with accessories shall be provided
	g.	Split Air conditioner	Provided as per machine room size. (minimum 2T)
5.0		Fire rating of Landing Door	Fire rated for minimum 2 hours.

6.0		Fire extinguisher	½ Kg CO_2 fire extinguisher along with fixing arrangement in car & 1 Kg in machine room.
7.0		Door hanger tracks	Yes, complete with accessories.
8.0		Apron / Fascia Plate	Yes as per IS: 14665 / IS :17900
9.0		Load plate	As per manufacturer's standard
10.0		Guide rails	Guide rails complete with supporting brackets for the car and counter weights.
11.0		Ropes for hoisting & Governor	i) Factor of safety for rope shall be 12 (minimum) or as per IS: 14665 / IS : 17900, whichever is higher. ii) Greased, Self-lubricating
12.0		Sound Reducing Material	Isolation Rubber / other arrangement in the Machine shall be provided.
13.0		**Door Motor**	
		a) Equipment driven by Motor	Doors
		b) Direction of rotation	Both Clockwise & Anticlockwise
		c) Type of enclosures	IP 54
14		**Main Motors**	
	a.	Type	Three phase Squirrel Cage Induction motors to be operated from VFD system shall be suitable for speed range and torque without exceeding temperature rise limits as specified elsewhere in this specification. VFD shall be used to drive three (3) phase squirrel cage inverter duty Induction motor with VPI insulation (Resin poor) suitable for VFD application.These motors shall be provided with insulated bearing on at least one side for motor frame size above 250 frame. However, contractor's proven practice with respect to use of insulated bearing in VFD driven motor may be accepted subject to Employer's approval.Motors shall conform to latest revision IS 14665 and motor subsection of this specification.
	b.	Design Codes & Standards	1.Three phase induction motors : IS15999, IEC:60034, IS: 12615, IS: 325 2.Single phase AC motors : IS:996, IEC:60034 3.Energy Efficient motors : IS 12615, IEC:60034-30 4.Elevator duty motors : IS:14665 IS/IEC:60034 5.Designation of Methods of Cooling of Rotating Electrical Machines: IS 6362 6.Designation for types of construction and mounting arrangement of rotating electrical machines: IS 2253
	c	Enclosure	TEFC
	d	Numbers furnished	1 no.
	e.	Voltage, phase and frequency	415V ± 10%, 3 Ph., 4 wire, 50 Hz, +3/-5 % Combined voltage & frequency variation = 10% absolute
	f	Class of protection for motor including terminal box	IP – 55
	g	Rated capacity (KW)	Maximum continuous motor ratings shall be at least 10% above the maximum load demand of the driven equipment under entire operating range including voltage and frequency variations.
	h.	Duration factor/duty	40 % CDF / S-4 for all elevators except for 3 nos -680kg , 3 nos-884kg and 1 no-1088 kg elevators motors with 60 % CDF / S-5.
	i.	Bearings (Motors)	Grease lubricated ball or roller bearings for Horizontal motors Grease lubricated ball or roller bearings or combined trust and guide beaing for Vertical motors. These motors shall be provided with insulated bearing on at least one side for motor frame size above 250 frame. However, supplier's proven practice with respect to use of insulated bearing in VFD driven motor may be accepted subject to End customer's approval.
	j	Class of insulation	Temp rise 70 deg. C by resistance method for both thermal class 130(B) & 155(F) insulation
	k	Number of starts/ hour	150 starts / hr for all elevators except for 3 nos -680kg , 3 nos-884kg and 1 no-1088 kg elevators motors with 180 starts / hr.
	l	Overload protection for motors provided	Yes
	m	Space heater requirements	For motors of rating 30 KW and above. Separate terminal box for space heaters & RTDs shall be provided.
	n	Motor pull out torque	275% of full load torque

	o	Terminal box of motor	-Motor terminal box shall be detachable type and located in accordance with Indian Standards clearing the motor base- plate/ foundation. DOP of terminal box shall be same as motor.
			-Terminals shall be stud or lead wire type, substantially constructed and thoroughly insulated.
			The terminals shall be clearly identified by phase markings, with corresponding direction of rotation marked on the non-driving end of the motor.
			- Rotation at 90 deg
	p	Cable glands and lugs	-Motor terminal box shall be furnished with suitable cable lugs and double compression brass glands to match with cable used.
			-Gland plates of thickness 3 mm (hot/cold rolled sheet steel) or 4 mm (non magnetic material for single core cables) shall be provided in case of cable boxes.
	q	Earthing points suitable for conenction	Motor body shall be grounded at two earthing points on opposite sides with two separate and distinct grounding pads complete with tapped holes, GI bolts and washers. LT Motors: 1KW to 25 KW --- 25 x 3mm GS flat.
	r	Minimum spacing between gland plate & centre of bottom terminal stud	Up to 3 KW As per manufacturer's practice. Above 3 KW - upto 7 KW 85 mm Above 7 KW - upto 13 KW 115 mm Above 13 KW - upto 24 KW 167 mm
	s	Minimum inter-phase and phase-earth air clearances with lugs installed	10 mm
	t	Inspection Testing (for motor)	
	t.1	List of Test for which reports have to be submitted. 1.Measurement of resistance of windings of stator and wound rotor. 2.No load test at rated voltage to determine input current power and speed 3.Open circuit voltage ratio of wound rotor motors (in case of Slip ring motors). 4.Full load test to determine efficiency power factor and slip. 5.Temperature rise test. 6.Momentary excess torque test. 7.High voltage test. 8.Test for vibration severity of motor. 9.Test for noise levels of motor(Shall be limited as per clause no 7.06.00 of this section). 10.Test for degree of protection and 11.Overspeed test.	
	t.2	The type test listed above should have been conducted within 10 years prior to supply under this contract. In absence of type tests reports or in case reports are not found to be meeting the specification/standards requirements, vendor shall conduct all such type tests without any commercial/delivery implication to BHEL according to the relevant standards and reports shall be submitted to the owner for approval.	
	t.3	The type test reports once approved for any projects shall be treated as reference. For subsequent projects of DVC, an endorsement sheet will be furnished by the manufacturer confirming similarity and “No design Change”. Minor changes, if any shall be highlighted on the endorsement sheet.	
	t.4	All acceptance and routine tests as per the specification and relevant standards shall be carried out.Charges for these shall be deemed to be included in the equipment price.	
	q	Other requirement	
	q.1	Squirrel cage Induction motor with VPI insulation shall be provided With VVVF system. Motor shall be energy efficient as per IS:12615, IEC 60034 and shall be elevator duty as per IS:14665. Winding & insulation shall be Electrolytic grade Copper conductor, Non-hygroscopic, oil resistant, flame resistant Insulation. Vibration shall be limited within the limits IS:12075.	
	q.2	For motors with starting time upto 20 secs. at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 2.5 secs. more than starting time. Permissible starting voltage for motor shall be as follows:Up to 85% of rated voltage for ratings below 110 KW & upto 80% of rated voltage for ratings from 110 kW to 200 kW. Starting Duty : Two hot starts, with motor initially at normal running temperature Maximum Locked Rotor Current : as per IS 12615.	
	q.3	All motors shall be so designed that maximum inrush currents and locked rotor and pullout torque developed by them at extreme voltage and frequency variations do not endanger the motor and driven equipment.	

	q.4	Starting Time: a) For motors with starting time upto 20 secs. at minimum permissible voltage during starting, the locked rotor withstandvtime under hot condition at highest voltage limit shall be at least 2.5 secs. more than starting time. b) For motors with starting time more than 20 secs. and upto 45 secs. at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 5 secs. more than starting time. c) For motors with starting time more than 45 secs. at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be more than starting time by at least 10% of the starting time. d) Speed switches mounted on the motor shaft shall be provided in cases where above requirements are not met.	
	q.5	PAINT SHADE FOR MOTOR (CORROSSION PROOF PAINTS OF COLOUR SHADE): - RAL 5012 (Blue). The thickness of finish coat shall be minimum 50 microns (minimum total DFT shall be 100 microns). However, in case electrostatic process of painting is offered. minimum paint thickness of 50 microns shall be acceptable for finish coat. Epoxy based paint with suitable additives shall be used.	
15		**Cables & Wirings**	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.
	a.	LT Power Cables	All LT power cables of sizes more than 120 sq.mm. shall be XLPE insulated, and sizes shall be of 1Cx150, 1Cx300, 1Cx630, 3Cx150, 3Cx185, 3Cx240 & 3Cx300 Sq.mm. However for cable sizes upto 120 sq.mm. both XLPE insulated & PVC insulated LT power cables are acceptable.
	b.	1.1 KV grade XLPE power cables	1.1 KV grade XLPE power cables shall have multi stranded compacted aluminum conductor (tensile strength of more than 100 N/ sq.mm), XLPE insulated, PVC inner-sheathed (black color as per IS:5831), Armoured (For single core Armoured cables, armoring shall be of aluminum wires H4 grade. For multicore Armoured cables armouring shall be of galvanized steel round wire/strip), PVC FRLS outer-sheathed (black colour) conforming to IS: 7098. (Part-I).
	c	1.1KV grade PVC power cables	1.1KV grade PVC power cables shall have multi stranded aluminum conductor (compacted type for sizes above 10 sq.mm), PVC Insulated, PVC inner sheathed ((black color as per IS:5831)) Armoured (For single core Armoured cables, armoring shall be of aluminum wires H4 grade. For multicore Armoured cables armouring shall be of galvanized steel round wire/strip), PVC FRLS outer-sheathed (black colour) conforming to IS:1554 (Part-I).
	d	LT Control Cables	LT Control Cables are Cu conductor 1.5 sq mm, PVC insulated, PVC inner sheath, GS wire/strip armoured and FRLS PVC outer sheath confirming to IS 1554 Part-1. Standard control cable sizes shall preferably be 3CX1.5, 5CX1.5, 7CX1.5 & 10CX1.5mm2, 14CX1.5 mm2.
	e	1.1 kV grade Trailing cables	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 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)
	f	Size	Cables shall be sized based on the following considerations: a) Rated current of the equipment b) Short circuit withstand capability c) Derating factors for various conditions of installations (variation in ambient temperature, grouping of cables).

16		**CABLE TRAYS**	Cable trays shall be ladder/perforated type complete with matching fittings (like brackets, elbows, bends, reducers, tees, crosses, etc.) accessories (like side coupler plates, etc. and hardware (like bolts, nuts, washers, G.I. strap, hook etc.) as required. Cable tray shall be ladder type for power & control cables and perforated for instrumentation cables. Cable trays, fittings and accessories shall be fabricated out of rolled mild steel sheets free from flaws such as laminations, rolling marks, pitting etc. These (including hardware) shall be hot dip galvanized. Cable trays shall have standard width of 150 mm, 300 mm & 600 mm and standard lengths of 2.5 metre. Thickness of mild steel sheets used for fabrication of cable trays and fittings shall be 2 mm. The thickness of side coupler plates shall be 3 mm. Cable troughs shall be required for branching out few cables from main cable route. These shall be U-shaped, fabricated of mild steel sheets of thickness 2 mm and shall be hot dip galvanised. Troughs shall be standard width of 50mm & 75 mm with depth of 25 mm. The tolerance for cable tray and accessories shall be as per IS 2102 (Part-1). Tolerance Class: - Coarse
17		**SUPPORT SYSTEM FOR CABLE TRAYS**	Cable supporting steel work for cable racks/cables shall comprise of various channel sections, cantilever arms, various brackets, clamps, floor plates, all hardwares such as lock washers, hexagon nuts, hexagon head bolt, support hooks, stud nuts, hexagon head screw, channel nut, channel nut with springs, fixing studs, etc. All steel components, accessories, fittings and hardware shall be hot dip galvanized. Cable tray support system shall be pre-fabricated out of single sheet. Support system for cable trays shall essentially comprise of the two components i.e. main support channel and cantilever arms. The main support channel shall be of two types : (i) C1:- having provision of supporting cable trays on one side and (ii) C2:-having provision of supporting cable trays on both sides. The main support channel and cantilever arms shall be fabricated out of 2.5 thick rolled steel sheet conforming to IS 1079. Cantilever arms of 320 mm, 620mm and 750 mm in length are required.
18		**Isolating switch**	Main isolating switches at elevator machine room for incoming supply from supply feeders.
19		**Control panel**	
	a.	Material	Cold Rolled 2 mm size,3mm for Gland Plates (CRCA/HR),1.6mm: Doors, covers etc: sheet steel 2mm size.
	b.	Numbers and location	In machine room with space heaters.
	c.	Degree of protection	IP 54
20		**Cable glands**	Cable shall be terminated using double compression type cable glands. Cable glands shall conform to BS:6121. Cable glands shall be made of heavy duty brass machine finished and nickel chrome plated. Thickness of plating shall not be less than 10 micron. All washers and Hardware shall also be made of brass with nickel chrome plating. Rubber components shall be of neoprene or better synthetic material and of tested quality.Cable glands shall be suitable for the sizes of cable supplied/erected.
21		**Lugs**	Cable lugs/ferrules shall be solderless crimping type suitable for power and control cables as per the DIN 46239. Aluminium solderless crimping lugs/ ferrules shall be used for Aluminium cables and Copper lugs/ferrules shall be used for Copper cables. Bimetallic washers or bimetallic type lugs shall be used for bimetallic connections
22		**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.
23		**E-Learning Package**	
	a.	The courses shall be web based and mobile based Application type. It shall run on all possible versions of web browser like Internet Explorer, Google Chrome, Firefox etc. on Laptop/Desktop and shall be Smartphone/Tablet/ Mobile responsive. The Mobile responsive courses shall run on Android, Windows Mobile, Blackberry, iOS etc.	
	b.	The courses shall support liquid/fluid page layout so that the entire screen gets adjusted to PC, Laptop, Smartphone/ Mobile, Tablet and any other display devices.	
	c	Course content text shall be in English language and be associated with a voiceover in English language with Indian accent.	

	d	Courses shall be SCORM (Sharable Content Object Reference Model) compliant, version 1.2 which is compatible with LMS at PMI.
	e	Each course shall have every physical and functional detail of the equipment / system supplied.
	f	Each of the e-Learning course shall be based on multiple web pages and mobile pages with multiple modules.
	g	There shall be option for self-assessment test after every course. In case the user doesn't opt for self-assessment test the user shall be able to go to the next course. There shall be no restriction in no. of times for repeating the assessments. All correct answers along with the answers marked by the users shall be displayed at the end of test/ quiz.
	h.	If Java and Flash, as applicable are not available in the system to run the package, then there shall be a prompt message for updation of the same.
	i.	Each course shall have a self-running interactive content with navigation buttons containing forward, backward, pause, bookmark and menu options in the course window.
	j.	The course shall contain chapter titled 'Introduction/overview' that explains the purpose of the course.
	k.	The course content shall contain descriptive text shall be factual, specific, terse, clearly worded, and simply illustrative, so that the user can understand it.
	l.	The system shall provide the user with the ability to select the information with a Cursor.
	m	The course menu should contain table of content linked to concerned pages. The user shall be given the capability to access all of the functions available on the system through a menu system. This shall consist of active buttons, which shall control a hierarchy of pull down/pop-up menus. Menu shall appear quickly and exist only while a selection is being made. The user shall be given the capability to position the cursor or pointer on the menu item and use pointer device such as mouse to activate the function.
	n	Every course shall contain the 3D design/drawing/exploded view/360 degree turn around view of the equipment/system, textual description of the equipment/system and its functionality with video (as applicable), animation and audio.
	o	The users shall be able to control audio sound level associated with the courses.
	p	Drawings / text in the courses shall be scalable (Zoom In/ Out).
	q	The user shall have the capability to record a bookmark to mark displayed information for later recall, whenever he accesses the same course next time.
	r	e-learning Package of an equipment / system shall include e-learning courses for each of erection, commissioning, operation and maintenance of that equipment / system.
	s	e-learning courses on erection, commissioning, operation and maintenance of an equipment / system shall include e-learning lessons/chapters/modules (as required) for erection, commissioning, operation and maintenance respectively of that equipment / system.
	t	The vendor shall get the approval of one sample course from EIC before proceeding for further courses.

ANNEXURE-E.1

SCOPE MATRIX BETWEEN BHEL AND ELEVATOR VENDOR (FOR EPC PROJECTS)

PACKAGE: ELEVATORS

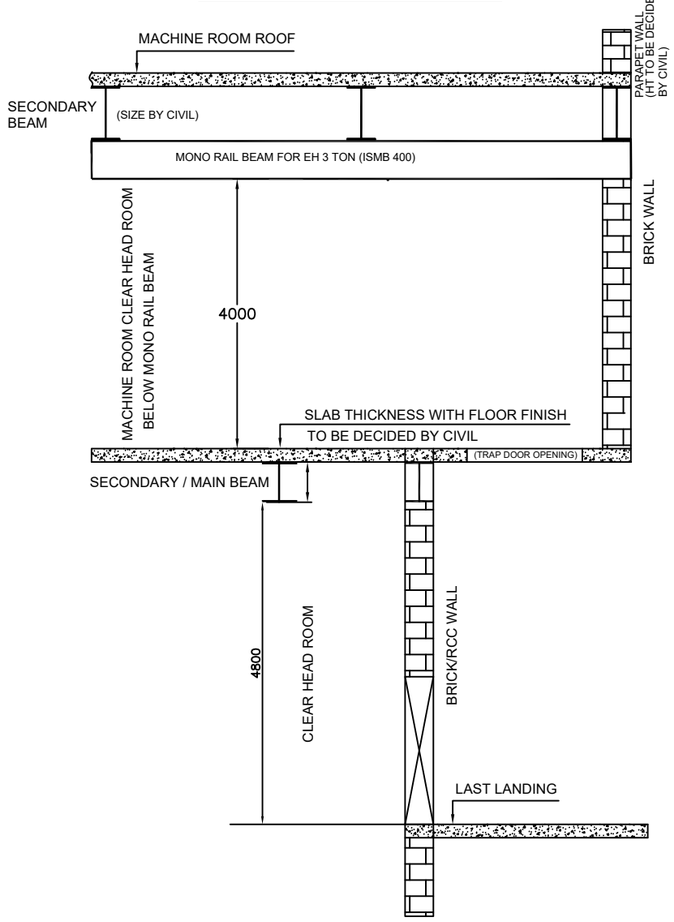
SCOPE OF VENDOR: SUPPLY , ERECTION & COMMISSIONING OF VENDOR'S EQUIPMENT

S. NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
1	Isolating Switch	Vendor	Vendor	BHEL will provide two number 415 V AC (Normal/ Emergency), 3 phase, 3 wire 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	Only 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.

COMPLIANCE DRAWINGS

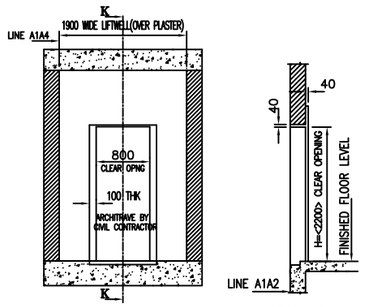
FIRST ANGLE PROJECTION — ALL DIMENSIONS ARE IN MM

ELEVATION ON MACHINE ROOM



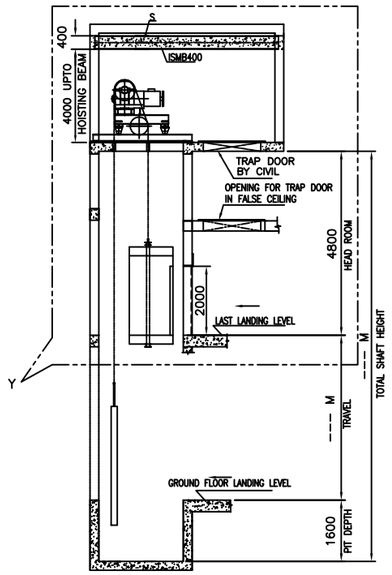
DETAIL–Y

STANDARD DETAILS OF SHAFT



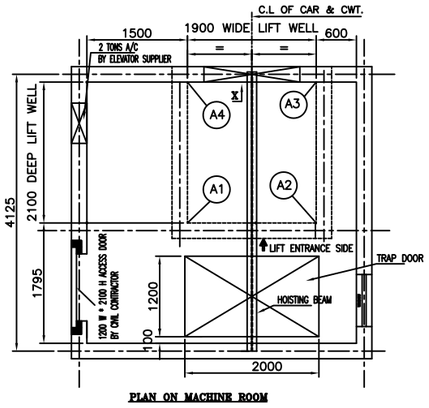
LANDING ENTRANCE DETAIL
(VIEW FROM LIFT WELL OUTSIDE)
(TYPICAL FOR ALL FLOORS)

SECTION–KK

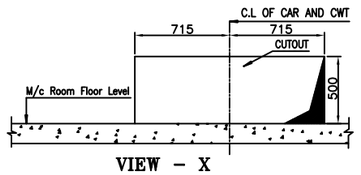


ELEVATIONAL DETAILS
(NOT FOR SCALE)

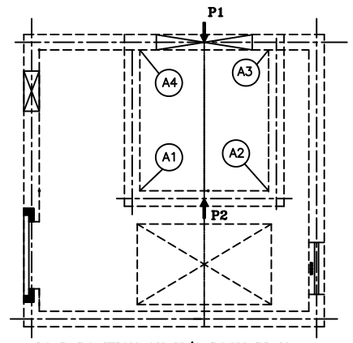
STANDARD DETAILS OF MACHINE ROOM



PLAN ON MACHINE ROOM

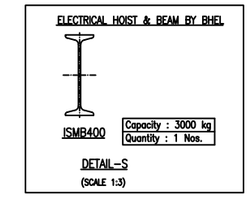


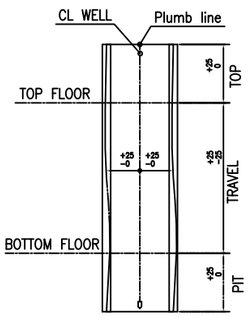
VIEW – X



LOAD POSITION ON M/C ROOM PLAN

Point	Dynamic Load (Kg)
P1	15000
P2	6000

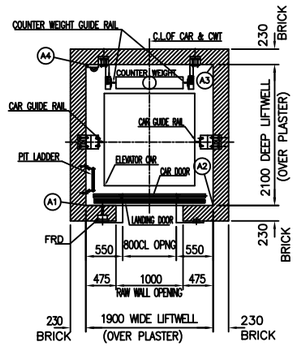




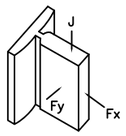
WELL TOLERANCES
(NOT FOR SCALE)

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 NOT KNOWN. 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. GROUTING FOR LOP, FRD, LANDING DISPLAY & ANY OTHER FOR FIXATION AT 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	ELECTRICAL	ELEVATOR SHAFT LIGHTING.	BY VENDOR
15	ELEVATOR SHAFT	MECHANICAL	WIRE MESH BETWEEN CAR & COUNTER WEIGHT.	BY VENDOR
16	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
17	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
18	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)
19	MACHINE ROOM	CIVIL	TRAP DOOR SHALL BE PROVIDED AS PER ENGG. INPUTS DRAWING FOR ELEVATOR.	BY CIVIL CONTRACTOR
20	MACHINE ROOM	CIVIL	SECONDARY BEAM ARRANGEMENT SHALL BE PERPENDICULAR TO MONORAIL BEAM.	BY CIVIL CONTRACTOR
21	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
22	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
23	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
24	MACHINE ROOM	ELECTRICAL	CONVENIENT OUTLET (15A /5A) IN THE MACHINE ROOM TO BE PROVIDED FOR POWER TOOL USAGE.	BY VENDOR
25	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)
26	MACHINE ROOM	ELECTRICAL	THE TERMINATION & TERMINATION BOX FOR THE FEEDERS SHALL BE PROVIDED.	BY VENDOR
27	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
28	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
29	MACHINE ROOM	MECHANICAL	SPLIT AC (MIN 2 TONS) TO BE PROVIDED IN THE EACH ELEVATOR MACHINE ROOM.	BY VENDOR
30	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
31	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
32	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
33	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
34	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
35	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



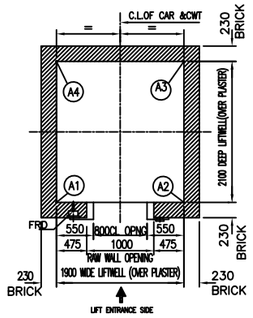
FORCES ON CAR & CWT GUIDE RAIL	
Fx	700 N
Fy	600 N
J	19000 N



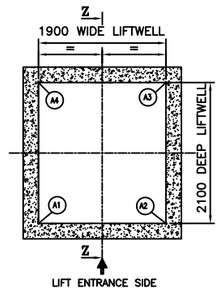
GUIDE RAIL FORCES

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

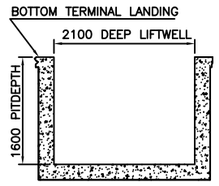
STANDARD DETAILS OF PIT



PLAN ON LIFTWELL



R.C.C DETAILS OF PIT



SECTION ZZ

CUSTOMER'S	XXXX
CONSULTANT	XXXX
PROJECT	RATE CONTRACT OF ELEVATOR
JOB NO. ——	BHARAT HEAVY ELECTRICALS LTD (A GOVERNMENT OF INDIA UNDERTAKING) POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA
STATUS CONTRACT	
DISTRIBUTION	

REV.	DATE	ALTD	CHD	APPD

DEPT CODE		NAME	SIGN	DATE
	DRN			
	DESN	GP		
	CHD	VVH		
	APPD	LJ		

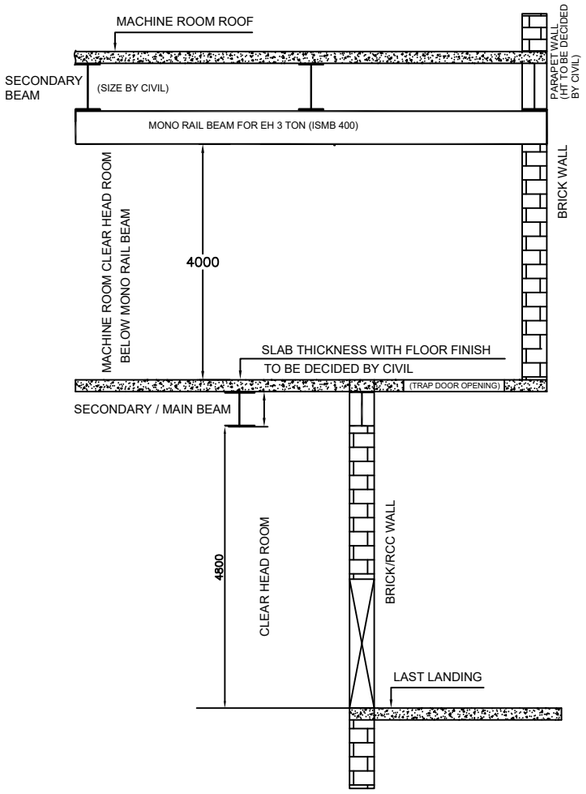
TITLE ENGG. INPUTS DRAWING FOR 10 PASS.(680KG) ELEVATOR-

DEPT.	SCALE	DRAWING NO.	
SIGN		PE-DG-RC-502-A001	
		SHEET 01 OF 01	REV. 00

SIZE–A0

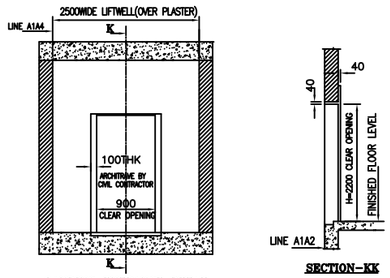
COMPUTER FILE NAME:

ELEVATION ON MACHINE ROOM



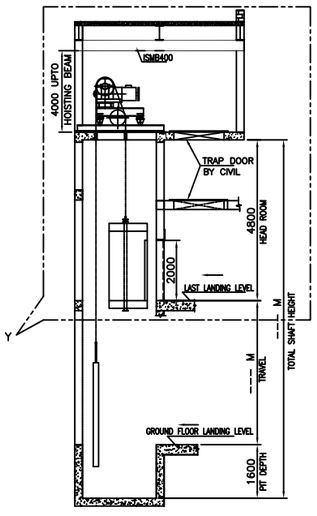
DETAIL–Y

STANDARD DETAILS OF SHAFT



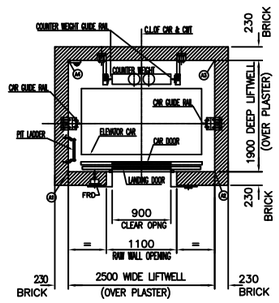
LANDING ENTRANCE DETAIL
(VIEW FROM LIFT WELL OUTSIDE)
(TYPICAL FOR ALL FLOORS)

SECTION–KK



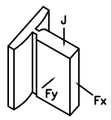
ELEVATIONAL DETAILS
(NOT FOR SCALE)

STANDARD DETAILS OF PIT

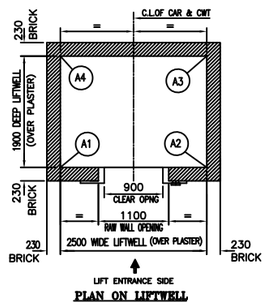


FORCES ON CAR & CWT GUIDE RAIL	
Fx	1300 N
Fy	600 N
J	23000 N

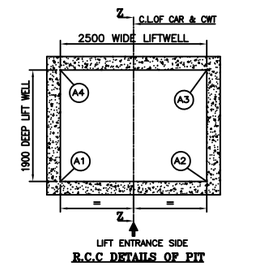
GUIDE RAIL FORCES



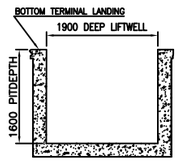
PLAN ON LIFTWELL– TYPICAL LOCATION OF GUIDERAILS FOR CAR & COUNTERWEIGHT



PLAN ON LIFTWELL

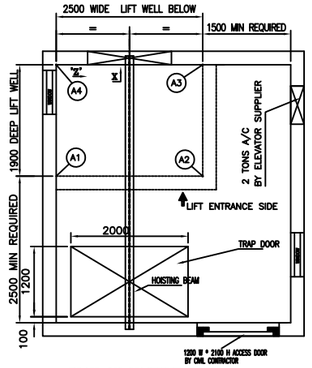


R.C.C DETAILS OF PIT

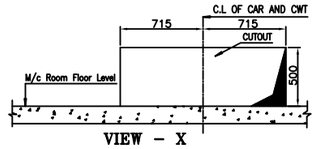


SECTION ZZ

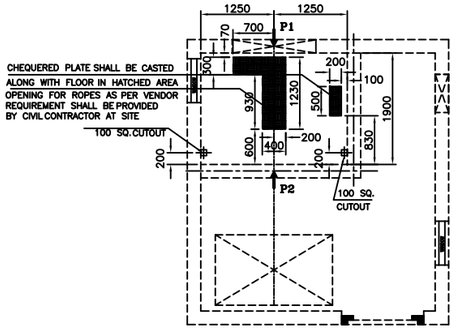
STANDARD DETAILS OF MACHINE ROOM



PLAN ON MACHINE ROOM

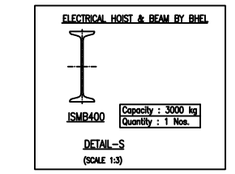


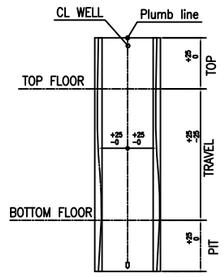
VIEW – X



LOAD POSITION ON M/C ROOM PLAN

Point	Dynamic Load (Kg)
P1	16000
P2	8000





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

CUSTOMER	-----
CONSULTANT	----
PROJECT	RATE CONTRACT OF ELEVATOR

JOB NO. —
STATUS ——
DISTRIBUTION

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA

REV.	DATE	ALTD	CHD	APPD

DEPT CODE		NAME	SIGN	DATE
	DRN.			
	DESN	GP		
	CHD	VVH		
	APPD	LJ		

TITLE ENGG. INPUTS DRAWING FOR 13 PASS.(884KG) ELEVATOR

DEPT. | SCALE | DRAWING NO. PE-DG-RC-502-A001
SIGN | SHEET 01 OF 01 | REV. 00
SIZE–A0

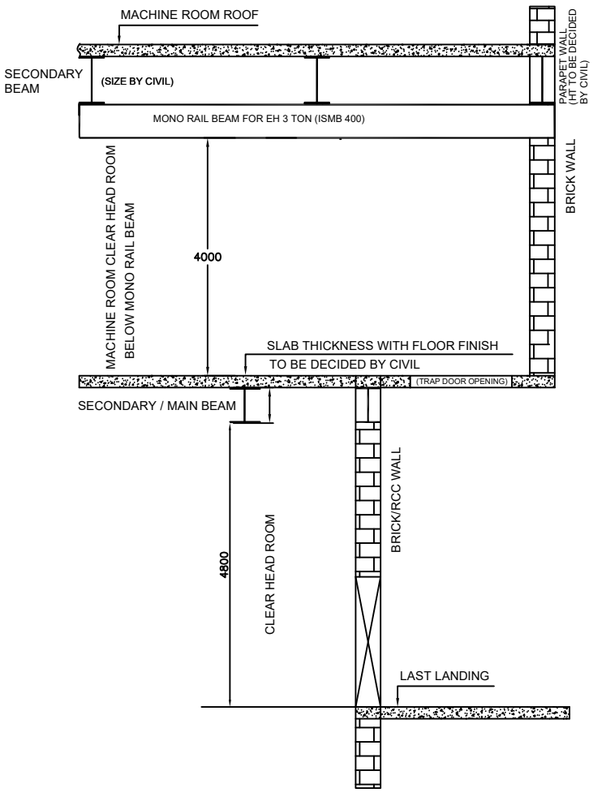
FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM

DRAWING NO.

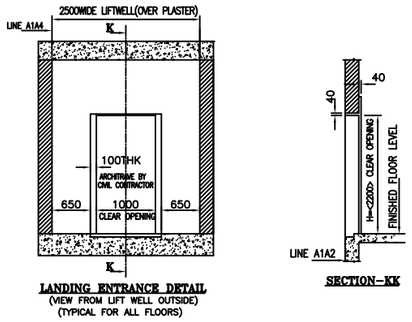
CUSTOMER'S DRAWING NO.

ELEVATION ON MACHINE ROOM



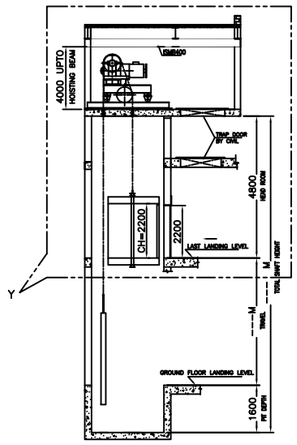
DETAIL–Y

STANDARD DETAILS OF SHAFT

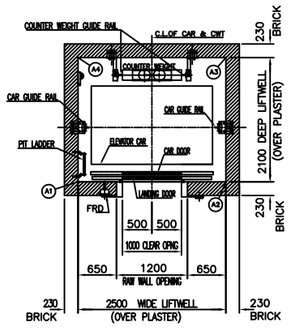


LANDING ENTRANCE DETAIL
(VIEW FROM LIFT WELL OUTSIDE)
(TYPICAL FOR ALL FLOORS)

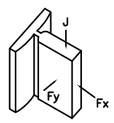
SECTION–KK



ELEVATIONAL DETAIL
(NOT TO SCALE)



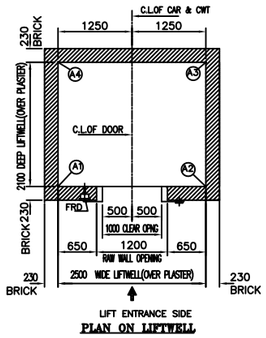
FORCES ON CAR & CWT GUIDE RAIL	
Fx	1400 N
Fy	700 N
J	27000 N



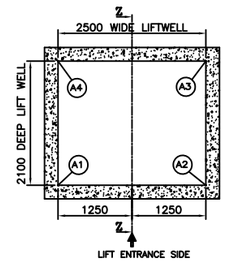
GUIDE RAIL FORCES

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

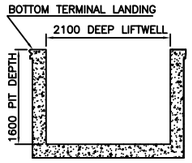
STANDARD DETAILS OF PIT



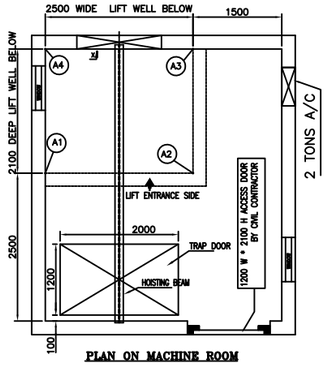
PLAN ON LIFTWELL



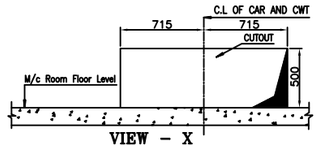
R.C.C DETAILS OF PIT



SECTION ZZ

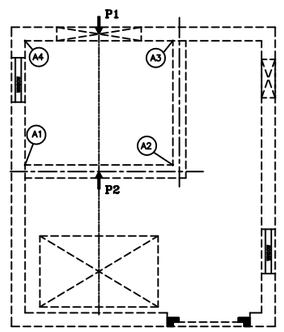


PLAN ON MACHINE ROOM



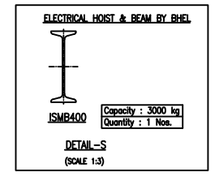
VIEW – X

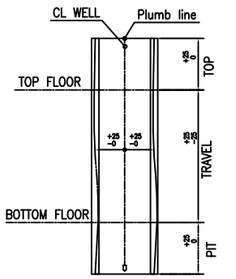
STANDARD DETAILS OF MACHINE ROOM



LOAD POSITION ON M/C ROOM PLAN

Point	Dynamic Load (Kg)
P1	12000
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	MACHINE ROOM	CIVIL	ELEVATOR SHAFT SLAB SHOULD BE ABLE TO SUSTAIN ADDITIONAL DYNAMIC LOAD EQUAL TO 5200 KG APPROX.	BY VENDOR
30	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
31	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
32	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
33	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
34	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
35	ELEVATOR SHAFT	CIVIL	CIVIL LOADS SHALL BE TRANSFERRED TO WALLS (TYPICAL LOCATION AS SHOWN IN DRAWING). WALLS SHALL BE DESIGNED ACCORDINGLY.	BY CIVIL CONTRACTOR
36	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
37	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
38	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
39	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

COMPUTER FILE NAME:

CUSTOMER: —

CONSULTANT:

PROJECT: RATE CONTRACT OF ELEVATOR

JOB NO.

STATUS CONTRACT

DISTRIBUTION

BHARAT HEAVY ELECTRICAIS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA

REV.	DATE	ALTD	CHD	APPD

DEPT CODE	NAME	SIGN	DATE
DRN.			
DESN	GP		
CHD	VVH		
APPD	SKB		

TITLE ENGG. INPUTS DRAWING FOR 16 PASS.(1088KG) ELEVATOR-

DEPT. SCALE

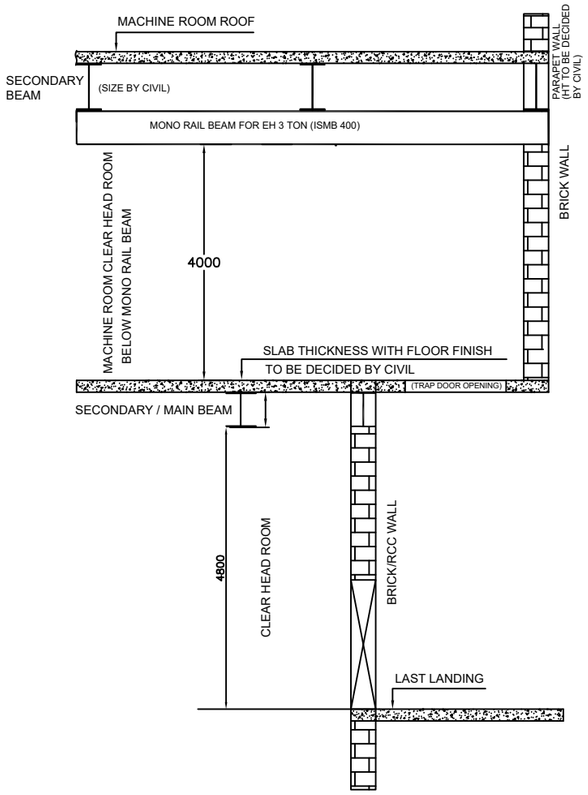
SIGN

DRAWING NO. PE-DG-RC-502-A001

SHEET 01 OF 01 REV. 00

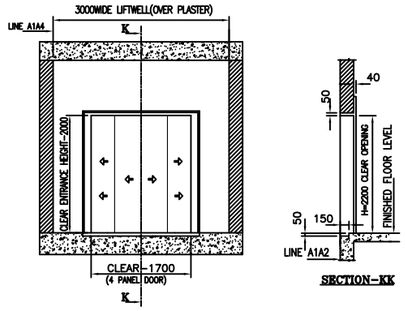
SIZE–A0

ELEVATION ON MACHINE ROOM



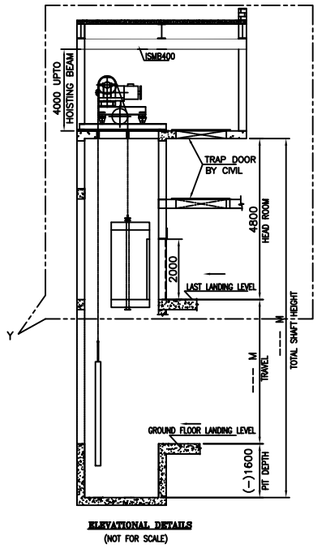
DETAIL–Y

STANDARD DETAILS OF SHAFT



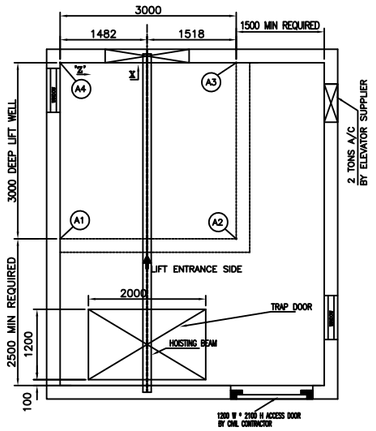
SECTION–KK

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

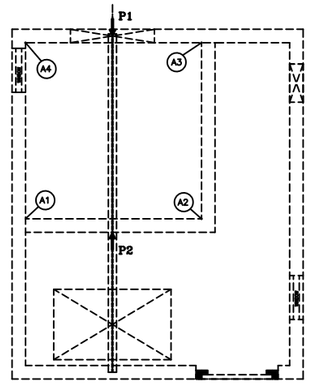


ELEVATIONAL DETAILS
(NOT FOR SCALE)

STANDARD DETAILS OF MACHINE ROOM

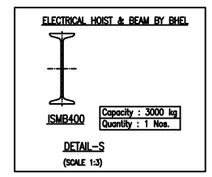


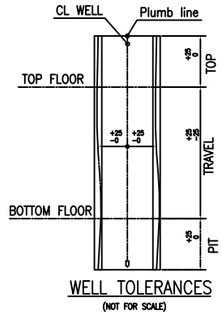
PLAN ON MACHINE ROOM



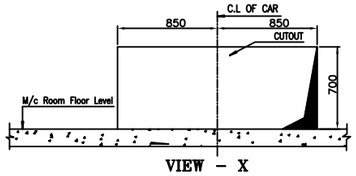
LOAD POSITION ON M/C ROOM PLAN

Point	Dynamic Load (Kg)
P1	16000
P2	8000





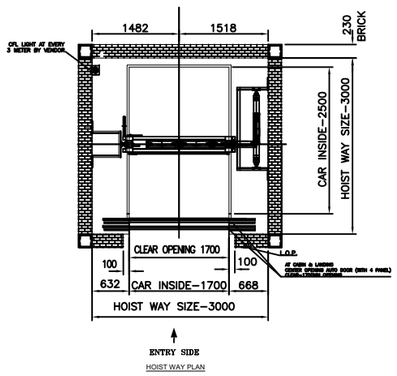
WELL TOLERANCES
(NOT FOR SCALE)



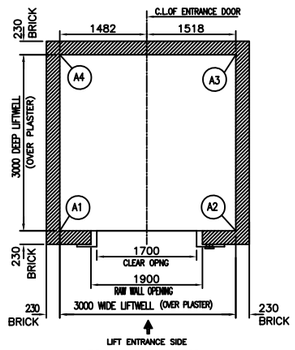
VIEW – X

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

STANDARD DETAILS OF PIT



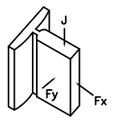
ENTRY SIDE
HOIST WAY PLAN



LIFT ENTRANCE SIDE

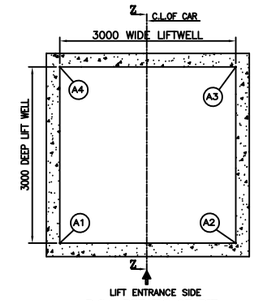
PLAN ON LIFTWELL

FORCES ON CAR & CWT GUIDE RAIL	
Fx	2000 N
Fy	2700 N
J	42000 N

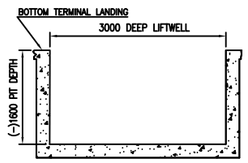


GUIDE RAIL FORCES

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



R.C.C DETAILS OF PIT



SECTION ZZ

CUSTOMER:	XXXX
CONSULTANT:	XXXX
PROJECT:	RATE CONTRACT OF ELEVATOR
JOB NO.	—
STATUS	CONTRACT
DISTRIBUTION	

BHARAT HEAVY ELECTRICALS LTD
(A GOVERNMENT OF INDIA ENTERPRISE)
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA

REV.	DATE	ALTD	CHD	APPD

DEPT CODE		NAME	SIGN	DATE
	DRN.			
	DESN	GP		
	CHD	VVH		
	APPD	LJ		

TITLE ENGG. INPUTS DRAWING FOR 2000KG GOODS CUM PASSENGER ELEVATOR

DEPT. | SCALE | DRAWING NO. PE-DG-RC-502-A001
SIGN | SHEET 01 OF 01 | REV. 00
SIZE–A0

COMPUTER FILE NAME:

FUNCTIONAL GUARANTEES TO BE DEMOSTRATED AT SITE

FUNCTIONAL GUARANTEES TO BE DEMOSTRATED AT SITE AS PER IS-14665 / IS:17900.	
S.N.	**DESCRIPTION OF TESTS TO BE PERFORMED**
1	Rated capacity of the Elevator
2	Travel and hoist Speed of the Elevator
3	Accurate positioning of the Elevator
4	Over Load test of the Elevator

STANDARD MANUFACTURING QUALITY PLAN FOR ELEVATOR

	MANUFACTURER'S NAME AND ADDRESS	MANUFACTURING QUALITY PLAN						TO BE FILLED IN BY CUSTOMER	
		ITEM	ELEVATORS	QAP No.		SIGN. OF MAFR	VENDOR QP NO.	REVIEWED BY	APPROVED BY
		TYPE	PASSENGER / GOODS CUM PASSENGER	REV. NO.	0		REV. NO / DATE		
		CAPACITY(SWL) UP TO	3T	DATE			PAGE NO: PAGE 1 OF 4		

SN	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD		AGENCY			REMARKS
					M	C/N					M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D	10.			11.
A.	**RAW MATERIAL INSPECTION**													
A.1	**STRUCTURALS:-** **MS PLATES, ANGLES & CHANNELS FOR CAR / CABIN PLATFORM & FRAME, CHEQURED PLATES**	VISUAL & DIMENSIONAL	MAJOR	VISUAL & MEASURE	100%	100%	MATERIAL SPECIFICATION AS PER APPROVED DATA SHEETS /MANUFACTURING DRAWINGS	IR		P	V	-	
		CHEMICAL COMPOSITION	MAJOR	CHEMICAL TEST	1 SAMPLE / HEAT			MTCS / CHECK TEST REPORT	√	P	V	V	IN THE ABSENCE OF CORRELATED TC CHECK TESTING SHALL BE DONE.
		MECHANICAL PROPERTIES	MAJOR	MECHANICAL TEST	1 SAMPLE /HEAT/HT BATCH				√	P	V	V	
A.2	**CASTINGS – SHEAVES, OVERSPEED GOVERNOR WHEEL, BRAKE DRUM**	CHEMICAL, COMPOSITION	MAJOR	CHEMICAL TEST	1 SAMPLE / HEAT		MATERIAL SPECIFICATION AS PER APPROVED DATA SHEETS /DRAWINGS.	MTCs / CHECK TEST REPORT	√	P	V	V	
		MECHANICAL PROPERTIES		MECHANICAL TESTS	1 SAMPLE /HEAT/HT BATCH				√	P	V	V	
A.3	**SS SHEETS**	CHEMICAL COMPOSITION	MAJOR	CHEMICAL ANALYSIS,	1 SAMPLE/ HEAT/		MATERIAL SPECIFICATION AS PER APPROVED DATA SHEETS /DRAWINGS	MTCs / CHECK TEST REPORT	√	P	V	V	IN THE ABSENCE OF CORRELATED TC CHECK TESTING SHALL BE DONE.
		MECHANICAL PROPERTIES	MAJOR	MECHANICAL TESTS	1 SAMPLE/HEAT/HT BATCH				√	P	V	V	
		LENGTH, WIDTH, THICKNESS	MAJOR	VISUAL & MEASURE	100%	100%	MANUFACTURING DRAWING	I.R.	√	P	V	V	
B.	**BOUGHT OUT ITEMS**													
B.1	**"T" GUIDE RAILS**	CHEMICAL COMPOSITION	MAJOR	CHEMICAL ANALYSIS,	1 SAMPLE / HEAT		IS-2062 / ISO 7465 / APPROVED DRAWING / APPROVED DATA SHEET	MTC / CHECK TEST REPORT	√	P	V	V	
		MECHANICAL PROPERTIES	MAJOR	MECHANICAL TESTS	1 SAMPLE / HEAT				√	P	V	V	
		VISUAL & DIMENSIONAL	MAJOR	VISUAL & MEASURE	RANDOM 25% (EACH SIZE)		IS-3443 / SAIL PRODUCT CATALOGUE / APPROVED DRAWING / APPROVED DATA SHEET	IR	√	P	V	V	
B.3	**WIRE ROPES**	IDENTIFICATION DIMENSIONAL CONFORMITY & BREAKING STRENGTH	MAJOR	CONSTRUCTION, DIAMETER, TENSILE DESIGNATION, BREAKING LOAD	100% (EACH BATCH)		IS-2365 / APPROVED DATA SHEET	MTC	√	P	V	V	SEE NOTE - 4
B.4	**GEAR BOX INTERNALS – WORM SHAFT, WORM WHEEL**	CHEMICAL COMPOSITION	MAJOR	CHEMICAL ANALYSIS,	1 SAMPLE / HEAT		MANUFACTURING DRAWING	MTC / CHECK TEST REPORT	√	P	V	V	SEE NOTE - 4
		MECHANICAL PROPERTIES	MAJOR	MECHANICAL TESTS	1 SAMPLE/HEAT				√	P	V	V	
	COMPLETE GEAR BOXES	BACK LASH	MAJOR	MEASUREMENT	1 PER STAGE		IS-4460 / PRODUCT CATALOGUE/COMPONENT DRAWING	IR	√	V	V	V	
		REDUCTION RATIO	MAJOR	MEASUREMENT	100%	100%	APPROVED DRAWING / APPROVED DATA SHEET						
	NO LOAD RUN OF GEAR BOXES	SOUND LEVEL	MAJOR	MEASURE	100%	100%	MANUFACTURER STANDARD/ COMPONENT DRAWING	IR/MTC	√	V	V	V	
		TEMPERATURE. RISE	MAJOR	MEASURE	100%	100%							
		OIL-LEAKAGE	MAJOR	VISUAL	100%	100%							
B.5	**TERMINAL BUFFERS**	CHEMICAL COMPOSITION	MAJOR	CHEMICAL ANALYSIS,	1 SAMPLE / HEAT		MANUFACTURING DRAWING	MTC / CHECK TEST REPORT	√	P	V	V	SEE NOTE – 4
		MECHANICAL PROPERTIES	MAJOR	MECHANICAL TESTS	1 SAMPLE/HEAT				√	P	V	V	

LEGEND: *** RECORDS**, INDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
** M**:** MANUFACTURER/SUB-SUPPLIER **C:** MAIN SUPPLIER, **N**: CUSTOMER **P:** PERFORM **W**: WITNESS AND **V:** VERIFICATION. AS APPROPRIATE, **CHP:** CUSTOMER SHALL IDENTIFY IN COLUM "N" AS 'W'

Note:# CUSTOMER Inspection Engineer to check, approval date/ revision no. of reference documents at the time of Inspection

	MANUFACTURER'S NAME AND ADDRESS	MANUFACTURING QUALITY PLAN						TO BE FILLED IN BY CUSTOMER	
		ITEM	ELEVATORS	RQP No.	00	SIGN. OF MAFR	CUSTOMER QP NO.	REVIEWED BY	APPROVED BY
		TYPE	PASSENGER / GOODS	REV. NO.	00		REV. NO 0 DATE		
		CAPACITY(SWL) UP TO	3T	DATE			PAGE NO PAGE 2 OF 4		
							VALID UP TO		

SN	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORM	Format of RECORD		AGENCY			REMARKS
					M	C/N					M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D	10.			11.
		VISUAL & DIMENSIONAL	MAJOR	VISUAL & MEASURE	100%	100%	PRODUCT CATALOGUE / COMPONENT DRAWING		IR	√	P	V	V	
		BUFFER STROKE	MAJOR	MEASURE	ONE NO/SIZE/LOT		IS 14665	IS 14665						
B.7	**COUNTER WEIGHT**	TYPE, WEIGHT	MAJOR	VERIFICATION	100%		APPROVED DATA SHEET				V	-	-	
B.8	**UPS**	MAKE, RATING	MAJOR	VERIFICATION	100%	1/TYPE/SIZE	CUSTOMER APPROVED DRAWING / APPROVED DATA SHEET		MTC	√	V	V	V	
B.9	**BATTERIES**	MAKE, RATING	MAJOR	VERIFICATION	100%	RANDOM	CUSTOMER APPROVED DRAWING / APPROVED DATA SHEET		MTC	√	V	V	V	
B.10	**TRAILING CABLES**	MAKE, TYPE, SIZE,RATING,ROUTINE TESTS & TYPE TEST	MAJOR	VERIFICATION	100%	1 / REEL	IEC 60227-6 CUSTOMER APPROVED DRAWING / APPROVED DATA SHEET		MTC	√	V	V	V	
B.11	**POWER CABLES (FRLS)**	MAKE, TYPE, SIZE,RATING,ROUTINE TESTS	MAJOR	VERIFICATION	100%	1 / REEL	IS 1554-1/IS 7098 CUSTOMER APPROVED DRAWING / APPROVED DATA SHEET		MTC	√	V	V	V	
B.12	**BATTERIES**													
B.13	**MOTOR**	MAKE / TYPE / RATING	MAJOR	VISUAL,	100%	100%	CUSTOMER APPROVED DRAWING / DATA SHEET / CUSTOMER SPECIFICATION / IS 325		IR,		P	V	V	REFER NOTE – 4
		ROUTINE TESTS	MAJOR	MEASUREMENT	100%	100%			MTC / COC	√	V	V	V	REFER NOTE - 1
B.14	**BRAKES –EM**	MAKE / TYPE / RATING	MAJOR	VERIFICATION	100%	-	CUSTOMER APPROVED DRAWING/ CUSTOMER SPECIFICATION / IS 3177 / MANUFACTURER STANDARD		IR		P	-	-	SEE NOTE - 4
		FUNCTIONAL CHECK , IR-HV	MAJOR	MEASURE	100%	1-			MTC		V	-	-	
B.15	**LIMIT SWITCH**	MAKE / TYPE / RATING IR / HV, OPERATION	MAJOR	VISUAL & MEASURE	100%	-	CUSTOMER APPROVED DRAWING / CUSTOMER SPECIFICATION / IS 14665 / MANUFACTURER STANDARD		IR		P	-	-	SEE NOTE - 4
B.16	**DBR (DYNAMIC BRAKING RESISTOR),**	MAKE,, RATING	MAJOR	VERIFICATION	100%	100%	MANUFACTURER DRAWING / APPROVED DATA SHEET		IR		P	V	-	SEE NOTE - 4
B.18	**MCB / CONTACTOR / TIME DELAY RELAY / AUX (CONTROL) RELAY/**	MAKE / TYPE / RATING	MAJOR	VERIFICATION	100%	-	CUSTOMER APPROVED DRAWING / CUSTOMER SPECIFICATION / RELEVANT IS STANDARD/ MANUFACTURER STANDARD FAT PROCEDURE FOR VFD		IR		P	-	-	SEE NOTE – 4
		ROUTINE TESTS	MAJOR	VERIFICATION	100%	-								
		IR & FUNCTIONAL CHECK	MAJOR	MEASUREMENT	100%	-			MTC / COC		V	-	-	
B.19	**CONTROLTRANSFORMER**	MAKE / TYPE / RATING	MAJOR	VERIFICATION	100%	-	CUSTOMER APPROVED DRAWING / CUSTOMER SPECIFICATION / RELEVANT IS STANDARD/ MANUFACTURER STANDARD FAT PROCEDURE FOR VFD		IR		P	-	-	SEE NOTE – 4
		ROUTINE TESTS	MAJOR	VERIFICATION	100%	-								
		IR & FUNCTIONAL CHECK	MAJOR	MEASUREMENT	100%	-			MTC / COC		V	-	-	
B.20	**PUSH BUTTON**	MAKE / TYPE / RATING	MAJOR	VISUAL & MEASURE	100%	100%	CUSTOMER APPROVED DRAWING / CUSTOMER APPROVED DATA SHEET		IR		P	V	V	SEE NOTE – 4
B.21	**PANEL & PENDENT STATION HOUSING / BOX.**	SHEET / GLAND PLATE THICKNESS & MATERIAL, DOOR ALIGNMENT FOR SMOOTH LATCHING, PAINT SHADE/ THICKNESS (MIN 70 MICRONS)/ ADHESION, DOP BY PAPER INSERTION,FUNCTIONAL TEST	MAJOR	VISUAL & MEASURE	100%	100%	CUSTOMER APPROVED DRAWING / CUSTOMER SPECIFICATION		IR		P			

	MANUFACTURER'S NAME AND ADDRESS	MANUFACTURING QUALITY PLAN					TO BE FILLED IN BY CUSTOMER	
		ITEM: ELEVATORS	RQP No.: 00	SIGN. OF MAFR	CUSTOMER QP NO.		REVIEWED BY	APPROVED BY
		TYPE: PASSENGER / GOODS	REV. NO.: 00		REV. NO: 0	DATE:		
		CAPACITY(SWL) UP TO: 3T	DATE:		PAGE NO: PAGE 3 OF 4			
					VALID UP TO:			

SN	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORM	Format of RECORD		AGENCY			REMARKS
					M	C/N					M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D	10.			11.
B.22	**ASSEMBLED PANEL AND PENDENT STATION (EXCLUDING VVVF DRIVE)**	MAKE/TYPE / RATING OF BOM ACCESSIBLE MOUNTING & LABELING OF COMPONENTS, WIRE DRESSING & FRRULING, CRIMPING CHECK BY GENTLE PULLING, EARTHING OF DOOR & PANEL, IR-HV TEST,	MAJOR	VISUAL & MEASURE	100%	100%	CUSTOMER APPROVED DRAWING / CUSTOMER SPECIFICATION / IS-8623, LIST OF MAKES FOR BOI		IR		P	-	-	
B.23	**VVVF DRIVE**	VERIFICATION OF MAKE, TYPE & RATINGS. PROTECTION TEST LIKE OVERLOAD, SINGLE PHASE, UNDER VOLTAGE & OVER SPEED ETC	MAJOR	REVIEW OF MFG.'S TEST CERTIFICATES	100%	100%	MANUFACTURER STANDARD		MTC		V	V	V	SEE NOTE – 4
C	**IN PROCESS INSPECTION**													
C.2	**SHEAVES, OVERSPEED GOVERNOR WHEEL AFTER MACHINING**	VISUAL & DIMENSIONAL	MAJOR	VISUAL & MEASURE	100%	100%	MANUFACTURER'S DRAWINGS		IR		P	V	-	
C.3	**WELDING OPERATION IN STRUCTURALS**	WPS, PQR &WPQ	MAJOR	VISUAL & MECHANICAL TESTS / NDT	100%	100%	APPROVED WPS, ASME SEC-IX	ASME SEC-IX	QW-482-484	√	P	V	V	SEE NOTE – 2
		MARKING & CUTTING	MAJOR	VISUAL & MEASURE	100%	100%	MANUFACTURING DRAWING		IR		P	V	_	
		EDGE PREPARATION	MAJOR	VISUAL & MEASURE	100%	100%	MANUFACTURING DRAWING / APPROVED WPS		IR		P	V	_	
		WELD JOINT SIZE / LOCATION / WELDER NO. CO-RELATION	MAJOR	MARKING, VERIFICATION	100%	100%	MANUFACTURING DRAWING				P	V	-	
		DP TEST ON WELD	MAJOR	NDT	100%	10%	ASTM E 165	**NO DEFECT**	DPT REPORT	√	P	V	V	
		DIMENSIONAL CHECK AFTER FINAL FABRICATION / MACHINING	MAJOR	MEASURE	100%	100%	MANUFACTURING DRAWING		IR		P	V	_	
D	**FINAL INSPECTION**													
D.1	**ASSEMBLED MACHINERY UNIT (MOTOR & GEAR)**	NO LOAD RUN TEST FOR 30 MINUTES, BRAKE FUNCTIONS, OIL LEAKAGE ETC	MAJOR	VISUAL & MEASURE (SEE NOTE – 6)	100%	1 NO / TYPE OF ELEVATOR	QA / TP /02, IS-14665/APPROVED DRAWING /APPROVED DATA SHEET/ APPROVED SIZING CALCULATION		IR	√	P	W	W	SEE NOTE –6 and 7 .
D.2	**DOOR OPERATOR ASSEMBLY**	DIMENSIONS, SMOOTH OPERATION	MAJOR	VISUAL & MEASURE	100%	1 NO / TYPE OF ELEVATOR	CUSTOMER APPROVED DRAWING & QA/TP/01		IR	√	P	W	W	
D.3	**ASSEMBLED CAR**	FINISH, DIMENSIONS	MAJOR	VISUAL & MEASURE	100%	1 NO / TYPE OF ELEVATOR	CUSTOMER APPROVED DRAWING		IR	√	P	W	W	
D.4	**OVERSPEED GOVERNOR**	CALIBRATION	MAJOR	VISUAL & MEASURE	100%	1 NO / TYPE OF ELEVATOR	IS 14665	IS 14665	IR	√	P	W	W	
D.5	**MICROPROCESSOR BASED CONTROLLER ASSEMBLY WITH VVVF DRIVE SYSTEM**	FUNCTIONAL CHECK	MAJOR	VISUAL & MEASURE	100%	1 NO / TYPE OF ELEVATOR	QA / TP / 08	QA / TP / 08	IR	√	P	W	W	
D.6	**CONTROL PANEL**	MAKE	MAJOR	VERIFICATION	100%	1 NO / TYPE OF ELEVATOR	APPROVED DATA SHEET		IR	√	P	W	W	
		DIMENSIONS	MAJOR	MEASURE	100%		APPROVED DATA SHEET		IR	√	P	W	W	

	MANUFACTURER'S NAME AND ADDRESS	MANUFACTURING QUALITY PLAN					TO BE FILLED IN BY CUSTOMER	
		ITEM	ELEVATORS	RQP No.	00	SIGN. OF MAFR	CUSTOMER QP NO.	REVIEWED BY / APPROVED BY
		TYPE	PASSENGER / GOODS	REV. NO.	00		REV. NO 0 DATE	
		CAPACITY(SWL) UP TO	3T	DATE			PAGE NO PAGE 4 OF 4	
							VALID UP TO	

SN	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORM	Format of RECORD		AGENCY			REMARKS
					M	C/N					M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D	10.			11.
		PAINT SHADE, THICKNESS	MAJOR	VISUAL & MEASURE	100%		CUSTOMER TECHNICAL SPECIFICATION/APPROVED DRAWING/APPROVED DATA SHEET	IR	√	P	W	W	
		DEGREE OF PROTECTION BY PAPER INSERTION	MAJOR	VISUAL	100%			IR	√	P	W	W	
D.7	**MANDATORY SPARES**	VERIFICATION OF SPARES AS PER PO AND CORELATION / CHEKS AS PER MAIN EQUIPMENT.	MAJOR	REVIEW OF INTERNAL INSPECTION REPORTS MFR'S TC	100%	100%	PO / APPROVED DRAWING / APPROVED DATA SHEET./ COMPONENT. DRAWING. / CUSTOMER APPROVED SPARE LIST	IR	√	P	V	V	
D.8	**PACKING**	PROPER PACKING	MAJOR	VERIFICATION	100%		CUSTOMER SPECIFICATION / APPROVED DRAWING	IR	√	P	V	V	

NOTES

1. **MOTOR POWER RATING LESS THAN 30KW:** ACCEPTANCE OF MOTOR LESS THAN 30KW IS BASED ON COC OF THE MANUFACTURER & THE CONTRACTOR CONFIRMING AS FOLLOWS: "IT IS HEREBY CONFIRMED THAT THE ABOVE MENTIONED MOTOR /MOTORS WAS/ WERE MANUFACTURED TAKING CARE OF CUSTOMER SPECIFIC REQUIREMENTS REGARDING AMBIENT TEMP., VOLTAGE & FREQUENCY VARIATION, HOT STARTS, PULL OUT TORQUE, STARTING KVA/KW, TEMP. RISE, DISTANCE BETWEEN CENTRE OF STUD & GLAND PLATE AND TESTED IN ACCORDANCE WITH APPROVED DRAWING /DATA SHEETS."
   MOTOR POWER RATING MORE ≥ 30 KW BUT < 50 KW ACCEPTANCE OF MOTOR RATING BETWEEN 30 KW & 50 KW IS BASED ON CUSTOMER REVIEW OF ROUTINE TEST INSPECTION REPORT AS PER IS 325 WITNESSED BY MAIN CONTRACTOR ALONG WITH COC OF THE MANUFACTURER & THE CONTRACTOR CONFIRMING AS FOLLOWS: "IT IS HEREBY CONFIRMED THAT THE ABOVE MENTIONED MOTOR /MOTORS WAS/ WERE MANUFACTURED TAKING CARE OF CUSTOMER SPECIFIC REQUIREMENTS REGARDING AMBIENT TEMP., VOLTAGE & FREQUENCY VARIATION, HOT STARTS, PULL OUT TORQUE, STARTING KVA/KW, TEMP. RISE, DISTANCE BETWEEN CENTRE OF STUD & GLAND PLATE, SPACE HEATER AND TESTED IN ACCORDANCE WITH APPROVED DRAWING /DATA SHEETS."
   MOTOR POWER RATING MORE ≥ 50 KW SEPARATE RQP / MQP SHALL BE SUBMITTED FOR MOTOR > 50KW
2. CUSTOMER / REPUTED TPI APPROVED WPS SHALL BE USED FOR FABRICATION. ONLY CUSTOMER/BHEL/LLOYD/BVQI/TPL APPROVED WELDERS SHALL BE ENGAGED FOR WELDING.
3. HV TEST ON CONTROL PANELS WILL BE DONE ISOLATING VVVF DRIVE AND OTHER ELECTRONIC PARTS. HV TEST AT 2 KV FOR POWER & 1.5 KV FOR CONTROL CIRCUIT
4. **LIST OF ALL MAJOR BOUGHT OUT ITEMS AND THEIR ACCEPTABLE MAKE SHALL BE ATTACHED ALONG WITH THE ENDORSEMENT SHEET**

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE:
	CUSTOMER :		QP NO.: PE-QP-999-Q-006, REV-02	DATE: 17.04.2020
	PROJECT:		PO NO.:	DATE:
	ITEM: AC ELECT. MOTORS UPTO 55KW (LV (415V))	SYSTEM:	SECTION: II	SHEET 1 of 2

S. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY **			REMARKS
1	2	3	4	5	6		7	8	9	D	M	C	N	
					M	C/ N								
1.0	ASSEMBLY	1.WORKMANSHIP	MA	VISUAL	100%	-	MFG. SPEC.	MFG. SPEC.	LOG BOOK		P	-	-	
		2.DIMENSIONS	MA	VISUAL	100%	-	MFG. DRG./ MFG. SPEC.	MFG. DRG./ MFG. SPEC.	LOG BOOK		P	-	-	
		3.CORRECTNESS COMPLETENESS TERMINATIONS/ MARKING/ COLOUR CODE	MA	VISUAL	100%	-	MFG.SPEC./	MFG.SPEC.	LOG BOOK		P	-	-	
2.0	PAINTING	1.SHADE	MA	VISUAL	SAMPLE	-	MFG. SPEC/ APPROVED DATASHEET	MFG. SPEC/ APPROVED DATASHEET	LOG BOOK	✓	P	V	-	
3.0	TESTS	1.ROUTINE TEST INCLUDING SPECIAL TEST	MA	VISUAL	100%	-	IS-325 / IS-12615/ APPROVED DATA SHEET	IS-325 / IS-12615/ APPROVED DATA SHEET	TEST/ INSPN. REPORT	✓	P	V *	-	* NOTE -1
		2.OVERALL DIMENSIONS & ORIENTATION	MA	MEASUREMENT & VISUAL	100%	-	APPROVED DRG/ DATA SHEET	APPROVED DRG/ DATA SHEET	TEST/ INSPN. REPORT	✓	P	V *	-	* NOTE -1 & NOTE-2

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by:	HEMA KUSHWAHA	HEMA KUSHWAHA	Checked by:		KUNAL GANDHI			Reviewed by:			
Reviewed by:	PRAVEEN DUTTA	PRAVEEN DUTTA	Reviewed by:	RITESH KUMAR JAISWAL	RITESH KUMAR JAISWAL			Approved by:			

		3.NAMEPLATE DETAILS	MA	VISUAL	100%	-	IS-325 / IS-12615 / APPROVED DATA SHEET	SAME AS COL. 7	TEST/ INSPN. REPORT	✓	P	V	-	
4.0	PACKING	SURFACE FINISH & COMPLETENESS	MA	VISUAL	100%	100%	AS PER MFG. STANDARD / (#)	AS PER MFG. STANDARD / (#).	INSPC. REPORT	✓	P	W	-	(#) REFER NOTE-8

NOTES:
1. Routine tests on 100% motors shall be done by the vendor. However, BHEL/ Customer shall witness routine tests on random samples. The sampling plan shall be mutually agreed upon.
2. For exhaust/ventilation fan motors of rating up to 1.5 KW, only routine test certificates shall be furnished for scrutiny.
3. In case test certificates for these tests on similar type, size and design of motor from independent laboratory are available, the same is valid for 5 years.
4. BHEL reserves the right to perform repeat test, if required.
5. After packing and prior to issue MDCC, photographs of items to be despatched shall be sent to BHEL for review.
6. In case of any changes in QP commented by customer at contract stage, same shall be carried out by bidder without any implication to BHEL/ Customer.
7. Project specific QP to be developed based on customer requirement.
8. For export job, BHEL technical specification for seaworthy packing to be followed.
9. Packing shall be suitable for storage at site in tropical climate conditions.
10. Latest revision/ year of issue of all the standards (IS/ ASME/ IEC etc.) indicated in QP shall be referred.

LEGENDS:

*RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION,
** **M**: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, B: MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, **C**: CUSTOMER,
P: PERFORM, **W**: WITNESS, **V:** VERIFICATION, AS APPROPRIATE
MA: MAJOR, **MI**: MINOR**, CR:** CRITICAL
D: DOCUMENTATION

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by:	HEMA KUSHWAHA	HEMA KUSHWAHA	Checked by:		KUNAL GANDHI			Reviewed by:			
Reviewed by:	PRAVEEN DUTTA	PRAVEEN DUTTA	Reviewed by:	RITESH KUMAR JAISWAL	RITESH KUMAR JAISWAL			Approved by:			

SUB VENDOR LIST

SR. NO.	ITEM	SUPPLIERS	REMARKS
1	TRAILING CABLE	NICCO	
		UNIVERSAL	
		INCAB STEP	
		ICL	
		APAR INDUSTRIES LTD	
		CMI LTD	
		KEI INDUSTRIES LTD	
		DAETWYLER (THELMA) CABLES	
		LAPP GERMANY	
		MACROTHREM	
		SUYOG ELECTRICALS LTD	
2	BUFFER SPRINGS	INDUSTRIAL STEEL SPRING -	
		ALL INDIA STEEL SPRING MANUFACTURING COMPANY	
		KOLKATA SHAW COMPANY KOLKATA	
		SUPER INDIA SPRINGS KOLKATA	
		MESCO SPRING.	
3	STAINLESS STEEL	SAIL	
		TISCO	
		JINDAL	
		RINL	
		MINOX METAL	
		ESSAR (AMNS)	
4	CR SHEET	ARCELOR MITTAL/ NIPPON STEEL	
		TATA STEEL BSL LIMITED	
5	GEAR BOX	PREMIMUM ENERGY TRANSMISSION LTD	
		SICOR S.P.A. ITLY	
		OEM	
6	WIRE ROPE	USHA MARTIN	
		FORT WILLIAMS	
		BOMBAY WIRE ROPES	
		BHARAT WIRE ROPES	
7	DRIVE MOTOR	SIEMENS	
		NGEF	
		CGL	
		KEC (KIRLOSKAR ELECTRIC CO. LTD)	
		BHARAT BIJLI	
		MARATHON	
		ABB	
		GE POWER	
		RAJINDRA ELECT INDUSTRIES	
		LAXMI HYDRAULICS PVT. LTD.	
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	**VARIABLE VOLTAGE VARIABLE FREQUENCY DRIVE**	L&T -YASKAWA	
		ABB	
		SIEMENS	
		SCHNIEDER	
		FUJI ELECTRIC	
		MITSUBISHI ELECTRIC	
13	**T GUIDES**	SAVERA	
		D.D HITECH	
		MARAZI	
14	**CAR DOOR OPERATOR**	WITTURE GMBH	
		FERMATOR	
		OEM	
15	**INFRARED DOOR CURTAIN**	MEMCO	
		WECO	
		TLIONES	
16	**BATTERY**	EXIDE	
		HBL POWER SYSTEM HYDERABAD	
		AMAR RAJA TIRUPATI	
		AMCO SAFT INDIA LTD BANGLORE	
	Note:		

1	THE SUB VENDOR LIST ABOVE IS INDICATIVE ONLY AND IS SUBJECT TO BHEL AND DVC APPROVAL DURING DETAILED ENGINEERING STAGE WITHOUT ANY COMMERCIAL & DELIVERY IMPLICATION TO BHEL
2	BIDDER TO PROPOSE SUB VENDOR WITHIN 4 WEEKS OF PLACEMENT OF LOI. THEREAFTER NO REQUEST FOR ADDITIONAL SUB-VENDOR SHALL BE ENTERTAINED.
3	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.
4	DEALERS ARE NOT ACCEPTABLE FOR ANY ITEM OF THE PACKAGE. BIDDER SHALL PROCURE ALL ITEMS INCLUDING PLATES, STRUCTURAL ETC. FROM APPROVED SUB VENDOR ONLY.

PAINTING REQUIREMENT

S.NO.	COMPONENTS	SPECIFIED REQUIREMENTS
1	Machine, Car frame & counter weight frame, level brace rods, Filler weights, Car & counterweight buffers, Fish plates, Buffer pedestals (structural), Brackets & rail fasteners, Brackets.	Anti- corrosive epoxy paint as per industry standard.
2	Brake adjusting screw & coupling fasteners	Zinc passivated
3	Hall buttons	Dust proof with SS hardware
4	Car operating panels (COP)	Dust proof contact & button with aluminum face plate and SS hardware. Main face plate S.S.
5	Governor	Cover & casting epoxy painted. Other component zinc plated.
6	Governor tension frame	Hot dipped galvanized and anti-corrosive epoxy paint with MS shaft for sheave.
7	Safety equipment (Linkage), Guide shoe	Zinc plated
8	Rope fasteners	Zinc passivated and chromate dipped
9	For Indoor components such as motors, electrical parts, Controller cabinet etc	Epoxy based with suitable additives. The thickness of finish coat shall be minimum 50 microns (minimum total DFT shall be 100 microns). However in case electrostatic process of painting is offered for any electrical equipment, minimum paint thickness of 50 microns shall be acceptable for finish coat.

COLOR SHADE

	SL. No	Item Description	Color Shade	Remarks			
	1	Motors	RAL 5012 (Blue)				
	2	Control Panels	RAL 9002 for front & rear and RAL 5012 for side				

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

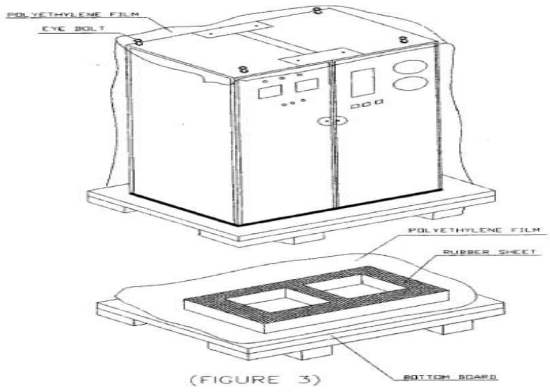


Figure 2

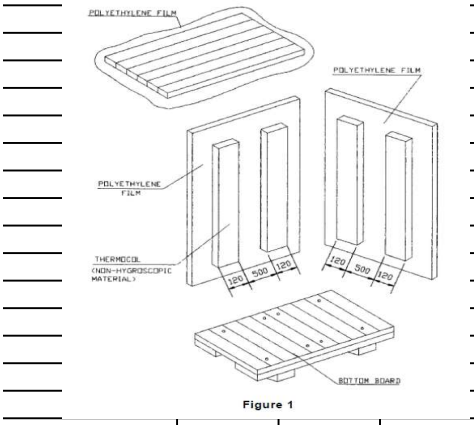


Figure 1

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 rubber mats to prevent the polyethylene sheet from damage. Top surface of the case shall be free from dents to prevent rain water pockets.

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.

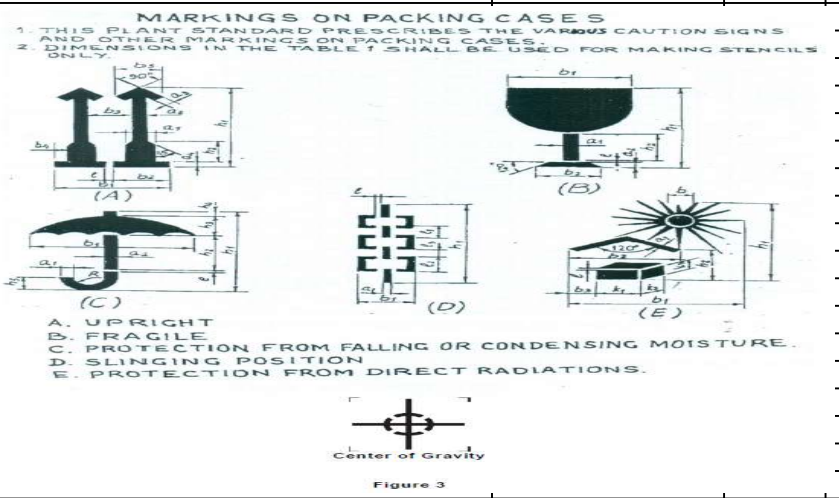


Figure 3

	BHEL – <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.

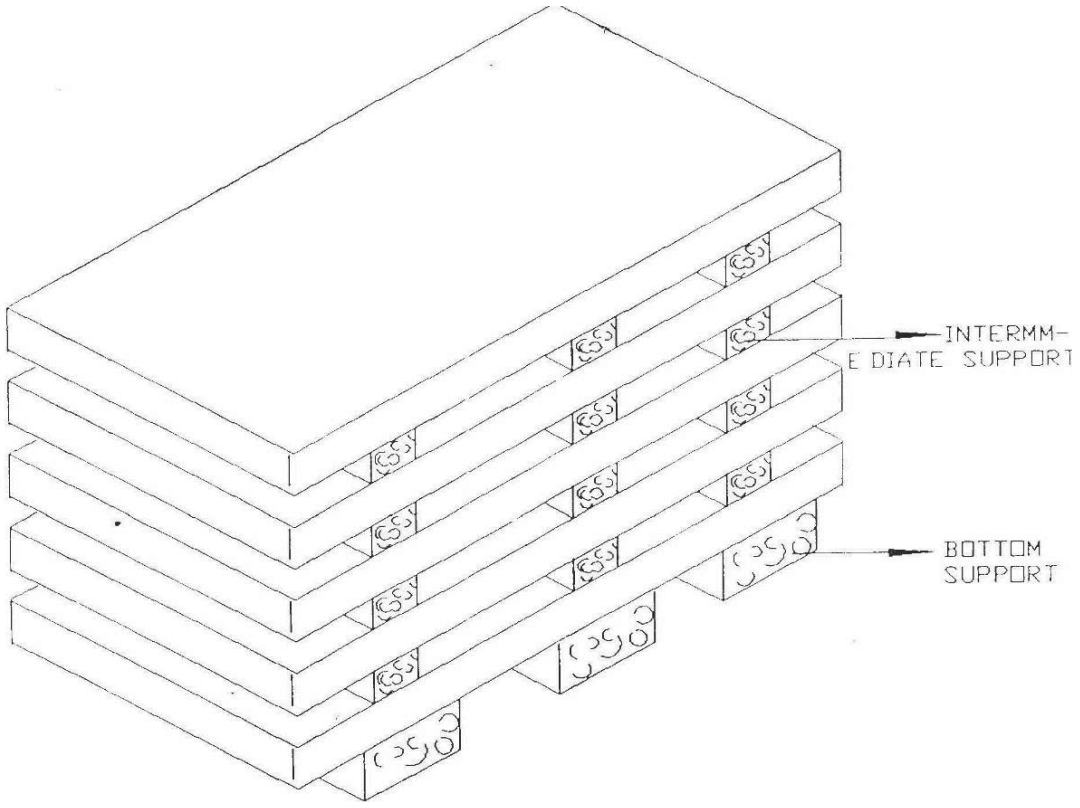


Figure – 1 – PLATE STACKING ARRANGEMENT

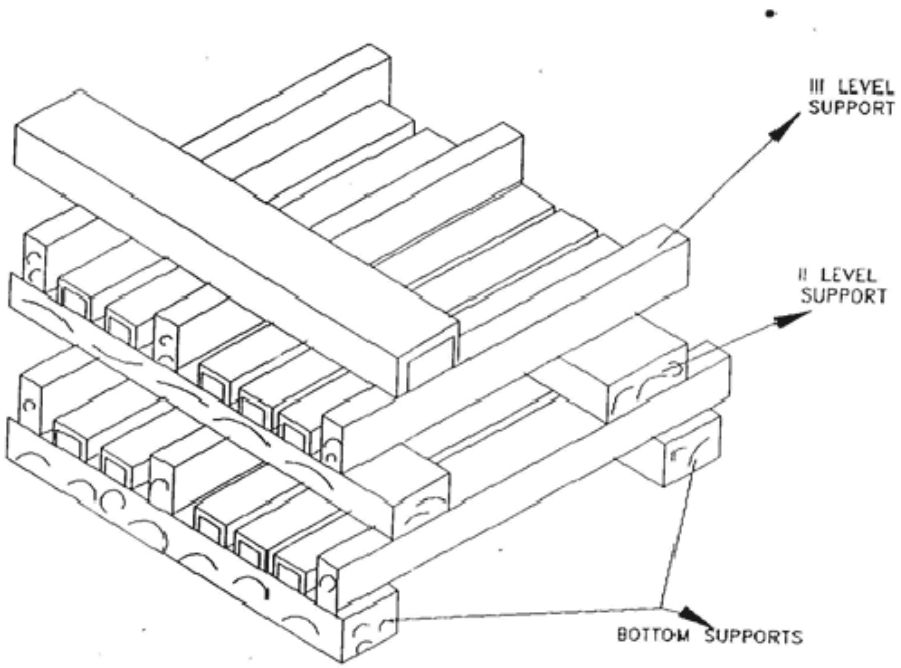


Figure – 2 – STRUCTURAL STEEL STACKING ARRANGEMENT

BILL OF QUANTITY

1 — 680 Kg Capacity- Conventional Type- Passenger Elevator

Capacity	No. of elevator	No. of landing each elevator	Total Travel (mtr) for each elevator	Total No. of landing	Total Travel (mtr)
680	1	5	22	5	22
680	3	5	18	15	54
680	19	4	12	76	228
680	2	3	9	6	18
680	2	5	19.5	10	39
680	1	4	18.5	4	18.5
680	4	5	15.3	20	61.2
Total	32			136	440.7

2 — 884 Kg Capacity Conventional Type- Passenger Elevator

Capacity	No. of elevator	No. of landing each elevator	Total Travel (mtr) for each elevator	Total No. of landing	Total Travel (mtr)
884	1	4	13.5	4	13.5
884	12	4	28	48	336
884	2	6	22	12	44
884	2	6	21.25	12	42.5
884	2	4	25.5	8	51
884	1	5	17	5	17
884	2	6	21.25	12	42.5
Total	22			101	546.5

3 — 1088 Kg Capacity-Conventional Type- Passenger Elevator

Capacity	No. of elevator	No. of landing each elevator	Total Travel (mtr) for each elevator	Total No. of landing	Total Travel (mtr)
1088	1	7	35.5	7	35.5
1088	2	5	17	10	34
1088	1	5	25	5	25
1088	2	7	38	14	76
1088	2	6	20.6	12	41.2
Total	8			48	211.7

4 — 1088 Kg Capacity- Goods cum Passenger Elevator

Capacity	No. of elevator	No. of landing each elevator	Total Travel (mtr) for each	Total No. of landing	Total Travel (mtr)
1088	2	5	17	10	34
Total	2			10	34

5 — 1088 Kg Capacity- Panoramic Type- Passenger Elevator

Capacity	No. of elevator	No. of landing each elevator	Total Travel (mtr) for each elevator	Total No. of landing	Total Travel (mtr)
1088	3	5	16.7	15	50.1
Total	3			15	50.1

6 — 2000 Kg Capacity- Goods cum passenger Elevator

Capacity	No. of elevator	No. of landing each elevator	Total Travel (mtr) for each elevator	Total No. of landing	Total Travel (mtr)
2000	3	4	28	12	84
Total	3			12	84

7 — TOOLS & TACKLES

S.N.	Description	Quantity	Remark
1	Spanner of all size required for maintenance	1 Set	
2	Adjustment 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 Tape	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.	
8	**MANDATORY SPARES**		
	NOTES: Refer clause 14.0 of General Technica Requirement.		
a.	**680 Kg Capacity- Conventional Type- Passenger Elevator**		
Sl. No.	**Item Description**	**Quantity**	Remarks
1	Friction block	18 nos. of each type	
2	Guide roller	20% of total population or 27 no's of each type whichever is higher	
3	Contactors	18 nos. of each type & Rating	
4	Control transformer	5 no. of each type & Rating	
5	Time device/Timer card (as applicable)	16 nos. of each type and rating	
6	Rectifiers	18 nos. of each type & Rating	
7	Auxiliary relay	4 nos. of each type	
8	Resistor Bank	23 no. of each type & Rating	
9	MCBs / MCCBs / Fuses	20 nos. of each type & current rating	
10	Limit switches	24 nos. of each type	
11	Push button	Complete replacement of one elevator	
12	Contact device (if applicable)	23 nos. of each type	
13	Transmitters	4 nos. of each type	
14	Switches	6 nos. of each type	
15	Receiver	4 nos. of each type	
16	Bearings	11 nos. of each type and size	
17	Roller	7 nos. of each type	
18	Worm gear spares of each type		
	i) 'O' rings	32 sets	
	ii) Sealing ring	30 sets	
19	Spares for brake		
	i) Fan	4 nos. of each type	
	ii) Magnetic coil	25 nos. of each type	
	iii) Brake disc	5 set of each type	
	iv) Brake pad	5 set of each type	
20	Bushing (for door front)	18 sets of each type	
21	Pinion	18 nos. of each type	

22	Motors		
	i) Drive Motor	21 no. of each rating	
	ii) Brake motor	9 nos. of each type	
	iii) Cooling Fan of Motors	4 no. of each type	
	iv) Lubrication oil pump motor	4 no. of each type and rating	
	v) Door Motor	9 no. of each type and rating	
	vi) Bearing (driving end)	4 no. of each type	
	vii) Bearing (non- driving end)	4 no. of each type	
	viii) End shield (DE and NDE)	4 no. of each type	
	ix) Fan Cover	4 no. of each type	
23	Door Sensors	4 no. of each type	
24	VVVFD System (For Elevators, Cranes, Hoists)	9 nos. Complete VVVFD unit - (To be repeated for each type, make, Model, rating & area of application)	
25	Floor indicator Display unit	07 no. of each type	
26	Landing door complete	07 set	
27	Car door complete	07 set	
28	Over current relay	05 nos. of each type & size	
b.	**884 Kg Capacity- Conventional Type- Passenger Elevator**		
Sl. No.	**Item Description**	**Quantity**	**Remarks**
1	Over current relay	21 nos. of each type	
2	Auxiliary relays	27 nos. of each type	
3	Friction block	20 nos. of each type	
4	Guide roller of each type	20% of total poulation or 27 nos whichever is higher	
5	Contactors of each type	21 nos.	
6	Control transformer	11 nos. of each type	
7	Time device	20 nos. of each type	
8	Rectifiers	20 nos. of each type	
9	Resistor	30 nos. of each type	
10	Fuses of each rating	20% of the total population / or 2 nos whichever is higher	
11	Limit switches of each type	30 nos.	
12	Push button	35 nos. of each type	
13	Contact device (if applicable)	30 nos. of each type	
14	Brake motor	18 nos. of each type	
15	Transmitters	17 nos. of each type	
16	Switches of each type	27 nos.	
17	Receiver	17 nos. of each type	

18	Bearings of each type & size	19 nos.	
19	Roller of each type	30 nos.	
20	Worm gear spares of each type		
a)	O' rings	29 sets	
b)	Sealing ring of each type	29 sets	
21	Spares for brake for each type		
a)	Fan	17 nos.	
b)	Magnetic coil	30 nos.	
c)	Brake disc	17 sets	
d)	Brake pad	18 sets	
22	Bushing (for door front)	20 sets of each type	
23	Pinion	20 sets of each type*	
24	Lift Main drive motor	08 no of each type & rating.	
25	Door opening motor	08 no of each type & rating.	
26	Landing door complete	08 no of each type & rating.	
27	Car door complete	08 no of each type & rating.	
28	VFD drive	08 no of each type & rating.	
c.	**1088 Kg Capacity- Conventional Type- Passenger Elevator, Goods cum passenger Elevator and Panoramic Type Elevator**		
Sl. No.	**Item Description**	**Quantity**	**Remarks**
1	Friction block	8 nos. of each type	
2	Guide roller of each type of type	20% of total poulation or 9 nos whichever is higher	
3	Contactors of each type	8 nos.	
4	Control transformer	5 nos. of each type	
5	Time device	8 nos. of each type	
6	Rectifiers	8 nos. of each type	
7	Overcurrent relay	8 nos. of each type	
8	Auxiliary relay	12 nos. of each type	
9	Resistor (if applicable)	12 nos. of each type	
10	Fuses of each rating	20% of the total population or 9 nos. of each type whichever is high	
11	Limit switches of each type	12 nos.	
12	Push button	12 nos. of each type	
13	Contact device (if applicable)	12 nos. of each type	
14	Brake motor	7 nos. of each type	
15	Transmitters	7 nos. of each type	
16	Switches of each type	12 nos.	
17	Receiver	7 nos. of each type	
18	Bearings of each type & size	8 nos.	
19	Roller of each type	12 nos.	
20	Worm gear spares of each type		

a)	O' rings	10 sets	
b)	Sealing ring of each type	10 sets	
21	Spares for brake for each type		
a)	Fan	7 nos.	
b)	Magnetic coil	12 nos.	
c)	Brake disc	7 sets	
d)	Brake pad	7 sets	
22	Bushing (for door front)	8 sets of each type	
23	Pinion	8 sets of each type	
24	Lift main Drive motor	1 no. of each type & rating	
25	Door Operating Motor	1 no. of each type & rating	
26	Landing Door complete	1 no. of each type & rating	
27	Car Door Complete	1 no. of each type & rating	
28	VFD drive	1 no. of each type	
d.	**2000 Kg Capacity- Goods cum Passenger Elevator**		
Sl. No.	**Item Description**	**Quantity**	**Remarks**
1	Friction block	2 nos. each type	

2	Guide roller of each type	20% of total population or 3 no's of each type whichever is higher	
3	Contactors of each type	2 nos. of each type & rating	
4	Control transformer	1 no. of each type & rating	
5	Time device	1 no. of each type	
6	Rectifiers	2 nos. of each type & rating	
7	Auxiliary relay	2 nos. of each type	
8	Resistor Bank	1 no. of each type	
9	MCBs / MCCBs / Fuses of each rating	20% of the total population	
10	Limit switches of each type	2 nos.	
11	Push button	1nos. of each type	
12	Contact device (if applicable)	1 nos. of each type	
13	Transmitters	2 nos. of each type	
14	Switches of each type	3 nos.	
15	Receiver	2 nos. of each type	
16	Bearings of each type & size	2 nos.	
17	Roller of each type	2 nos.	
18	Worm gear spares		
	i) 'O' rings	2 sets	
	ii) Sealing ring of each type	2 sets	
19	Spares for brake		
	i) Fan	1 nos. of each type	
	ii) Magnetic coil	2 nos. of each type	
	iii) Brake disc	1 set of each type	
	iv) Brake pad	1 set of each type	
20	Bushing (for door front)	2 sets of each type	
21	Pinion	2 nos. of each type	
22	Motors		
	i) Main Drive Motor	1 no. of each rating	
	ii) Lubrication oil pump motor	1 no. of each type and rating	
	iii) Door Motor	1 no. of each type and rating	
	iv) Cooling Fan of Motors	1 no. of each type	
	v) Brake motor	1 nos. of each type	
	vi) Bearing (driving end)	1 no. of each type	
	vii) Bearing (non- driving end)	1 no. of each type	
	viii) End shield (DE and NDE)	1 no. of each type	
	ix) Fan Cover	1 no. of each type	
23	Door Sensors	1 no. of each type	
24	VVVFD System -(For Elevators,)	One Complete VVVFD unit - (To be repeated for each type, make, Model, rating & area of application)	

DOCUMENTATION REQUIREMENT

DRAWINGS & DOCUMENTS TO BE SUBMITTED BY ALL THE BIDDERS ALONG WITH THE BID

Sl. No.	DOCUMENT TITLE
1	PQR CREDENTIALS
2	COMPLIANCE SHEET
3	"NO DEVIATION" CERTIFICATE DULY STAMPED AND SIGNED.

DRAWINGS & DOCUMENTS TO BE SUBMITTED BY SUCCESSFUL BIDDER AFTER AWARD OF CONTRACT ALONG WITH SUBMISSION SCHEDULE

S.N.	BHEL drawing No.	Title	Approval category	Schedule date of submission (in weeks from date of project specific LOA)
1	PE-V0-AAA-502-A001	General Arrangement Drawing, M/C Room Layout, Scope & BOM and Dimensional Details of Elevator (Building wise).	A	3
2	PE-V0-AAA-502-A002	Technical Data Sheet For Elevator (Building wise).	A	3
3	PE-V0-AAA-502-A003	Quality Plan (Common for all Elevators)	A	3
4	PE-V0-AAA-502-A004	Wiring Diagram & Power Distribution Schematic(For Each Elevator).	I	4
5	PE-V0-AAA-502-A005	O&M Manual for Elevator.	I	6
	LEGENDS			
	A= Approval category			
	I= Information category			

Notes:-

1	Bidder to follow the following the drawing submission schedule: i.1st submission of drawings from date of project specific LOA as per the submission schedule. ii.Every revised submission incorporating comments – within 10 days. iii. BHEL & Customer Comment/ Approval -18 days
2	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. For any clarification/ discussion required to complete the drawings, the bidder shall himself depute his personal to BHEL for across the table discussions/ finalizations/ submissions of drawings.

DRAWINGS & DOCUMENTS TO BE SUBMITTED AS FINAL / AS-BUILT DOCUMENT

Sl. No.	DOCUMENT TITLE	No. of prints (Sets)	No. of portable hard disk
1	APPROVED DOCUMENTS	3	2
2	AS BUILT DRAWINGS/ DOCUMENTS	3	2
3	ERECTION MANUAL	3	2
4	O&M MANUAL ALONG WITH E LEARNING MODULE	3	2
5	PERFORMANCE AND FURNTIONAL GUARANTEE TEST REPORTS	3	0

COMPLIANCE CERTIFICATE

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

1	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.
2	Bidder shall submit Manufacturing Quality Plan(MQP) in the event of order based on the guidelines given in the specification & reference MQP enclosed therein. MQP will be subject to BHEL / CUSTOMER approval & customer hold points for inspection / testing and additional inspection requirement, if any shall be marked in the MQP 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.
3	All drawings/ data-sheets / calculations etc. submitted along with the offer shall not be taken cognizance off.
4	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.
5	All sub vendors shall be subject to BHEL / CUSTOMER approval in the event of order.
6	Guarantee for plant/ equipment shall be as per relevant clause of GCC / SCC / Other Commercial Terms & Conditions.
7	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.
8	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.

9	As built drawings shall be submitted as and when required during the project execution.
10	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.
11	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.
12	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.

Signature of authorised Representative

Name and Designation :

Name & Address of the Bidder

Date

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
PASSENGER ELEVATOR CAPACITY 680 KG																		
ELEVATOR MOTOR	16.5		U	1	0	D	S	-	C		Each Elevator Machine Room							
SPLIT AIR-CONDITIONER FOR ELEVATOR M/C ROOM AND LIGHTING FOR ELEVATOR M/C ROOM & SHAFT AND MAINTENANCE AND INSTALLATION REQUIREMENT	7		U	1	0	D	S	-	C		Each Elevator Machine Room							
PASSENGER ELEVATOR CAPACITY 884 KG																		
ELEVATOR MOTOR	16.5		U	1	0	D	S	-	C		Each Elevator Machine Room							
SPLIT AIR-CONDITIONER FOR ELEVATOR M/C ROOM AND LIGHTING FOR ELEVATOR M/C ROOM & SHAFT AND MAINTENANCE AND INSTALLATION REQUIREMENT	7		U	1	0	D	S	-	C		Each Elevator Machine Room							
PASSENGER ELEVATOR CAPACITY 1088 KG																		
ELEVATOR MOTOR	16.5		U	1	0	D	S	-	C		Each Elevator Machine Room							
SPLIT AIR-CONDITIONER FOR ELEVATOR M/C ROOM AND LIGHTING FOR ELEVATOR M/C ROOM & SHAFT AND MAINTENANCE AND INSTALLATION REQUIREMENT	7		U	1	0	D	S	-	C		Each Elevator Machine Room							
GOODS CUM PASSENGER ELEVATOR CAPACITY 1088 KG																		

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)

बीएचईएल	**LOAD DATA (ELECTRICAL)**	**JOB NO.**	**--**	**ORIGINATING AGENCY**		**PEM (ELECTRICAL)**
		PROJECT TITLE	**RATE CONTRACT OF ELEVATOR**	**NAME**	**GP/VVH**	**DATA FILLED UP ON**
		SYSTEM / S	**ELEVATORS**	**SIGN.**		**DATA ENTERED ON**
		DEPTT. / SECTION	**MAUX / MH**	**SHEET 1 OF 2**	**REV. 00**	**DE'S SIGN. & DATE**

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
ELEVATOR MOTOR	16.5		U	1	0	D	S	-	C		Each Elevator Machine Room							
SPLIT AIR-CONDITIONER FOR ELEVATOR M/C ROOM AND LIGHTING FOR ELEVATOR M/C ROOM & SHAFT AND MAINTENANCE AND INSTALLATION REQUIREMENT	7		U	1	0	D	S	-	C		Each Elevator Machine Room							
GOODS CUM PASSENGER ELEVATOR CAPACITY 2000 KG																		
ELEVATOR MOTOR	20		U	1	0	D	S	-	C		Each Elevator Machine Room							
SPLIT AIR-CONDITIONER FOR ELEVATOR M/C ROOM AND LIGHTING FOR ELEVATOR M/C ROOM & SHAFT AND MAINTENANCE AND INSTALLATION REQUIREMENT	7		U	1	0	D	S	-	C		Each Elevator Machine Room							

Note:

1) No other single phase or 3 phase supply shall be provided for elevator erection / operation etc.
2) Only two nos. (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 Control Transformer in their scope for stepping down the voltage as per their requirement.
3) 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)

भेल BHEL	**LOAD DATA (ELECTRICAL)**	**JOB NO.**	**--**	**ORIGINATING AGENCY**		**PEM (ELECTRICAL)**
		PROJECT TITLE	**RATE CONTRACT OF ELEVATOR**	**NAME**	**GP/VVH**	**DATA FILLED UP ON**
		SYSTEM / S	**ELEVATORS**	**SIGN.**		**DATA ENTERED ON**
		DEPTT. / SECTION	**MAUX / MH**	**SHEET 2 OF 2**	**REV. 00**	**DE'S SIGN. & DATE**

PRE QUALIFICATION REQUIREMENT (TECHNICAL)	
1	Bidder should have designed, manufactured and tested elevator with minimum capacity 680 Kg.
2	Bidder has to submit the following supporting documents meeting above mentioned pre-qualifying requirement. Copy of minimum one (1) performance certificate in English from End user along with copy of related Purchase Order (PO) or letter of intent (LOI) or letter of award (LOA) or work order (WO) specifying that the product/ equipment is running satisfactorily for one (1) year from date of commissioning, as on the date of bid opening.
3	Bidder should have manufactured and supplied average thirty (30) nos. of Elevators in the last two (2) preceding years from the date of bid opening. Relevant PO/LOI/LOA/WO along with respective Material dispatch clearance certificate (MDCC)/ Material receipt certificate (MRC)/Lorry receipt (LR)/ Supply invoice shall be submitted to establish the above.
Note	
a	Bidder shall submit the design documents to substantiate technical parameter specified in PQR, if the same is not mentioned in performance certificate / purchase order.
b	Bidder to submit all supporting documents in English. If documents submitted by bidder are in language other than English, a self-attested English translated document should also be submitted.
c	Notwithstanding anything stated above, BHEL / End Customer reserves the right to assess the capabilities and capacity of the bidder to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL / End Customer. (Bidder to furnish details as per Annexure-A- “Sub-vendor questionnaire”).
d	Consideration of bidder for project specific ordering shall be subject to End customer / Owner's approval of bidder/s.
e	After satisfactory fulfilment of all the above criteria / requirement, offer shall be considered for further evaluation as per NIT and all the other terms of the tender.

Annexure-A

	Corporate quality Assurance **SUB-VENDOR QUESTIONNAIRE**

i.	***Item/Scope of Sub-contracting***			
ii.	***Address of the registered office***		***Details of Contact Person (Name, Designation, Mobile, Email)***	
iii.	***Name and Address of the proposed Sub-vendor's works where item is being manufactured***		***Details of Contact Person: (Name, Designation, Mobile, Email)***	
iv.	***Annual Production Capacity for proposed item/scope of sub-contracting***			
v.	***Annual production for last 3 years for proposed item/scope of sub-contracting***			
vi.	***Details of proposed works***			
1.	***Year of establishment of present works***			
2.	***Year of commencement of manufacturing at above works***			
3.	***Details of change in Works address in past (if any)***			
4.	***Total Area***			
	Covered Area			
5.	***Factory Registration Certificate***	***Details attached at Annexure – F2.1***		
6.	***Design/ Research & development set-up (No. of manpower, their qualification, machines & tools employed etc.)***	***Applicable / Not applicable if manufacturing is as per Main Contractor/purchaser design) Details attached at Annexure – F2.2 (if applicable)***		
7.	***Overall organization Chart with Manpower Details (Design/Manufacturing/Quality etc)-***	***Details attached at Annexure – F2.3***		
8.	***After sales service set up in India, in case of foreign sub-vendor (Location, Contact Person, Contact details etc.)***	***Applicable / Not applicable Details attached at Annexure – F2.4***		
9.	***Manufacturing process execution plan with flow chart indicating various stages of manufacturing from raw material to finished product including outsourced process, if any***	***Details attached at Annexure – F2.5***		
10.	***Sources of Raw Material/Major Bought Out Item***	***Details attached at Annexure – F2.6***		
11.	***Quality Control exercised during receipt of raw material/BOI, in-process , Final Testing, packing***	***Details attached at Annexure – F2.7***		
12.	***Manufacturing facilities***	***Details attached at Annexure – F2.8***		

	(List of machines, special process facilities, material handling etc.)	
13.	***Testing facilities*** ***(List of testing equipment)***	***Details attached at Annexure – F2.9***
14.	***If manufacturing process involves fabrication then-*** ***List of qualified Welders*** ***List of qualified NDT personnel with area of specialization***	***Applicable / Not applicable*** ***Details attached at Annexure – F2.10*** ***(if applicable)***
15.	***List of out-sourced manufacturing processes with Sub-Vendors' names & addresses***	***Applicable / Not applicable*** ***Details attached at Annexure. –F2.11*** ***(if applicable)***
16.	***Supply reference list including recent supplies***	***Details attached at Annexure – F2.12*** ***(as per format given below)***

Project/ package	*Customer Name*	*Supplied Item (Type/Rating/Model /Capacity/Size etc)*	*PO ref no/date*	*Supplied Quantity*	*Date of Supply*

17.	***Product satisfactory performance feedback letter/certificates/End User Feedback***	***Attached at annexure - F2.13***
18.	***Summary of Type Test Report (Type Test Details, Report No, Agency, Date of testing) for the proposed product (similar or higher rating)*** ***Note:- Reports need not to be submitted***	***Applicable / Not applicable*** ***Details attached at Annexure – F2.14*** ***(if applicable)***
19.	***Statutory / mandatory certification for the proposed product***	***Applicable / Not applicable*** ***Details attached at Annexure – F2.15*** ***(if applicable)***
20.	***Copy of ISO 9001 certificate (if available)***	***Attached at Annexure – F2.16***
21.	***Product technical catalogues for proposed item (if available)***	***Details attached at Annexure – F2.17***

Name :		***Desig :***		***Sign:***		***Date :***	

Company's Seal/Stamp: -

PRE QUALIFICATION REQUIREMENT (FINANCIAL)