An ISO 9001 Company

Bharat Heavy Electricals Limited
(High Pressure Boiler Plant)
Tiruchirappalli – 620014, TAMIL NADU, INDIA
MATERIALS MANAGEMENT

TITLE	Phone: +91 431 2574087/2574163 Fax : +91 431 252 0233/0525 Email : ssraju@bheltry.co.in
2 Sets of Passenger cum Goods Elevator	

	Reference Number: Enquiry:FBC&HRSG: PUR:Elevator	**Enquiry Date: 02.03.2009**	**Due date for submission of quotation: 23.03.2009**
You are requested to quote the Enquiry number date and due date in all your correspondences. This is only a request for quotation and not an order			

BHEL/Trichy is looking for ..... **Supply, Erection & Commissioning of 2 Sets of Passenger cum Goods Elevator**

BHEL commercial terms & conditions with Price Bid formats and all annexure can be downloaded from BHEL web site http://www.bhel.com or from the Government tender website http://tenders.gov.in (public sector units) Bharath Heavy Electricals Limited) under enquiry reference "FBC&HRSG:PUR:Elevator "	
Tenders should reach us before 14:00 hours on the due date Technical bid will be opened at 14:30 hours on the due date Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present.	Yours faithfully, For **Bharath Heavy Electricals Limited** Dy. Manager / Purchase / FBC&HRSG

BHARAT HEAVY ELECTRICALS LIMITED
FBC & HRSG / PURCHASE

Ref: PUR/FBC&HRSG/Elevator/OT

Date.: February 17, 2009

SPECIAL CONDITIONS

1. This tender is for the supply of 2 Nos. of Elevator (Passenger cum Goods) for KONIAMBO 1&2 CFBC Boilers as per the enclosed Specification of the Indent C1/5312&5313-LU-25-1-97-469 dt. 01.12.08.

2. The vendor shall have adequate experience in manufacturing of Lift

3. The tender is in TWO parts. One part consisting of Commercial and Technical conditions along with Quality plan for supply in-line with our requirements and another Part containing Price Bid. Techno-Commercial bid and Price bids are to be submitted in separate sealed covers. In addition to technical and commercial conditions, vendors who are not registered vendor of BHEL, Trichy have to submit the filled in "Supplier Registration Forms" (available in www.bhel.com website) along with the technical bid. Based on this and other conditions, as well as capacity and capability and approval by customer vendors will be short-listed. Both these covers are to be put in a single cover duly super scribing the Enquiry Number. The technical and commercial bid will be opened on the due date and based on the acceptance of techno-commercial bid and vendor evaluation, the price bid of the qualified vendors will be opened on a suitable date with due intimation.

   Following will be the criteria for short-listing the vendors.
   - Evaluation of the dully filled Supplier Registration Forms.
   - Availability of minimum manufacturing, handling, testing and measuring facilities as detailed in the Supplier Registration Form.
   - BHEL will have the right for spot assessment of the facilities.
   - Meeting our techno-commercial requirements of the enquiry.
   - Customer approval for the Vendors before ordering.

4. BHEL reserves the right to Negotiate with the L1 vendor.

5. BHEL reserves the right to re-float the tender opened, if L1 price is not the lowest acceptable price to them inter-alia other reasons.

Dy. Manager/Purchase/FBC&HRSG

ANNEXURE TO ENQUIRY FOR PROCUREMENT OF PASSENGER CUM GOODS ELEVATOR

Sl.No.	Item Description	Quantity
01	Supply and erection & commissioning of Passenger cum Goods Elevator as per specification FBC&HRSG:CI:5312:P Rev.01 Landing & Top Landing at 48.7M. Elevator Shaft Dimension 4M x 4M. Vendor to furnished Quality Plan for the Elevator. All Equipments coming in Elevator shall carry CE MARKING to signify conformity to the European Directives. Offer shall be submitted as per enclosed specification & Documents along with Tender.	2 Sets

List of enclosed Documents:

1. Elevator Specn. FBC&HRSG:CI:5312:P Rev.01
2. Low Voltage Motor Specn: 319000-00000-JSS-1691-0001 Rev.05
3. Specn.: FBC&HRSG:CI:5312:LVM2
4. Applicable Codes & Stds for elevator Doc.No. 319000-00000-JSD-1500-0009 Rev.05
5. Doc.No. 319000-00000-JSD-1500-0008 Rev.05
6. Doc.No. 319000-00000-JSD-1600-0001 Rev.05
7. Packing Procedure Doc.No. 319000-00000-WI-GPCO-0001
8. Technical Data Sheet, FBC&HRSG:CI:5312:PANNEX

Dy.Manager/Purchase/FBC&HRSG

SPECIFICATION FOR
PASSENGER CUM GOODS ELEVATOR

REV NO	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED
00	17.08.08	Initial issue	NITIN	A.Swaminathan	S.Jayaprakash
01	1.12.08	Revised	NITIN	A.Swaminathan	S.Jayaprakash

SPECIFICATION FOR PASSENGER CUM GOODS ELEVATOR

01.00.01	**SITE CONDITION**	
01.00.01	Altitude above MSL	: Project information.
01.00.02	Relative humidity	: Average 77.1 Max 99.2
01.00.03	Design Ambient Temp.	: 28.9
01.00.04	Seismic Loads - Zone III	: As per latest revision of IS-1893-III/ 1984 and its equivalent.
01.00.05	Wind loads @ 10 metres above sea level	: As per IS-875 (Part 3) / 1987 and its equivalent.

02. 00.00 GENERAL:

This specification is intended to cover the design, engineering, manufacture, inspection, testing, delivery, of passenger & passenger cum goods Elevator.
Vendor to quote optionally for machine room less model elevator

03.00.00 DRAWINGS / DOCUMENTS

The following preliminary documents/drawings should be enclosed along with the offer without fail.

03.00.01 Detailed description of the system offered.

03.00.02 Write-up on interlocks, controls and safety devices provided.

03.00.03 General Arrangement of Elevator (including hoist way, pitwell etc.

03.00.04 General Arrangement of machine room and equipment in machine room.

i) Electrical control scheme with legend and write-up.

ii) Machine room Air-Conditioning details.

iii) Foundation and loading details of machine room floor and the concrete structure.

iv) Manufacturing schedule.

v) Filled in vendor data sheet for Elevator, Main motor and Door operator motor.

03.00.11 Filled in vendor quality plan.

03.01.00 The signed "No deviation format" shall be sent along with the Offer and BHEL will evaluate the offer only upon receipt of the same.

04.00.00 GUARANTEE

The Elevator Vendor shall guarantee that the materials, workmanship and performance of the apparatus installed under this specification is perfect in every respect and that they will make good of any defects (not due to careless operation) which may develop within 18 months from the date of formal handing over of the equipment.

05.00.00 MAINTENANCE

After the completion of the installation, maintenance and service for the equipment furnished under this specification shall be provided by the vendor for a period of eighteen months. This service shall include monthly inspections of the installation during regular working hours by trained employees and shall include all necessary adjustments, greasing, oiling, cleaning, supply of genuine standard parts to keep the equipment in proper operation except any part made necessary by misuse, accidents or negligence caused by others.

06.00.00 STATUTORY REQUIREMENTS

All registration and statutory inspection fees if any, in respect of his work pursuant to this contract shall be to account of the elevator vendor. However any registration, statutory inspection fees lawfully payable under the provision of any statutory laws and its amendments from time to time, during erection in respect of the plant equipment ultimately to be owned by owner shall be to the account of the owner. Should any such inspection or registration need to be re-arranged due to the fault of the vendor or his sub-contractor, the additional fees for such inspection and / or registration shall be borne by the vendor. While the statutory payment shall be made by the owner for any registration, statutory inspection etc. during erection, the vendor shall be responsible for carrying out and co-ordinating various activities with the statutory authority as well as for obtaining the clearance and registration of the equipment.

06.01.00 Special Requirements:

CE Marking

Equipment shall carry the CE mark to signify conformity to the European directives, as per the "Council of the European Communities" directive and particularly:

Reference	Subject of Directive
89/336/EEC	Electromagnetic Compatibility
94/9/EC	Equipment and Protective Systems in Potentially Explosive Atmospheres
73/23/EEC / 93/68/EEC	Low Voltage Equipment Directive and Amendment
98/37/EC	Machinery Safety
97/23/EC	Pressure Equipment Directive (PED)
1999/5/EC	Directive of the European Parliament and of the Council on Radio Equipment and Telecommunications Terminal Equipment and the Mutual Recognition of Their Conformity

The Supplier is responsible for CE Marking conformity.

For further detailed information, see http://europa.eu.int/comm/enterprise/newapproach/newapproach.htm for the Guide to the Implementation of Directives based on the New Approach and the Global Approach.

In cases of contradiction, the contents of the on/off valves data sheet shall have precedence over the contents of this JSD. The Supplier model number shall confirm to the associated Instrument Data Sheet requirement.

If the Supplier intends to deviate from the specifications, codes, standards, etc. and/or to use alternative designs, materials, methods, etc., he must immediately notify HT of this in writing to request approval. Under no circumstances may the Supplier present deviations and/or alternatives by means of sending the

documents required "For Review" to HT.

The Pressure Equipment Directive (PED)

Refer to Pressure Equipment Directive 97/23/CE

Supplier shall be responsible for compliance with the requirements of the Directive 97/23/CE.

Any instrument, valve, safety device, piping accessory, etc. above a pressure of 0.5 bar must have CE Marking.

CE Marking & European Directives
CE Marking symbolizes the conformity of a product with the applicable European Community (safety) requirements imposed on a manufacturer.
CE Marking affixed to the products is a declaration by the manufacturer that:
• The product conforms to all applicable European Community provisions;
• The appropriate conformity assessment procedures have been completed; and
• The ESRs (Essential Safety Requirements) have been addressed.
The design, fabrication, installation and testing of the Suppliers scope of work shall comply with all European Directives and New Caledonian statutory and regulatory requirements.
"European Directives" are documents outlining requirements to ensure the placement of safe products on the (European) market. In Europe, the Directives are progressively replacing the national standards.
European Directives are widely used because they are mandatory or because they are a convenient means to demonstrate the achievement of an appropriate level of safety.
The European Directives that are applicable to this project shall include, but not necessarily be restricted to, the following:
• CE Marking – European Directive - 93/68/EEC dated 22 July 1993;
• Machinery – European Directive – 98/37/EEC dated 22 June 1998;
• Pressure Equipment – European Directive – 97/23/EEC and Decree 99-1046 including annex and French act dated 21 December 1999;
• Simple Pressure Vessels – European Directive – 87/404/EEC dated 25 June 1987;
• Construction Products – 89/106/EEC dated 27 June 1991;
• Civil Explosives – 93/15/EEC dated 1 January 1995;
• Potentially Explosive Atmospheres – 94/9/EC dated 1 March 1996;
• Lifts – 95/16/EC dated 1 July 1997;
• Telecommunications Terminal Equipment – 98/13/EC dated 6 November 1992;
• Radio & Telecommunications Terminal Equipment – 99/5/EC dated 8 April 2000;
• Personal Protective Equipment – 89/686/EEC dated 1 July 1992;
• Electromagnetic Compatibility Directive (EMC) - 89/336/EEC; and
• Low Voltage Directive – 72/23/EEC.
The above list is not exhaustive and it shall be the responsibility of the Supplier to comply with all applicable European Directives.

Compliances with Codes & Standards

On a general basis, equipment design, manufacture, construction and testing shall comply with the requirements of EN, French and New Caledonian codes and standards as well as all laws and regulations of local authorities. Where other codes, standards/ equivalent ASME Standard or Suppliers Practices are used, they shall also satisfy the French and New Caledonian requirements. In the event of conflicting requirements between codes and standards, the French and New Caledonian requirements shall apply.
Any code or standard or Suppliers Practices employed shall be duly mentioned within the furnished documentation. It shall not be made redundant references to standards for any item of equipment, and consideration shall be given to the necessary consistency from design stage to tests of the whole boiler, including material selection and component sizing.
The Equipment shall comply with all European Directives and New Caledonian statutory and regulatory requirements. CE Marking requirements as required from the Supplier according to directives. The responsibility of the Supplier shall be to determine the requirements in New Caledonia in this regard.

When selecting a particular Code or Standard the Supplier shall ensure that the Code or Standard will be applicable when manufacture and erection of equipment commences.
Legislation in New Caledonia is based on the French Metropolitan Texts. However, being an overseas territory, New Caledonia adopts, through the Territorial Assembly, its own regulation derived from the Metropolitan Texts.
The essential requirements that significantly impact the realization of the Power Station construction works in New Caledonia relate to the compliance with the European, French and local technical codes and standards.
The Caledonian decree 1348 of 22 November 1985 stipulates that French standards, regulation and codes are mandatory in New Caledonia. However, there is a number of local New Caledonian regulations and directives that must be complied with. The Supplier must ensure compliance with these local regulations and directives.
According to French practices, the compliance of works can either be demonstrated or certified. The demonstration of compliance means the ability of the Supplier to justify the application of such standards and codes at design and construction phases.
The certification of compliance is required by either the Owner/Operator or its insurers. Certification is provided with documentation approved by a Notified Body. This approval to exercise conformity assessment activities is delivered by the French Authorities and the insurance companies (namely the reinsurers)
PACKING:
Wooden packing shall be as per ISPM15
Packing, marking and shipping instructions refer 319000-00000-W-GPCO-0001 REV04 (40SHEETS)
LOW VOLTAGE MOTORS as per 319000-00000-JSS-1691-0001 REV05(14SHEETS) but with 400V ,3-ph,50hz and Annexure –2 (FBC & HRSG:CI:5312:LVM2-2SHEETS)

07.00.00 Works not included in Elevator contract, but furnished by others in accordance with local codes and regulations
and the approved drawing of the Elevator vendor.

07.01.00 Civil works associated with the Elevator pit.

07.02.00 Furnishing and installation of steel beams (Hoisting beams) in the machine room, to lift equipment during installation and to facilitate maintenance.

07.03.00 Machine room civil works including concrete flooring.

07.04.00 Steel structures for Columns and associated bracings and approach platforms upto landing doors at each level.

07.05.00 Supporting steel material between hoistway & car to be provided by BHEL.

08.00.00 AUTOMATIC TERMINAL STOPS:

The Elevator shall be equipped with an automatic stopping device arrangement to bring the car to a stop at the terminal landings independent of the regular operating device in the car. Final limit switches shall be provided in the hoist way, operated by the car and arranged to stop the car and prevent normal operation, should it travel beyond the zone of the normal stopping device.

09.00.00 SCOPE OF WORK:

Design, engineering, manufacture, inspection, testing, delivery,

09.00.02 Necessary pulley block, rope and hook arrangements at the machine room/hoist ceiling to carry out the maintenance and erection of equipment shall be supplied by Elevator vendor. The necessary monorail beam will be supplied by purchaser (BHEL).

09.00.03 A steel ladder has to be provided for access to the pit by the Elevator vendor.

09.00.04 Guard to protect the hoist way including temporary barricades at hoist way openings by Elevator vendor.

Scaffolding as per erection requirement shall be provided by the Elevator vendor. After completion of handing over activities, the scaffolding materials are to be taken by the vendor. Suitable provision to be made by vendor accordingly.

09.00.05 All the electrical equipment including Lift well, Hoist way & machine room lighting with fittings, Power/control/trailing cables, switch-Disconnector for 400 V AC 3 ph supply and 230 V AC single phase supply (to receive the incoming feeders provided by customer) shall be included in the Elevator vendor scope.

09.00.06 vendor to quote prices separately
i) For erection.
ii) Commissioning.
iii) Annual maintenance.

10.00.00 POWER SUPPLY:

One three phase 400V, AC, 50 Hz, and one single phase 230V, AC, 50Hz supply feeders will be provided in the machine room by BHEL.

The junction box having switch Disconnector /MCBs of adequate rating shall be arranged by the vendor to receive the above supplies. The Elevator vendor shall also indicate the proposed location of junction box in the machine room. All further cabling and wiring from the junction box shall be carried out by the Elevator vendor.

Further the Elevator vendor shall tap the supply with necessary isolator, switch/MCB units and distribute the power supply to the Elevator equipment and hoist way lighting.

a.	Lift operation	400V, 3 phase, 50 Hz 3 wire supply
	Variation in	i. Voltage: ± 10 % ii. Frequency: ± 5 %
b.	Lighting and fan	230 V, single phase, 50 Hz supply
	Variation in	i. Voltage: ± 10 % ii. Frequency: ± 5 %

The vendor shall arrange to tap power supply required for constructional purposes from the point terminated by the owner. The exact Power requirement of 3 phase supply and single phase power supply shall be indicated in the offer.

NOTE:

Vendor has to confirm Power Supply requirement as given below:
I. 3 Ph, 3Wire 400 V, 50 Hz AC:
(Max. 3 Ph Power shall be 20 KW)
II.1 Ph, 230 V, 50 Hz, AC:
a) Lighting for Hoist way, Car & Machine Room:
b) A/C Machine:
c) Controller:
(Max. 1 Ph Power shall be 10 KW)

DETAILS OF SPECIAL TREATMENT FOR ELEVATOR

As the Elevators are to be installed in a heavily polluted and dusty area in a thermal power station, the Elevator components shall be given special corrosion treatment as indicated below.

Sl.No.	Description	Special Treatment
11.00.01	Cars & Counter weight	Anti-corrosive epoxy paint
11.00.02	Fish plates	Anti-corrosive epoxy paint
11.00.03	Car & Counter weight buffer	Anti-corrosive epoxy paint
11.00.04	Supports (Buffer)	Anti-corrosive epoxy paint
11.00.05	Rail Brackets	Anti-corrosive epoxy paint
11.00.06	Bracket & rail fasteners	Zinc-passivated with epoxy painted
11.00.07	Tie down bolts	Zinc-passivated with epoxy painted
11.00.08	Machine	Anti-corrosive epoxy paint
11.00.09	Brake adjusting screw & coupling fasteners	Zinc-passivated
11.00.10	Bracket	Anti-corrosive epoxy paint
11.00.11	Controller cabinet	Anti-corrosive epoxy paint as per industry standard.
11.00.12	Hall buttons	Dust-proof with aluminium face plate or stainless steel hardware.
11.00.13	Car operating panel	Dust proof stainless steel plate and hardware.
11.00.14	Governor	Cover and casting epoxy painted. Other components zinc plated.
11.00.15	Governor Tension frame	Hot dip galvanised and anti-corrosive epoxy paint with M.S. shaft for sheave.
11.00.16	Car frame, level brace rods and counter weight frame	Epoxy paint as per IS-1477 and its equivalent.
11.00.17	Safety equipment (Linkages)	Zinc-plated
11.00.18	Safety switch and car gate switch	IP-65. Dust proof heavily zinc plated arm, stainless steel shaft and housing as per vendor standard.
11.00.19	Guide shoe	Zinc-plated

11.00.20	Cam bar mountings and channels	Zinc-plated and anti-corrosive epoxy paint
11.00.21	Counter weight frame	Anti-corrosive epoxy paint
11.00.22	Guide shoe with Nylon ribs	Zinc-plated
11.00.23	Filter weights	Anti-corrosive epoxy paint
11.00.24	Rope fasteners	Zinc-passivated and chromate dipped
11.00.25	Hoist rope	Greased after galvanising
11.00.26	Governor rope	Greased after galvanising
11.00.27	Car enclosure, interior gate, car door and landing door	Anti-corrosive two coats baked enamel paint
11.00.28	Alarm and door open bells (Electronic hooter)	Painted.
11.00.29	Junction box	Metallic body - dust proof with Anti-corrosive epoxy paint
11.00.30	Hall position indicator and car position indicator	Dust proof with stainless steel enclosure and Face plate.

The Lift shall be designed to meet the latest applicable requirements of all local Lift acts and rules.

12.00.0 MACHINE ROOM Air conditioning: Machine room shall be provided with 5 tons or with 2 nos., of 2.5 tons capacity A/C units to make the machine room dust proof. Vendor to indicate the power consumption of A/C units.

13.00.00 ELEVATOR PARTICULARS & DESIGN PARAMETERS

13.00.01 Passenger cum goods & passenger Elevator shall be provided with 1 no. Fireman's switch (Alarm Switch).

13.00.02 The Lift shall be located on the side of the boiler as indicated in the plant layout drawing. Entry to the Lift shall be from the side parallel to boiler axis.

13.01.01 The Lift shall be designed in line with the recommendation contained in the latest editions of Standards IS: 14665:2000 95/16/EC Dt.1july 1997 and its equivalent (All Parts)-'Specification of Electric Passenger and Goods Lifts', 'Codes of practice for Installation, Operation, Maintenance of Electric Passenger and Goods Lifts ' and 'Outline Dimensions of Electric Lifts'.

13.02.00 Design Criteria and Equipment specification for passenger cum goods Elevator

13.02.01	Type of service	Passenger cum goods Elevator
13.02.02	Number required	**One no/ Boiler. No.off boiler:2**
13.02.03	Load on the Elevator	**2.0 Tonnes**
13.02.04	Rated speed	
13.02.05	Total travel	**48700mm**
13.02.06	No. of floors to be served	**6**

13.02.07	Entrances	
13.02.08	Entrances and Platform size	As per IS 14665-2000 and its equivalent.
13.02.09	Landing levels: floor to be served	**0.000 mm ,10000mm, 20700mm , 25700mm , 34500 mm, 48700mm**
13.02.10	Drive Motor	Two speed AC Motor or single speed AC motor as per IS 325 & JEC 60072 IS 14665-2000 NF EN 60034/ NF EN 60072/ NF EN 60079
13.02.11	Method of control	Motor Speed Control: Variable Voltage variable frequency (VVVF) control for Single speed motors. Logic Control: Relay logic control or Microprocessor Control with automatic level adjustment. The control system shall be of field proven design and having satisfactory track record.
13.02.12	Flooring of Car	Chequered plate (5 mm thick) with wooden platform over steel sheeting and replaceable felt spreading 25 mm thick platform
13.02.13	Position of Machine room	Directly above the Lift shaft
13.02.14	Design, construction and finish of car	MS sheet fabricated, smooth finish, spray painted to approved shade.
13.02.15	Lighting and fan in the car	One cabin fan and two nos. of 20 Watts, recessed fluorescent lamp fitting for operation on 240 V, 50 Hz, AC single phase power supply
13.02.16	Car entrance and landing door	Shall be as per IS 14665-2000 and its equivalent.
13.02.17	Method of operation of car	Power operated type – automatic, Centre opening / closing car and landing doors.
13.02.18	Operation of Lift	Automatic, simplex, selective, collective with and without attendant, through illuminated pushbutton station located inside the car with provision for locking control in Auto or attendant position.
13.02.19	Signals	Car position indicator in car, hall position indicator at all floors, telltale lights at all floors, battery operated alarm bell and emergency light with suitable battery and battery charger and controls.
13.02.20	Shaft lighting	The Lift shaft shall be suitably illuminated by providing the fittings at every 3m(three metres) from bottom of Lift well.

Fittings type: 60 W Bulk head fitting with bulb, conducting, pull boxes, wiring, switches, other components / accessories and necessary switches. The make of the fittings & accessories shall be indicated in the offer.

Note: Whenever levels, elevations/ locations are specified, the same shall be subject to confirmation after the award of contract.

13.02.21 Foundation plan and elevation with landing levels shall be as per purchaser (BHEL) drawings.

14.00.00 MECHANICAL EQUIPMENT:

14.00.01 LIFT CAR:

The car platform frame and sling shall be of steel construction. The platform shall be suitably isolated from its sling. The car shall be enclosed with suitably braced and reinforced sheet metal panel. The sheet metal panel shall have ventilation slots at the base. The car interior, the car doors and the landing doors shall be finished with two coats of baked enamel or other suitable paint as approved by the purchaser. All other exposed steel or cast surfaces shall be painted with one coat of suitable metal primer and two coats of machinery enamel paint. The car shall be provided with the following accessories:

a) Car control station with position indicator inside the car and at landing platforms.

b) An emergency stop switch.

c) A three pin plug & socket with switch on top of Lift car for use by persons working there on.

d) Telephone instrument shall be provided inside the car and shall be connected to plant network.

Adequate lighting and ventilation shall be provided in the Lift car. The car shall be fitted with fan of adequate capacity. The car shall be fitted with fan smooth on slip surface. The car platform shall be robust in construction and elegant in appearance.

The car shall be provided with an emergency alarm push button inside the Lift car which shall be clearly marked. The alarm shall be clearly audible outside the Lift way in order to obtain assistance in case of breakdown or failure between the floors.

14.00.02 CAR DOOR:

The car door shall be of hollow metal construction 16-gauge thick sheet steel. Sides of the door shall be flush with all seams continuously welded. Guide shoes shall be rubber or roller type designed for operation on unlubricated guides. The car door shall be provided with locking gear of heavy and robust construction, so arranged mechanically and interlocked that the doors cannot under any circumstance be opened unless the Lift car is within a particular landing zone. Conversely the Lift shall not move until all the landing doors are closed and interlocked properly.

Width of Car Entrance shall be 1100 mm.

The live load coming into play shall be taken into consideration while designing doors, doorframe and hanger tracks. The car doors shall be designed such that their closing and opening is not likely to injure a person. A retractable safety shoe shall extend the full height and project beyond the front edge of the car, to open the closing door if and when it touches a person or an object. Alternatively opening of car by means of optical sensing.

14.00.03 LANDING DOORS:

All landing openings in the Lift well enclosure shall be protected with doors which shall extend the full height and width of the landing opening. The type of door provided shall be similar to the Lift car door. Every landing door shall be fitted with a locking device. The door shall be suitably interlocked so that they cannot open unless the car is within a particular landing zone. The locking device is closed until the door is closed. The levers operating the locking devices shall not interfere with the landing side or Lift enclosures.

14.00.04 LOAD PLATE:

A load plate displaying the rated load of the Lift in terms of persons and kilograms shall be fitted in the car in a conspicuous position.

14.00.05 SUSPENSION ROPES:

The car and the counter weights shall be suspended by steel wire ropes. Chain shall not be used for suspension. Not less than four independent stranded steel wire suspension ropes shall be used for car or counter weights of the Lift with traction drive. The minimum diameter of the stranded rope shall not be less than 12.5 mm and minimum factor of safety shall not be less than 10. The suspension ropes shall conform to latest edition of IS 2365 and its equivalent STDS -" Specification for steel wire suspension ropes for Lifts and hoists" or equivalent International Standards.

14.00.06 HEAVES AND PULLEYS:

All driving sheaves and pulleys fixed to and revolving with the shaft shall be fixed by means of sunk keys of

sufficient strength and quality. Sheaves and pulleys shall be made of cast steel to IS 1030 and free from cracks, sand holes and other injurious defects. They shall have suitable flanges and smoothly machined rope grooves. The diameter of the sheave or pulley shall be as specified in the latest edition of IS 14655 or equivalent International Standards.

14.00.07 SHAFT:

Shafts and axles shall be forged steel. They shall have sufficient rigidity and bearing surface. Any shaft when stepped, shall be turned to a reasonable radius at the point of reduction.

14.00.08 COUNTER WEIGHTS:

The Elevator shall be provided with suitable counter weights located in the Lift shaft. The counter weight shall be designed for smooth and easy operation of the Lift and shall be in accordance with Indian Standard referred earlier or equivalent International Standard. Suitable counter weight screen shall be provided in the Elevator shaft. The counter weights shall consist of cast iron weight contained in structural steel frame. It should preferably be equal to that of the car weight plus 40 % of the rated load. The traction should be such that no appreciable slip may occur but that slip shall free to take place upon the landing of either the car or the counter weights.

14.00.09 GUIDE RAILS:

Guide rails for the car and counter weights shall be machined 'T' sections and continuous throughout the entire length and shall be provided with adequate steel brackets or equivalent fixing of such design and spacing between brackets shall be such that to avoid any deflection during the normal operation. Guide rails section shall be adequate to withstand the forces resulting from the application of the safety gear when stopping the counter weights or fully loaded car. The guide shoes or their lining shall be easily renewable, adjustable and self lubricated. Guides shall be of such length that it shall not be possible for any of the car or the counter weight shoes to run off the guides.

14.00.10 BUFFERS:

Sufficient number of buffers of spring loaded type shall be fitted below the Lift car and counter weights. The buffers shall be capable of stopping the car or counter-weights without permanent damage or deformation to itself or any part of the Lift equipment. The number of buffers shall be so fixed as to ensure proper sharing of the impact loads by all of them.

14.00.11 EMERGENCY SAFETY DEVICES AND BRAKES:

The Lift shall be provided with safety device attached to the Lift car frame and placed beneath the car. The safety device shall be capable of stopping and sustaining the Lift car up to governor tripping speed with full rated load in car. The application of the safety device shall not cause the Lift platform to become out of level in excess of 3 cm/m measured in any direction. Slack rope switches, if necessary, shall also be provided. The Elevator vendor shall also provide personnel evacuation system during the power failure to the Elevator.

The Machine shall be provided with direct current spring set, solenoid release double shoe brakes of sufficient capacity to stop the car at any position with the design load. These brakes shall be designed in such a way that it gets applied automatically in the event of power failure.

14.00.12 OVER SPEED GOVERNOR AND GOVERNOR ROPES:

Governor shall be located where there is sufficient room for their proper operation and where they cannot be struck by the Lift car or counter weight in the event of over run. Each governor shall be marked with tripping speed in terms of a car speed in m/sec and the motor control and brake control circuit shall be opened before or

at the time the governor trips. Governor ropes shall not be less than 8 mm in diameter and shall be of steel or phosphor bronze and of suitable construction. The ropes shall run clear of the governor jaws during normal operation of the Lift. The Governor has to be compatible for operation with microprocessor based control system or resistance based control system.

14.00.13 LEVELLING DEVICE:

The Lift shall be provided with a two way automatic levelling device. The levelling device shall take care of overrun and under run of the car and rope stretch, such that car floor is within 6.0 mm from the landing level at all floors while in operation.

14.00.14 MACHINE ROOM AND OVERHEAD STRUCTURES:

All the overhead machinery shall be supported on beam to be furnished by the contractor. The machinery support beam shall rest on top of or be designed to be framed into the contractor's structural steel frame for the boiler house.

The Lift drive controller and all other apparatus and equipment of Lift installation, except such apparatus and equipment which function in the machine room shall be located at the top of the Lift well. Adequate machine room and hoist way lighting shall be provided by the Elevator vendor. The maximum loads transmitted by the single heaviest equipment both during erection and maintenance of the Lift to the machine room floor and other structures like guides etc. shall be furnished by the Elevator vendor within 15 days of placing the award letter. Sound reducing materials below machines in machine room shall be provided.

14.00.15 TERMINAL STOPPING AND FINAL LIMIT SWITCHES:

The Lift shall be equipped with upper and lower normal terminal limit switches arranged to stop the car automatically within the limit of the top car clearance and bottom run by from any speed attained in normal operation. Such limit switches shall act independently of the operating device, the final limit switches and buffer.

Final limit switches shall be provided to stop the car automatically within the top and bottom clearance independent of normal operating device and the terminal limit switches. The final limit switch shall act to prevent movement of the car under power in both directions of travel and shall after operating, remain open until the Lift car has been moved by a hand operating mechanism within the limits of normal travel.

14.00.16 INDICATORS:

The Lift shall be provided with position indicator and call indicator inside the Lift car to show the position of the Lift car with reference to the floor numbers and the landing from which the call is being received. Up and down travel direction and position indicators shall be of standard construction.

14.01.00 ELECTRICAL EQUIPMENT AND CONTROLS:

14.01.01 OPERATION AND INTERLOCKS:

The operation of the Lift shall be simplex, selective, collective, automatic, with or without operator. The Lift operation shall conform to the following requirements.

a) The operation of the Lift shall be through a push button station located inside the car.

b) The Lift shall not move unless the car door, landing door and all other protected openings connected with the control circuit are closed.

c) Two push buttons, one for upward and the other for downward movement at each intermediate landing and one push button at each terminal landing shall be shall be provided in the landing floors in order to call the car.

d) The landing doors shall be interlocked so that the landing door at any floor shall not open when the Lift is not on that floor.

e) Push button shall be fixed in the car for holding the doors open for any length of time required.

14.01.02 LIFT DRIVE:

The Lift drive shall be equipped with automatic electro-hydraulic thruster brakes. The Lift shall be driven by a drive suitable for method of control offered by the Elevator vendor. No friction gearing or clutch mechanism shall be used for connecting the main driving gear to the sheaves.

14.01.03 ELECTRIC MOTORS:

Motors shall be suitable for frequent starting. S4 duty class as per IS-4722 & IS-12824 and its equivalent. With CDF 40% and maximum 120 starts per hour at 50 Deg. C ambient and with IP 54 protection class.

14.01.04 CONTROLLERS:

The controllers shall be designed to start, accelerate, stop and reverse the Lift when the appropriate push buttons are pressed. It shall be arranged so as to provide maximum convenience to the operator. Contact finger buttons shall be easy to adjust and replace. The speed control device shall be such as to give smooth, easy and accurate speed control. The Lift controls shall be housed in dust and vermin proof enclosures. The controls shall be wired with stranded copper conductor cables. All equipments mounted shall be neatly labelled as per wiring diagram. Ventilating louvers are to be provided in the panels.
The electrical controllers shall be provided with enclosure conforming to IP-54. The contactors, relays, resistors etc. used in the total system shall be of open type construction and design. Vendor shall furnish the size of controller panel (Length x Depth x Height) with out fail in the offer.

14.01.06 CABLES AND INTERNAL WIRING:

Standards and Codes

.Electrical cables shall conform with:
IEC 60502
IEC 60840
NF EN 60228
Power cables with extruded insulation and their accessories for rated voltages from 1 kV (Um= 1,2kV) up to 30 kV (Um= 36kV).
Power cables with extruded insulation and their accessories for rated voltages above 30 kV (Um= 36kV) up to 150 kV (Um= 170kV).
Conductors of insulated cables.
NF EN 60885 Electrical test methods for electric cables.
NF C32-070
NF C32-102
Insulated cables and flexible cords for installations - Classification tests on cables and cords with respect to their behaviour to fire.
Cables of rated voltages up to and including 450/750 V and having cross-linked insulation.
All information shall be based on International System (SI) unit of measure.
All equipment presenting a risk or leading to a risk regarding the safety of workers have to comply with French standards, codes and regulations, even if designed with or on the basis of another standard. This is mandatory by the NC Deliberation No 51/CP dated 10 May 1989, which technical provisions refer to the European Directive 92/104/EEC.

The current edition of the French codes shall be used for the design of all components of the project as stipulated by the New Caledonian law (Caledonian decree 1348 of 22 November 1985).
When a Notified Body is required to verify the conformity with the French codes (or IEC code that have been adopted by the European Union), it shall be the Supplier's responsibility and shall be at Supplier's expense (except when otherwise specified).
The Notified Body that acts as a recognized third party, conversant with French and New Caledonian codes, shall certify and stamp the certificate of conformity issued and signed by the Supplier or manufacturer of the supply.

. **Low Voltage Systems**

The standard nominal voltages to be used on the project together with the permitted variation at the point of use, are .as follows:

- 690 V nominal +10%, -6%, 3 phase, 3 wire, 50 Hz from a star-connected source. The star point shall be earthed through an impedance (IT earthing system).
- 400 V nominal +10%, -6%, 3 phase, 3 wire or 4 wire, 50Hz from a star-connected source. The star point shall be earthed directly (TT earthing system).

Design and Construction

Cables up to 36kV shall be manufactured, tested and supplied in accordance with IEC 60502. Cables

Cable cores shall be stranded copper, Class 2 according to NF EN 60228, Conductors of Insulated Cables.
The outer thermo-plastic jacket shall be sunlight and ozone resistant outdoor grade and low smoke, halogen free.

Colours and Marking

Conductor:

Individual conductors shall be coloured and marked in accordance with Cenelec Harmonisation Document HD 308 $2 Identification of cores in cables and *flexible* cords.
Note that recent changes to the European wiring rules have resulted in the harmonisation of colours and alphanumeric marking across Europe.

Sheath:

The cable sheath of low voltage cables shall be coloured Black.
The cable sheath of high voltage cables shall be coloured Red.
Sheaths shall be marked every two (2) metres with:

- Manufacturer's name.
- Construction number.
- Cable voltage.
- PVC sheath quality.
- Cable type, cross section and formation.
- Fire resistance class as per Section 6.7.
- CEMarking.
- Metre marking, accuracy +/- 1%, on same side as other markings.

Voltage Designation:

Cables shall be voltage rated to Category B as defined in IEC 60502.

Low Voltage Power Cables

Low voltage cables shall be copper conductor, 0.6/1 kV, PVC (×LPE for 16mm2 and above), PVC sheathed.
The requirement for multi-core cables to be manufactured with an integral earth conductor shall be specified in the schedule.
Where cable screening is specified in the schedule, a copper tape screen shall be used. Single core conductors shall be individually screened. Multi-core conductors shall be overall screened.
Where cable armouring is specified in the schedule, galvanised steel wire armour shall be used. For single core cables the armour shall be of non-magnetic material.

14.01.07 Cabling and Earthing:

Earthing shall be carried out as per IS 3043 and its equivalent and Indian Electricity Rules. The Lift structures, motor, frames, metal cases and all electrical equipment including conduit, cable armouring and guards shall be properly bonded and earthed by two separate and distinct connection. The Elevator vendor shall provide 25 x 3 mm GI flat for control panel and 50 x 6 mm GI flat earth bus in the machine room and connect all earth points to the same. The earth bus will be connected to the station earth mat by the owner.

15.00.00 OTHER REQUIREMENTS:

15.00.01 Electric high speed door operators for the opening and closing of the car doors and landing doors shall be furnished and installed. The car and landing doors shall be mechanically connected and shall move simultaneously in opening and closing. The car door and landing door shall be power closed and shall be controlled in opening and closing by oil cushioning mechanism built into the gear unit. Necessary lockable switches shall be provided in the Lift machine room to control the operation of the door. Should the electric power fail, it must be possible for the doors to be manually opened from within the car.

15.00.02 Overload relays shall be provided to protect the drive motor against overload or a power failure. Suitable protection shall be provided on the controller to protect the Lift equipment from phase reversal, low voltage.

15.00.03 A complete set of special tools and tackles required shall be supplied along with Lift. Each tool and tackle shall be stamped so as to be identified easily for its use and size. Tools shall be supplied in a steel tool box. (The list of tools and tackles shall be furnished along with the offer).

15.00.04 Spares:

The vendor shall furnish the List of start up , mandatory and recommended spare parts and include separately in the offer with item wise price in the schedule of spare parts. Purchaser reserve the rights to finalise the quantities of spare parts and effect price adjustment on the basis of unit rates quoted. The spares ordered by the purchaser shall be delivered at site to suit the commissioning of the respective units. The vendor shall indicate in the schedule of spare parts the delivery period from the date of acceptance of the offer for the spares. The vendor shall also indicate in the schedule of spare parts, the details of fast, slow and medium moving spares.

The spares recommended above with unit prices shall be atleast for three years normal consumption for operation of the plant. The vendor shall also indicate the service expectancy for these spare parts under normal operating conditions before the replacement is necessary.

All the spares supplied under this contract shall be strictly interchangeable with the parts for which they are intended for replacement. The spares shall be treated and packed for long storage under the climatic conditions prevailing at site (e.g.) small items shall be packed in sealed transparent plastic bags with dissector packs as necessary. Each spare part shall clearly be marked or labelled on the outside of the packing in single case. The general description of the contents shall be shown on the outside of such cases. All cases, containers and other packages shall be marked suitably and numbered for the purpose of identification.

All cases, containers and other packages are liable to be opened for such examination as may be felt reasonable by the purchaser. The vendor shall bear in mind the shipment of the plant having ball or roller type bearings for which the following special provisions shall apply:

i) If temporary transit bearings are fitted to such plant, then, additionally, two complete sets of service bearings shall be included and shipped with such plant.

ii) If the item of the plant is shipped with service bearings in position, then additionally one complete set of service bearings shall be included and shipped with such plants. In either or both of the above provisions, the cost of the additional sets of bearings shall be included in the offer.

iii) If replacement of any bearing is required due to damages during shipment or other causes, the spare bearings shall be used to replace at free of charge.

The price of spares will have to be kept optional. As & when requirement arises the same will be utilised by BHEL.

16.00.00 Acceptance:

After erection, the performance of the Lift shall be tested for ascertaining the conformity with the specification and upon satisfactory completion of the tests, the Lift will be taken over. The responsibility for obtaining commissioning and handing over protocol signed by the customer lies with the Elevator vendor.

17.00.00 BHEL Inspection:

a. Vendor shall prepare Quality plan in the BHEL standard Quality Plan format (copy enclosed). Such a QP shall contain all the required quality checks right from the raw material stage through in process, Assembly, Testing & Final inspection. Reference can be drawn from earlier approved QP. The same shall be submitted to BHEL for review & approval for a fixed period of time.

b. For the required projects, such a BHEL approved QP shall be submitted by the vendor to BHEL after order placement for giving specific approval for the relevant project with due endorsement.

c. Such a QP shall form part of PO.

d. Elevators are subject to inspection by BHEL and inspection call shall be given 15 days in advance.

e. Vendor shall submit the routine & type test certificates along with inspection call.

f. The validity of type test certificates shall be not earlier than 5 years from the date of enquiry.

18.00.00 Documentation:

18.00.01 within 15 days from the date of LOI, all the final Drawings / documents specified in Clause 3.00.00 (03.00.01 to 03.00.11) shall be submitted.

18.00.02 No. Of copies of drawings and documents to be submitted after award of order shall be as follows.
(All Drawings & Documents shall be in English as well as in French.)

SL.NO	DESCRIPTIONS	NO.OF PRINTS	NO.OF CD ROMS
01.	Drawings for " Approval"	6	---
02.	Drawings for " information"	6	---
03.	Drawings " Final Drawings"	10	3
04.	Drawings " As Built "	10	3
05.	Data sheets & other type of documents	10	3
06.	Operation & Maintenance manual - " Draft "	2	---
07	Operation & Maintenance manual-"Final " (and in CD`S 2 copies).	6	3
08.	Test certificates / reports	3	---
09	Completion report	3	---

Vendor to fill all data in annexure & to submit with offer.

LOW VOLTAGE MOTORS

Document Category : C

Rev.	Date (dd/mmm/yyyy)	Author (Name)	Checked (Name)	Approved (Name)	Approved (Name)	Status
05	17/Mar/2008	Pankaj Hedaoo	Paul Manoun	Jude Adhibhan	K. Brown	Issued for Purchase
04	18/Oct/2007	Rajat K. Roy	Younes B. Arjmand	Jude Adhiban	K. Brown	Re-Issued for Implementation
03	13/July/2006	P. Shield	G. Bahuchet	H. Tendijowski	W. Yau	Re-Issued for Implementation
02	13/Jan/2006	L. Weber	G. Bahuchet	H. Tendijowski	W. Yau	Re-Issued for Implementation
01	13/Jan/2006	L. Weber	G. Bahuchet	H. Tendijowski	W. Yau	Re-issued for Approval
00	14/Dec/2005	L. Weber	G. Bahuchet	H. Tendijowski	W. Yau	Issued for Implementation
HT					Owner	

REVISION HISTORY

Rev No.	Revision Date	Revision Detail
05	10/Mar/2008	Issued for Purchase
		Section 6.2- Modified – Min size of motors for repair included.
		Section 6.3- Modified – Further details included .
		Section 6.4- Modified – Details modified as EFF1 is applicable only till 90kW ratings.
		Section 6.5.2- Modified– Starting Current requirements detailed further
		Section 6.5.3 - Modified – Locked rotor time requirements detailed further
		Section 6.5.4 - Modified – torque requirements detailed further
		Section 6.6- Modified – Details modified to accept G.S slide rails
		Section 6.8 - Modified – Material requirements detailed further to include Aluminium frame for smaller motors and GRP/ metal alloy fans
		Section 6.10- Modified – Requirements for Dust Hazard area motors added.
		Section 6.11- Modified – Requirements for bidirectional motors modified to reduce noise levels
		Section 6.12 - Modified– Noise level requirements detailed further
		Section 6.13.1 - Modified – Bearings requirements detaled further
		Section 6.13.2 - Modified – Drip Trays for grease collection deleted
		Section 6.14 - Modified– Requirements detailed further to alternately include reinforced winding insulation (Class F) as an alternative to Class H for VSDS driven motors.
		Section 6.16 - Modified– Fan requirements detailed further for larger frame size, two pole motors
		Section 6.19.1 - Modified – Requirements for Dust Hazard area motors added.
		Section 6.19.2 - Modified – Requirements detailed further
		Section 6.19.4 - Modified – Requirements detailed further
		Section 6.19.4.1 - Modified – Requirements detailed further
		Section 6.20 - Modified– Document numbers corrected.
		Section 6.21 - Modified– Requirements for Dust Hazard area

		motors added. Section 6.22- Modified – Requirements for vibration monitoring systems modified with respect to bearings lubricated for life. Section 6.23- Modified – Requirements for Dust Hazard area motors added. Section 8 - Modified – Combined testing of VSDS and Motor included. Section 9 Modified – Sea worthy packing included.

Table of Contents

1. Scope

This Specification describes the minimum requirements for the design, manufacture, supply and delivery of high efficiency, low voltage, three and single phase 50Hz electric motors, complete with all components and ancillary equipment, including all minor items not specifically referred to, but essential for the safe and satisfactory installation, testing, commissioning, operation and maintenance of the motors. The equipment is to be installed by others as part of the Koniambo Nickel Project in New Caledonia.

The scope of supply includes the size, type and quantity of motors listed in the Scope of Supply document: 319000-00000-SR-1691-0011. The schedule of equipment applicable to tender or contract including all required options is referenced in the Scope of Supply document and Low Voltage Motors and Variable Speed Drives Pricing Schedule document: 319000-00000-PS-1691-0001.

The supplier shall advise their capacity to provide service and support to the owner with regard to Installation, Commissioning, Training, Maintenance, Replacement and Repair.

This Specification applies to fixed, multi and variable speed low voltage motors of all frame sizes including motors which form part of packaged plant or equipment. Any exceptions in regard to specific motor sizes are noted in this Specification.

2. Standards and Codes

All equipment shall comply with the requirements of French and New Caledonian Codes and Standards as well as all laws and regulations of local authorities. Where other Codes and Standards are used, they shall also satisfy the French and New Caledonian requirements. In the event of conflicting requirements between Codes and Standards, the French and New Caledonian requirements shall apply.

Motors shall conform with:

NF EN 60034	Rotating electrical machines.
NF EN 60072	Dimensions and output series for rotating electrical machines.
NF EN 60079	Electrical apparatus for explosive gas atmospheres.

All information shall be based on International System (SI) unit of measure.

All equipment presenting a risk or leading to a risk regarding the safety of workers have to comply with French Standards, Codes and regulations. This is mandatory by the NC Deliberation No 51/CP dated 10 May 1989, which technical provisions refer to the European Directive 92/104/EEC.

The current edition of the French Codes shall be used for the design of all components of the project as stipulated by the New Caledonian law (Caledonian decree 1348 of 22 November 1985).

When a Notified Body is required to verify the conformity with the French codes (or IEC codes that have been adopted by the European Union), it shall be the Supplier's responsibility and shall be at Supplier's expense (except when otherwise specified).

The Notified Body that acts as a recognized third party, conversant with French and New Caledonian Codes, shall certify and stamp the certificate of conformity issued and signed by the Supplier or manufacturer.

3. Specification, Data Sheets and Project Documents

The equipment to be supplied shall comply with the latest revisions of the documents listed in the material requisition.

Precedence of documents shall be as following. Meanwhile, in case of conflict, the matter shall be raised for review:

- Equipment Data Sheets and Drawings
- Equipment Specification
- Standard Specifications

Any deviation to documents listed in the material requisition shall officially be forwarded for approval prior to work execution.

4. CE Marking

All equipment shall carry the CE Marking (European Conformity), as per the 'Council of the European Communities' Directive.

The Supplier is responsible for CE Marking conformity.

5. Operating Conditions

Details of the site operating conditions are contained in the Site Criteria document, 319000-00000-JSD-GENG-0001. Refer to Project Electrical Design Criteria document, 319000-00000-JSD-1600-0001, for electrical operating conditions.

6. Design and Construction

6.1 General

The equipment shall be designed and installed to operate continuously at full load for 24 hours per day, 7 days per week at the extremes of temperature, humidity and environmental conditions indicated. The equipment shall have a design life of 20 years without the need for an excessive maintenance regime.

Motors shall be designed for safety, corrosion resistance and ease of access to maintainable components.

Special motor operating conditions (if any) will be individually considered and specified in requirements for those motors. Such conditions include frequent starting, ambient temperature extremes and variable or multi-speed operation.

6.2 Minimum Size for Repair

The minimum motor size that can be repaired at the Supplier's (or supplier's authorised) ATEX certified workshop in New Caledonia. It is intended to replace rather than repair motors below the minimum size for repair. For the project this frame size is Frame 132. 05

6.3 Voltage Sizing

Motors voltages will be supplied as follows:

System	Nominal Service Voltage
Motors (DOL) = 355 & = 0.75 kW	690 V ± 10%, 3 Phase, 50 Hz, 3 Wire, impedance earthed
Motors (VSD driven) = 1000 & = 0.75 kW	690 V ± 10%, 3 Phase, 50 Hz, 3 Wire, impedance earthed
<0.75kW	230V± 10%, 1 phase, 50Hz, solidly earthed.
Service Power	400 / 230 V ± 10%, 3 Phase, 50 Hz, 4 Wire, solidly earthed

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6.4 Service Rating

Motors shall be of high efficiency, class EFF1 in accordance with EU/CEMEP, as applicable. 05

Motors shall be of Squirrel Cage type. Double cage rotors are unacceptable. The number of motor poles will be specified in the schedule.

Motors shall be designed for continuous running operation at rated power, duty service type S1. Performance and dimensions shall be in accordance with applicable Standards.

Motors shall be capable of withstanding voltage transients caused by switching with vacuum contactors.

6.5 Starting

6.5.1 General

All motors shall be designed and braced for direct on line (DOL) starting, for restarts with full opposite residual voltage under full load conditions.

At any value between 80% and 100% of rated voltage and without exceeding the designed temperature limitations motors shall, as a minimum be capable of the following starting sequence for the prospective equipment load:

- Three successive starts from maximum ambient temperature.
- Two successive starts with the motor already at full load working temperature.

The starting sequence shall be repeatable after a 30 minute cooling period at standstill.

6.5.2 Starting Current

Starting current shall not exceed seven (7) times full load rated current (FLC) for motors above 200kW - including IEC tolerance. For Motors upto & including 200kW, the starting current shall be seven times full load current exclusive of IEC tolerance. 05

6.5.3 Locked Rotor withstand time

Motors shall have a permissible locked rotor withstand time of not less than two seconds than the starting time of load (i.e time required by the driven equipment to come to full speed) from cold without exceeding the allowable temperature rise. Exact values for safe stall time from hot and cold shall be specified. 05

6.5.4 Torque

Motors shall be able to deliver sufficient torque so as to accelerate the load to full speed within the time specified for the application, without exceeding the designed tem perature limitations.

Motor torque characteristics shall comply with relevant Standards unless higher torque characteristics are specified.

6.6 Mounting

The motor mounting arrangement will be specified in the schedule.

Where specifically requested the Supplier shall supply slide rails consisting of two cast iron rails designed for floor mounting and complete with adjustment and holding down bolts. Galvanised steel slide rails can also be accepted.

6.7 Fasteners

Metric Standards shall apply.

All fasteners shall be stainless steel with hexagonal or socket heads. Bolts are to be used for fixing the terminal box to the motor.

6.8 Materials

Motor frames, end shields, terminal boxes are to be fabricated from cast iron. For aluminium frame motors, these shall be as per manufacturer's standard.

Motors below 0.75kW may have aluminium frame. Motor fans are to be fabricated from metal alloys/ glass reinforced polymers with a proven track record, and suitably certified for use in hazardous areas. Cast iron or steel can also be employed. Motors below the minimum motor size for repair may have non-metallic fans and sheet metal fan cowls.

Materials are to be selected which prevent / resist corrosion.

6.9 Frame

The stator lamination pack shall be secured in the frame. Castings shall be sound and free of shrink holes, cracks, scale or other defects. End shields shall bolt directly to the motor frame.

Motor frame including bearing supports shall have sufficient strength and rigidity to avoid distortion or increased vibration as a result of external mechanical forces.

Three phase motor frames shall be rationalised in accordance with Cenelec HD 231. Motor frames for motors with an output outside of that specified in HD 231 shall be optimised based on the applicable Standards and performance requirements.

6.10 Degree of Protection

Motors shall have a minimum Ingress Protection rating of IP55. For motors used in dust hazard area Zone 21, the IP class shall be IP65. Zone 22 area motors shall be min IP55.

Motors are to be fitted with a breathing vent at the bottom of each end. Motors shall be provided with drain holes, which shall be tapped and fitted with a porous drain plug. When drain plugs are not provided, motors shall be supplied with space heaters.

An approved sealing compound of non-setting material shall be used to weatherproof mating machined surfaces.

6.11 Rotation

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Preferred direction of rotation is clockwise from the drive end. Motors shall be suitable, without modification, for rotation in both directions. For Higher frame size motors (2 pde above Frame 355) may be unidirectional to reduce noise levels. The direction of rotation shall be selected in close consultation with driven equipment vendor.

6.12 Noise

05

The noise level of the motor is not to exceed 80 dB(A) at 1 metre plus IEC tolerance. This is also applicable for motors operating with variable speed drive system over the entire operating range. Silencers shall be used when the noise levels exceed the above specified limits.

6.13 Bearings and Lubrication

6.13.1 General

05

All machines shall be fitted with heavy duty bearings. All bearings shall be designed for an L10 life of 25000 to 50,000 hours.

Bearings shall be of Standard types enabling replacements to be readily available from recognised bearing manufacturers. Bearings shall be in metric sizes.

Bearings shall be selected to suit the motor load and operational requirements. Motor load requirements will be specified in the data sheet.

05

Motors of all sizes shall be equipped with metal caged rolling element bearings. Plastic cage bearings are not acceptable. Deep groove ball bearings are also acceptable.

Drive end bearings shall be designed for applications producing radial loading (e.g. VBelt drives). The drive end bearing on flange mounted motors will be to the Supplier's Standard arrangement provided that this design incorporates an oil seal and slinger.

Non drive end bearings shall be secured to the shaft by means of a nut, circlip or other approved means so that the motor can be loaded up to the full axial loading of the bearing.

Shaft end float shall be stated on the nameplate for all motors to enable a check to be made on the end float of the coupling to be supplied with the driven equipment.

All motors shall be fitted with bearing protection from induced currents in the form of a shaft earth or bearing insulation to protect against induced currents.

05

Insulated bearings maybe provided for motors driven by VSDS as per vendor's standard.

6.13.2 Requirements for 160 Frame Size And Above

Bearing lubrication system required. This shall comprise a full through flush regreasing facility incorporating a pressure relief value that allows the bearing to be purged whilst in operation with the old grease being automatically exhausted from the motor enclosure.

Adequately sized grease discharge ports shall be provided. The grease discharge port shall be located outside the area enclosed by the mounting flange. The fitting of grease relief holes alone is not acceptable. The removal of a exhaust plate/ plug when regreasing is not acceptable.

Each bearing shall be fitted with a V-ring or Labyrinth seal (depending on speed requirements) to prevent contamination through ingress of lubricants, moisture or fine dust. Seals are to be positioned so as not to be liable to mechanical damage.

Grease nipples shall be readily visible and accessible and shall be of 6mm button head type. For motors fitted with a stainless steel dust shield the grease points shall be extended through the dust shield to allow maintenance access. Captive dust caps shall be provided at all lubricating points.

Lubrication points shall be located on the top of the motor at the drive end and non drive end. These shall be positioned so that they are opposite the exhaust port on the grease relief valve. The Location of grease nipples shall be clearly shown in equipment maintenance manuals. 04

Oil lubricating systems will be considered where the grease limiting speed of the bearing is exceeded.

6.14 Windings and Insulation

Windings shall be of high quality copper alloy capable of withstanding 1.2 times the maximum rated speed undamaged.

Winding insulation shall be Class F with Class B temperature rise. Winding insulation of motors to be used with variable speed drives shall be Class H with Class B temperature rise.

Alternately, the class F winding insulation for motors, when proposed to be used with variable speed drives; shall be reinforced to withstand the output voltage of modern VSDS. The low voltage motor Supplier shall consult with the variable speed drive Supplier to ensure the motors and VSDS are compatible. 05

Tropic proofing shall be applied.

The windings shall have their six (6) leads accessible in the terminal box to allow star or delta coupling. Two speed motors shall have separate windings.

6.15 Temperature Sensors

Alarm and trip thermistors or RTD's shall be fitted as standard to all variable speed drive motors rated 55kW and above.

Temperature sensors are to be embedded in the hottest part of each winding.

Temperature sensor leads shall be colour coded and identified by the temperature rating. The Supplier shall specify alarm and trip temperatures for the temperature sensors.

6.16 Cooling

DOL motor enclosures shall be of the totally enclosed fan cooled type (TEFC) to IC411.

Variable speed drive motors shall be of the totally enclosed fan cooled type (TEFC) to IC411 or IC416 (where required).

Shaft driven and auxiliary cooling fans shall be of the bi-directional type and low noise. Motor fan cowl shall be designed so as not to allow insertion of a finger.

In order to reduce noise level on high RPM, higher kW rated motors, uni-directional fans maybe employed based on confirmation of direction of rotation from driven equipment manufacturer.

6.17 Anti-Condensation Heaters

230 VAC anti-condensation heaters shall be installed in all VSDS motor frames 55kW and above. Heater power terminals shall be brought out to a separate terminal box. The heater power supply will be RCD (30mA) protected at the supply point.

Anti-condensation heaters shall be arranged to provide uniform heating of stator and should maintain the temperature of the motor windings approximately 5°C above ambient temperature.

6.18 Dust Shields

As an option, motors with regreasable bearings may require a dust shield. These shields shall be 2mm thick stainless steel and wrap around the motor from one set of mounting feet to the other over the cooling fins. Terminal boxes, grease nipples, lifting lugs etc shall protrude through the dust shield.

6.19 Terminal Boxes

6.19.1 General

Terminal boxes shall be of cast iron and rated at IP55 for all IP55 motors. For IP65 Motors in Zone 21 areas, the terminal box shall also be IP65. 05

A separate terminal box is required for motor power and anti-condensation heaters for VSDS driven motors 55kW and above.

For motors fitted with thermistor/ RTDs a separate terminal box with an M20 entry is required for Thermistor/ RTD connections. 05

6.19.2 Location

Terminal boxes shall be located on top or on the right hand side of the motor when viewed from the drive end. 05

Top mounted Terminal box shall be rotatable.

6.19.3 Segregation and Terminals

Power terminal boxes shall be designed for air termination of copper conductors. There shall be adequate space in power terminal boxes to complete an air insulated termination of a three phase low voltage cable after glanding. Oversized terminal boxes shall be provided to accommodate larger cable sizes.

Power terminal boxes shall be equipped with six fixed stud type terminals to accommodate six winding ends. The studs shall be arranged so that the windings can be linked in either star or delta configuration. The links shall be provided by the Supplier.

Thermistors may share the power terminal box on approval, in such cases these shall be mounted on a separate terminal strip.

Terminal blocks, boards and / or bushings shall be of synthetic resin material, porcelain shall not be acceptable.

6.19.4 Gland Plate

Terminal boxes shall be fitted with a removable, metallic, non magnetic gland plate for cable entry to the cable box. Where Gland Plates are not provided, knock-outs for cable entry as specified on data sheets shall be provided. 05

Terminal boxes and gland plates shall be of adequate size to allow for glanding and air termination of the low voltage cables. Gland plates shall be to the ingress protection rating of the terminal box.

Cables shall be bottom entry.

The design intent is to ensure cables can be removed from the motor without damage to cables or flexible conduits.

6.19.4.1 Earthing

An M10 (or size equivalent to power cable) stainless steel bolted earth stud is to be located inside every terminal box complete with nuts and washers. 05

An additional M10 stainless steel bolted frame earth stud is to be located at the underside of the power terminal box complete with nuts and washers.

6.19.5 Covers

Stainless steel bolts, nuts and spring washers shall be fitted on all terminal box covers. Bolts shall be captive.

Terminal boxes shall be flanged, gasketted and bolted complete with appropriate seals to the specified ingress protection rating.

6.20 Nameplate, Labels and Signage

Nameplates, labels and signage shall be as per the specifications given in the project Equipment Nameplates document 319000-00000-SP-G349-0002. In addition, nameplates, labels and signage shall also comply with the requirements set out in the Electrical Installation docum ent 319000-00000-JSS-1601-0002. 05

6.21 Surface Preparation and Finish

The Supplier's Standard epoxy painting system shall be offered on the provision that it provides protection against all site conditions and complies with applicable standards; otherwise the painting shall be in accordance with the Protective Coatings document: 319000-00000-SP-2300-0001.

Parts of the motor normally shielded by the fan cover and the inside of the fan cover shall, with respect to corrosion protection, be treated in a similar manner as normally exposed parts.

The paint colour for motors shall be as follows:

Non-Hazardous Area Motors	Supplier Standard (Internal) / RAL 7001, Grey (External)
Hazardous Area Motors (Zone 1, Zone 21)	Supplier Standard (Internal) / RAL 5002, Blue (External) 05
Hazardous Area Motors (Zone 2, Zone 22)	Supplier Standard (Internal)/ RAL 1033, Golden Yellow (External)

The Supplier shall advise if there are any significant implications for using the nominated colours as opposed to the Supplier standard colours.

6.22 Vibration Monitoring

All motors with regreaseable bearings shall be equipped with at least one Shocked Pulse Measurement (SPM) transducer adaptor at the drive end and non drive end in an accessible position clear of the motor body to suit a bearing condition analyser.

These shall be positioned so as to detect any vibration on the motor frame

Additional SPM transducer adaptors may be specified for motors with special loading requirements. For motors greased for life, SPM nipples may not be provided 05

6.23 Hazardous Areas

The hazardous area classification of all motors shall be noted in the data sheet. Motors noted as located in a hazardous area shall be ATEX certified for the hazardous area classification (e.g. DIP (dust hazard), EExn, EExd or EExp). 05

6.24 Alternative Designs

Alternative designs may be offered for motors below the minimum size for repair, which may be replaced rather than repaired. Deviation to this Specification, if any, shall be submitted with the tender.

7. Drawings and Data Requirements

For a list of drawings and data to be supplied on this Material Requisition refer to document:

Scope of Supply 319000-00000-SR-1691-0011, Part 2

All preliminary documents for approval or review shall be in English. All final documentation shall be in French and English. Documentation issued during execution of the contract shall be issued in French or English as required by the Owner or Sub-Supplier.

All documentation shall be functionally grouped, bound, labelled and indexed for ease of reference. The Owner reserves the right to request additional documentation and changes to existing documentation where required.

8. Inspection and Testing

The Owner maintains the right to inspect the Supplier's facilities at any time during the execution of the contract. This is required in order to verify compliance with the schedule or to inspect the progress/ quality of the equipment being furnished.

The Low Voltage Motors Inspection and Test Plan document lists the generic inspections, tests and hold points to be complied with during the execution of the contract. These shall be incorporated into the Supplier's Fabrication and Quality Control Plan document.

The Owner will establish and advise the Supplier of the contractual hold points from the Supplier's Fabrication and Quality Control Plan document. Once established, the specific contractual hold points will be captured by the Owner in the Low Voltage Motors Inspection and Test Plan document.

The Motor and VSDS shall be tested together as a single unit. The Owner may witness such combined testing.

The Supplier shall advise the owner of an impending hold point via an Inspection Release Note as per the Scope of Supply document and shall not proceed past the hold point until a course of action is advised by the Owner.

All systems shall be tested before shipping and all shall be operating properly at the time of shipping.

The Supplier shall carry out routine tests on all motors. Copies of routine and type test certificates shall be provided in manuals. Routine tests shall include:

- Withstand Voltage Test.
- Winding Insulation Resistance Measurement.
- Winding Resistance Measurement (Ambient).
- Surge Comparison Test.
- No-load Losses and Current Tests.
- Locked Rotor Current Tests.

9. Packaging for Transport

Heavy duty plastic wrapping and sealing of entries with threaded plugs as a minimum. Exposed shafts shall be wrapped with a protective tape to prevent surface deterioration.

A shaft locking clamp to prevent drive end bearing damage by "Brinelling" during transport shall be fitted prior to shipment. A shaft key shall be supplied with the motor. Shaft locks shall prevent the longitudinal movement and the rotational movement of the rotor and shall be easily removable when the motor is installed. All motors fitted with a shaft lock shall have adequate warning notices displayed in a prominent position on the motor frame.

Motors shall be fitted with lifting lugs or eye bolts to the weight of the motor. Removal of the lifting facilities shall not compromise the degree of protection of the motor. All lifting points are to be clearly identified.

Sea worthy packing shall be employed when advised. 05

ANNEXURE-2 – ECI (SPECIFICATION FOR LV MOTORS)

BHEL -TIRUCHY
FBC&HRSG
ELECTRICALS, CONTROLS & INSTRUMENTATION

REF: FBC&HRSG: CI: 5312:LVM2
Rev:00 (2-Sheets)
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Motors shall conform to French Standards. High efficiency energy saving motors are required. All bolts and screws shall be corrosion resistant stainless steel. Only stainless steel shall be used for dust shields or shims etc.
Motors shall be suitable for exposed outdoor use to 40C ambient in a tropical environment that may be dusty, wet, corrosive and subject to spillage of nickel ore, rock, salt water spray, coal or corrosive fluids.
Motors shall preferably be 4-pole foot mounted. However motors of up to 8 poles may be used for Economic or maintenance reasons. Preferred direction of rotation is clockwise from the drive end.
Preferred location of the rotatable terminal box is RHS viewed from the drive end or else top mounted.
All motors shall be provided with stainless plates (in addition to the standard nameplate) engraved with the motor number. These plates shall be attached with stainless steel wire so that the plates can be transferred to replacement motors.
All motors shall be able to start and accelerate connected loads when the voltage at the point of load is 80% of the nominal voltage.

LV Motors

These shall be rated up to 355kW and up to 1000kW if equipped with VSD unit unless otherwise specified and shall be provided with the following features:

- Conform to the relevant standard including frame sizes.
- Cast iron frame, fan cooled.
- Squirrel cage motor, duty type S1 (continuous).
- 690V +10% -6% (steady state), -10% during the starting period of other motor, 3 phase 50 Hz with Variations as noted in clause 'frequency Variation".

The system frequency variations are as follows:

- Steady State 50 Hz ±2%. (1Hz)
- Short term (1 minute) limit 50 Hz ±4%.
- Brief emergency excursion limit (10 seconds) to 54Hz following a major load rejection or 47Hz following a major load application.
- Enclosed frame, IP55, TEFC.
- Stainless steel dust shield wrapped around motor body between mounting feet (option).
- Bi-directional cooling fan - low noise.
- Noise level below 80 dBA at 1m.
- Motor terminal box IP55, with removable nonmagnetic gland plate or cable entry, RHS viewed from drive end or on top.
- Earth stud in terminal box plus external frame earth stud beneath terminal box.
- Motor terminal box oversized to accommodate specific 3C+E cables or large single core cables per cable schedule.
- Winding insulation Class F, with Class B temperature rise as a minimum.
- Method of cooling IC411.
- Rated for 6 starts per hour as a minimum.
- Grease pressure relief anti friction bearings.
- Bearings chosen to suit load type.
- Bearing lubrication system required.
- Bearing current protection fitted (e.g. shaft earth or bearing insulation).
- 230 V AC heaters fitted 55kW and above (VSDs only).
- Thermistors fitted 55kW and above (VSDs only).

ANNEXURE-2 – ECI (SPECIFICATION FOR LV MOTORS)

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□ Separate junction boxes for power, heaters, and temperature sensors. □ Two pack epoxy paint colored as per section 11, Painting and Identification.
□ Tropic proofed.
□ Rationalized motor sizes to reduce spares.
□ Suitable for use with variable speed controllers or separately driven fan fitted.
□ Motors above 0.75kW to be 3 phase.
□ All bearing housings on motors with reasonable bearing shock pulse movement shall be equipped with SPM transducer adaptors in an accessible position clear of the motor body to suit a bearing condition analyser. Axial, vertical and horizontal SMP studs shall be fitted at DE and NDE.
□ Shipped bolted to a skid frame, wrapped in several layers of heavy duty plastic with shaft clamps fitted and all entries sealed by threaded plugs. Shaft keys shall be taped to the motor shaft.
□ Parallel type drive shafts shall be provided unless required otherwise by the drive application.
□ The sizes of single speed general-purpose three phase motors shall be rationalised in accordance with Cenelec HD 231.

Motor Numbering

In addition to the standard nameplate, all motors shall be provided with a blank 316 stainless steel plates for HT to add their motor number.

Variable Speed Drive Motors

Motors for variable speed drive applications shall be specifically chosen based on the duty and speed range provided on the motor data sheet.
Specific additional requirements for VSD motors are as follows:
□ Class H insulation with class B temperature rise preferred.
□ Bearing current protection fitted (e.g. shaft earth or bearing insulation).
□ Noise within specified limits over speed range specified.
□ Motor temperature sensors fitted (thermistors or RTD) for motors rated 55kW and above.
□ 230V AC heaters fitted for motors rated 55kW and above
□ Separately driven fan or larger frame size motor supplied if standard motor cannot meet service conditions (load and duty over speed range).

	Name	Signature	Date
Prepared	Nitin Menon		26.04.2008
Checked	A.Swaminathan		26.04.2008
Approved	R.J.Narayanan		26.04.2008

	Details
	T
TUV	Technischer Ueberwachungs Verein
	U
UPS	Un-interruptible Power Supply
UTE	Union Technique de l'Electricite
UV	Ultra Violet
	Y
YAT	Yard Acceptance Test

2.3 Codes and Standards

The equipment shall comply with the requirements of New Caledonian laws, regulations, codes and standards as well as French codes and standards (AFNOR – Association Française de Normalisation). Where other codes and standards are used, they shall be used in addition to the above. In the event of conflicting requirements between codes and standards used, the French and New Caledonia requirements shall apply.

Unless specifically stated otherwise, the design of all equipment will be based on the current standards and/or codes, as issued by the organisations listed below:

AFNOR	Association Française de Normalisation
CENELEC	Comité Européen de Normalisation Electrotechnique
IEC	International Electrotechnical Commission
ISO	International Organisation for Standardization

The codes, standards and recommended practices applicable to the Koniambo Project are the following:

2.3.1 IEC/ISO/AFNOR/CENELEC Codes

The following codes will be applicable to the Koniambo Project:

AFNOR	Association française de normalisation
NF C 15-100	Low–voltage electrical installations
NF EN 50394-1	Electrical apparatus for potentially explosive atmospheres - Group I - Intrinsically safe systems - Part 1: construction and testing
NF EN 50281-1 (IEC 61241 (Part 0)	Electrical apparatus for use in the presence of combustible dust - Part 1-1: electrical apparatus protected by enclosures - Construction, testing, selection, installation and maintenance.
NF EN 61241	Electrical apparatus for use in the presence of combustible dust - Part 1: protection by enclosures "tD"
NF EN 62262	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK codes)
NF EN 61152	Dimensions of metal-sheathed thermometer elements.
NF EN 60770 (Part 1)	Transmitters for use in industrial-process control systems.
NF EN 842	Safety of machinery. Visual danger signals. General requirements, design and
NF M61-002	Nuclear energy. Sealed radioactive sources. General and classification.
NF ISO 9978	Radiation protection, sealed radioactive sources, leakage test methods
NF EN 61511 (Parts 1, 2, 3)	Functional safety - Safety instrumented systems for the process industry sector - Part 1 : framework, definitions, system, hardware and software requirements
NF EN 60447	Basic and safety principles for man-machine interface, marking and identification - Actuating principles

NF H 95-103	Continuous mechanical handling equipment> Safety code for belt conveyors
NF EN 741	Continuous handling equipment and systems. Safety requirements for systems and their components for pneumatic handling of bulk materials.
NF EN 618	Continuous handling equipment and systems. Safety and EMC requirements for equipment mechanical handling of bulk materials except fixed belt conveyors.
NF EN 619	Continuous handling equipment and systems. Safety and EMC requirements for equipment mechanical handling of unit loads.
NF EN 620	Continuous handling equipment and systems. Safety and EMC requirements for fixed belt conveyors for bulk material.
NF EN ISO-5167	Measurement of Flow by Means of Pressure Differential Devices Inserted in Circular Cross-Section Conduits Running Full
NF EN ISO-6817	Measurement of Conductive Flow in Closed Conduits – Method Using Electromagnetic Flow Meters
IEC	International Electrotechnical Commission
IEC 60038	IEC Standard Voltage
IEC 60050-351	International Electro Technical Vocabulary
IEC 60204-1	Safety of Machines
IEC 60528	Expression of Performance of Air Quality Infra-red Analyzers
IEC 60529	Degrees of Protection provided by Enclosures (IP Code)
IEC 60534-4 Part 4	Industrial Process Control Valves. Inspection and Routing Testing
IEC 60534-8 Part 8	Noise Consideration
IEC 60746	Expression of performance of electrochemical analyzers
IEC 61000-3	Electromagnetic Compatibility (EMC). Part 3: Limits
IEC 61000-6-2	Electromagnetic compatibility - Part 6-2: Generic standards - Immunity for industrial
IEC 61000-6-4	Electromagnetic compatibility - Part 6-4: Generic standards - Emission standard for
IEC 60079-1	Electric Apparatus for Explosive Gas Atmosphere
IEC 61115	Expression of Performance of Sample Handling Systems for Process Analysers
IEC 61207	Expression of Performance of Gas Analysers
IEC 61285	Safety of Analyser Houses
IEC 61831	On-line Analyser systems – Guide to Design and Installation
IEC 61832	Analyser Systems – Guide to Technical Enquiry and Bid Evaluation
ISO 4126	Safety Valves and Bursting Disc Safety Devices
IEC 60584	Thermocouples
CENELEC	Comité Européen de Normalisation Electronique
ATEX 94/9/EC	The directive for devices and protection system designated for use in area subject to explosion hazard
EN50014	Electrical apparatus for potentially explosive atmospheres - General requirements
EN50016	Electrical apparatus for potentially explosive atmospheres - Pressurized apparatus "p"
EN50018	Electrical apparatus for potentially explosive atmospheres - Flameproof enclosure "d"
EN50019	Electrical apparatus for potentially explosive atmospheres - Increased safety "e"
EN50020	Electrical apparatus for potentially explosive atmospheres - Intrinsic safety "i"
EN50021	Specification for electrical apparatus with type of protection "n"
EN50028	Electrical apparatus for potentially explosive atmospheres - Encapsulation "m"

2.3.2 ANSI/ASME Codes

The following ANSI/ASME codes will be applicable to the Koniambo Project:

ANSI B 16.5	Pipe Flanges and Flanged Fittings
ANSI B16.10	Face to Face and End to End Dimensions of Valves
ANSI B16.34	Steel Valves
ANSI B16.36	Orifice Flanges
ANSI B16.47 – B	Large Diameter Steel Flanges
ANSI/FCI 70-2	Control Valve Seat Leakage
ASME I	Rules for Construction Power Boilers
ASME IV	Rules for Construction of Heating Boiler
ASME VIII, Division 1	Rules for Construction Pressure Vessels

2.3.3 API/ISA Codes (Recommendations)

The following API/ISA codes are recommended for the Koniambo Project:

API RP 520 (Part 1)Design	Sizing and Selection of Pressure Relieving Devices in Refineries
API RP 520 (Part 2) Installation	Installation of Pressure Relieving Devices in Refineries
API RP 521	Guide for Pressure Relieving and Depressurising Systems
API 526	Flanged Steel Safety Relief Valves
API 527	Seat Tightness of Safety Relief Valves
API RP 551	Process Measurement Instrumentation
API RP 555	Process Analysers
API 598	Valve Inspection and Testing.
ISA RP76.0.01-1998	Analyser System Inspection and Acceptance
ISA S 75.01	Flow Equations for Sizing Control Valves.
ISA S 75.19	Hydro Testing of Control Valves

2.3.4 Order of Precedence

In case of conflicts or discrepancies between any documents, the order of precedence shall be:

- Laws and regulations of local authorities and governmental bodies of New Caledonia.
- French Laws and regulations.
- European regulation and directives.
- This specification or Drawings
- Other Standard Project documents.
- Vendor Standards.

Supplier shall inform HT in writing of all instances of conflict and discrepancies and shall wait for HT's written approval before proceeding with the work.

These requirements do not relieve Supplier of his responsibility to perform all services in a safe manner and to supply a product capable of performing its intended service.