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SPECIFICATION FOR DIESEL FIRING SYSTEM SKIDS

PROJECT : KONIAMBO NICKEL PROJECT, NEW CALEDONIA
2X135 MW CFBC BOILER
l'Usine du Nord
Nouvelle-Calédonie

KONIAMBO HATCH Technip

Requisition Number:	319000-00420-PO-0150-0003
Purchase Order Number:	319000-00420-PO-0150-0003-0006
Equipment / Item Tag:	----
Equipment / Item Description:	**SPECIFICATION FOR DIESEL FIRING SYSTEM SKIDS**
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Comment given in this document does not relieve vendor of his/her responsibility for the correct engineering design and fabrication. This equipment or product shall be made as per the codes, requisition, specification, project procedures, and international standards.

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DIESEL FIRING SYSTEM SKIDS

1. AIM, RANGE OF VALIDITY

This Technical Specification defines the minimum requirements with respect to calculation, design, manufacture and performance of the specified supply and services. In case that information, data, etc given in this technical specification and the corresponding attachments should contradict, those definitions and data are valid which grant the higher standards or the better rights to the Orderer.

Deviations from this Technical Specification have to be announced to the Orderer by the Contractor/Bidder in writing.

The orderer reserves the right, to decide the version to be executed.

The Contractor/Bidder is free to propose alternatives to the specified supply and services. However the supply shall be as approved by Orderer.

2. BRIEF DESCRIPTION OF THE PROJECT

The plant is a 2 x 135 MW_e Circulating Fluidized Bed Combustion plant, producing 409.1 t/h each of superheated steam for production of electricity. This plant is located in New Caledonia, situated in the South Pacific Ocean, 1500 km east of Australia. New Caledonia is an overseas territory of France. Site has an design ambient temperature of 33.9° C.

The CFBC boilers are designed to burn coal.

The core of the plant is the combustor where the fuel is burned in a fluidized bed. The bed material is circulating, with solids constantly being carried out with the flue gas,

separated by cyclones and re-circulated to the combustor via seal pot. In order to control the temperature in the combustor a separate stream of bed material is directed to Fluidized Bed Heat Exchanger, cooled and re - circulated to the combustor.

3. TECHNICAL DESCRIPTION

Burners and lances are used for supplementary firing at times when heat input by main fuel is not in operation or not sufficient to maintain the necessary temperature and flow conditions in the combustor.

Fuel oil used for the Start-up Burner and Bed Lances is Diesel.

3.1. START – UP BURNERS

The start up burners are necessary for heating up to the bed material in the combustor until the ignition temperature for the lances or main fuel is reached They may also be used for supplementary firing. They can be employed separately as well as in combination with the lances

They are located in the lower part of the inclined walls of the combustor with both of them opposing each other.

Ignition of the start up burners is carried out by gas igniters with IFM and is checked by individual flame scanners with fail safe logic.

3.2. LANCES

The lances are necessary for further heating of the bed material in the circulating fluidized bed to reach the ignition temperature for coal firing. They are also employed for support firing during technical failures, e.g complete or partial outage of the coal supply. Six Lances are located in the inclined walls. Lances have neither ignition nor flame monitoring systems.

4. RULES, REGULATIONS, STANDARDS

Design shall comply with all the relevant French and New Caledonian statutory and regulatory requirements.

It is the Contractor's responsibility to observe and strictly comply with all relevant mandatory rules (laws, regulations, codes,) issued by international authorities as well as local authorities of the countries involved (country of Orderer, country of Contractor, Country of manufacturing, Country of installation)

In addition to any mandatory regulations the Contractor shall also comply with applicable standards, recommendations and guidelines of major organizations depicted in the Doc. Nos. 319000-00000-JSD-1500-0008/Rev05 and 319000-00000-JSD-1500-0009/Rev05 and the project specifications furnished.

- NFPA Standards (U.S) – National Fire Protection Association
- TRD rules
- Alphanumerical tagging system of plants and devices of the power plant according to our P&ID numbering.
- ISO 3740/3741/3743/3744: Acoustics – Determination of sound power levels of noise sources (using sound pressure)
- DIN – EN 267: Automatic forced draught burners for liquid fuels

Relevant / applicable clauses of the following shall also be complied with :

a) Diesel properties, Doc No. 319000-00000-NM-0002-0002/00 (Page-10)
b) Junction Boxes and Cable glands,
Doc No.319000-00000-JSS-1570-0101/0A (Pages 9/14-14/14)
c) Noise level criteria, Doc No. 319000-00000-SP-6000-0001/0A
d) Noise data, Doc No. 319000-00371-DS-4110-0002/00
e) Name Plates, Doc No.319000-00000-SP-G349-0002/00(Page nos. 3/5-5/5)
f) Painting, 319000-00420-A0106-015-0003-4101/0B (Page nos. 1/7, 4/7)
g) Packing material specn, Doc No. ISPM No-15
h) Packing procedure, Doc No. 319000-00000-WI-GPCO-0001/04
i) Documentation requirement, Doc No. 319000-00000-PP-GPES-0025/01
j) Spare parts requirement, Doc No. 319000-00000-PP-GPCO-0108/05

Contractor's responsibility includes especially, but is not limited to, all rules regarding health and safety, fire and explosion protection and environmental protection.

In the event of any conflict between two relevant rules or a relevant rule and the requirements stated in this specification, the more stringent requirement shall govern.

It is the Contractor's responsibility to obtain the latest, valid issue of each applicable rule. In the event of a dispute over any rule, the Contractor shall provide the Orderer with a copy of the respective rule.

Nothing in this specification shall be construed to relieve the Contractor of his responsibilities. If anything stated in this specification is in conflict with any applicable rule the Contractor shall point this out to the Orderer and ask for clarification.

SI units shall be used for technical data throughout all documents.

5. SCOPE OF SUPPLY

Each of the following scope of items shall be delivered as a skid units fully mounted, checked with functional and pressure tests and flushed. Each skid shall contain all the valves & accessories along with pipings & tubings, as per the respective P&ID. Tag Nos. shall be finalized during approval of the Skid GA drawings.

Skids shall be compact and equipment layout is so as to provide access to the valves and accessories.

The system specific tag numbers shown in the PIDs furnished shall be applied for identification and labeling of components throughout all documents.

5.1 TECHNICAL REQUIREMENTS

5.1.1 DESIGN

All valves, Instrumentation & Control equipment and piping within the valves or control valves and at the burners/lances respectively are to be done according to DIN. The following is to be considered at the battery limits.

- Scope of supply shall terminate with companion flanges, gaskets and suitable fasteners ; open ends are to be firmly capped.
- Flexible hoses with threaded companion connectors shall be supplied.

- Hoses with flanged connection, are to be delivered with counter flanges, gaskets and suitable fasteners.

All components and the corresponding supports are to be designed so that they withstand the following loads:

- Weight of the equipment including internal and external attachments.
- Forces due to thermal expansion and inner pressure
- Cyclic loads.
- Loads due to wind
- Combinations of loads

5.1.2 MATERIALS

- The use of grey cast iron is not allowed
- Minimum is GGG – 40 or high order materials
- Pipelines for instrument air are to be made from stainless steel
- The material that was allowed by the Orderer in case of assignment, is not allowed to be changed without permission by the Orderer. This also applies to the use of a higher grade.

5.1.3 VALVES

The choice of valves is done by manufacturer standard. All valves must comply with the applicable international standards.

5.1.4 ELECTRICAL, C&I EQUIPMENT

The requirements for all electrical equipment, like motors and I&C equipment, is described in the attached specifications.

5.1.5 PAINTING :

The requirements for Painting and Coating, including color code, shall be in line with the specifications and requirements furnished in the purchase enquiry

5.1.6 SPECIAL REQUIREMENTS :

a) **Commissioning Spares :**

List of commissioning spares and O & M spares with price break - up to be furnished in the offer itself.

b) **CE Marking :**

Equipment shall carry the CE mark to signify conformity to the European directives, as per the 'Council of the European Communities' Directive.

Supplier is responsible for conformity of the equipment to CE marking and the CE marking in the equipments/components supplied.

c) **PED Requirements :**

Fabrication/marking of skids/components shall meet the requirement of 97/23/EC Pressure Equipment Directive (PED).

d) **General Reference Subject of Directive, but not limited to :**

- 73/23/EEC and 93/68/EEC Low Voltage Equipment Directive and Amendment
- 89/336/EEC Electromagnetic Compatibility
- 94/9/EC Equipment and Protective Systems in Potentially Explosive Atmospheres
- 1999/5/EC Radio and Telecommunications Terminal Equipment
- 97/23/EC Pressure Equipment Directive (PED)
- 98/37/EC Machine Safety.

5.1.7 SERVICES

ENGINEERING

Included in the order are all necessary basic and detail engineering activities required for the design and manufacturing of the supplied equipment, including, but not limited to :

- Design calculations and preparation of data sheets
- Preparation of drawings (arrangement, sectionals, details, workshop drawings)

- Obtaining all necessary approvals and certificates from the authorities.
- Preparation of technical layouts and plans.
- Preparation of lists and schedules
- Preparation of documentation, descriptions and manuals.
- Further more included are all necessary consultation with the Orderer, his client or the client's consultants and authorities from start of contract till end of warranty period.

5.1.8. QUALITY MANAGEMENT, INSPECTIONS & TESTING

All necessary quality assurance measures, as described in section 6 of this specification, especially all necessary inspections and tests, as per section 6.3 of this specification, are included in the scope of services

5.1.9. PACKING & TRANSPORT

Packing and packing material shall be as per the specifications noted in the purchase enquiry. Skids and other loose items shall be transported suitably to New Caledonia Koniambo site. Reference shall also be made to section 8.0 of this specification

5.1.10 ERECTION & COMMISSIONING

Erection and Commissioning is not part of the scope of services, it will be carried out by a qualified contractor of the Orderer or his client. However:

The design and arrangement of components and equipment shall be done in such a way that the erection and commissioning can be done by third parties.

A detailed erection / commissioning manual of the complete scope has to be provided by the Subcontractor. This manual must be so detailed that the erection and commissioning can be evaluated by the contractor and be executed by third companies.

The manual has to consider the following main items:

- Data of scope of erection (components, dimensions, weights etc.)
- Description of all parts to be assembled and installed with reference to place and identification via labels and reference to drawings.
- All activities, their sequence and duration, with required man power, detailed assembling description for all components to be assembled at site.
- Auxiliary means for the erection, necessary devices and tools (lifting equipment, fixing tools etc), required machinery (welding machines etc), tools, test equipment, concept for crane and lifting devices

This information shall be based on drawings with additional text information and verbal descriptions. The complete handling of all parts delivered to site, the requirements as tolerances, site adjustment etc., shall be clearly stated.

Based on the erection and commissioning concept the subcontractor has to generate a time schedule showing all activities for preparing the workshop drawings, all main site activities, devices, shop works, applications, tests etc. In order to optimize the erection

activities, battery limits insulation works, steel works, duct works, e/c work etc. shall be considered. All links to other erection and commissioning activities, components shall be investigated.

5.1.11 The following items shall be provided as optional scope of services:

- Supervision of erection and commissioning, especially alignment and final checks.
- Training of operation and maintenance staff, according to the Contractors O&M manuals.
- Trouble shooting service personnel for support in case of problems (reaction time max 7 days from day of activation until arrival on site)

6. QUALITY MANAGEMENT

The Contractor has to execute a suitable Quality Management System according to the recommendations of DIN/ISO 9000. etc. This also applies for sub suppliers of the

Contractor. These have to present quality certificates for manufacturing and qualification of employees. Contractor and sub supplies are obliged to define quality management (QM) elements in a provable way.

As evidence serve beside the QM-Manual additional regulations for determining internal procedures and execution of quality issues. The Contractor has to make sure that for quality related activities only personnel with respective skills and experience are assigned.

The Contractor has to present to the Orderer on demand in which way the skills have been achieved and how these have been maintained.

The Orderer reserves the right to check the control activities or the respective documentation of executed activities specified in QM-Programs and for quality control plans of the Contractor. For this reason the Orderer is granted free access to workshops of the Contractor or sub suppliers of the Contractor during manufacturing and erection phases.

6.1. QUALITY SUPERVISION

The Contractor has to specify the volume of quality supervision in a quality control plan according to the master plan furnished.

The minimum requirements of the Orderer, specified in the master plan, have to be observed.

The Contractor has to inform the Orderer about deviations with respect to the manufacturing or erection documentation or about defective products and propose a procedure to make good these deviations or defective products.

In addition the Contractor has to mark the product as "defective" and stop further work at the product or it's use in further manufacturing and erection steps, until a decision about the further progressing has been made.

If a deficiency can be cured by corrective works, the Contractor is responsible for the identification, the execution, supervision and documentation of the correction works.

If the product can't be cured by corrective works, the Orderer has to be informed by the Contractor by a deficiency report and to be involved into the decision of further progressing.

The Contractor presents the quality control plans for all relevant components with the agreement of the Orderer. This Quality Control Plan defines the volume of quality

checks during manufacturing and erection (general qualification certificates of workshop, checks on received material, welding supervision, quality documentation packing, transport)

If no standard quality control plan has been provided by the Orderer, the Contractor has to present a quality plan (taking into account the attached master plan) at least four weeks before start of manufacturing or two weeks after receiving the order from the Orderer.

The Contractor informs the Orderer in due time about quality inspection dates which allow the Orderer to participate in these inspections. The presence and participation of the Orderer during the inspections does not reduce the Contractor's responsibility and contractual obligations.

The Quality Documentation has to be delivered by the Contractor in accordance with the demands of the attached list "Contractor Documentation".

6.2. QUALITY GUARANTEES

Tests and inspections do not release the manufacturer from his responsibility with regard to warranties and guarantee obligations and with regard to compliance with other provisions.

The basis for the implementation is the drawings approved by the Orderer.

The Orderer or its representative and the Principal reserve the right to monitor the work at any time and to check the technical implementation

Compliance with deadlines must not be affected by tests.

The Contractor must request decisions that are reserved by the Orderer or its representatives in good time so that difficulties or delays in the implementation of the work do not occur

The offer or order price must contain all costs for material, work and construction samples, in so far as tests and sampling are prescribed and carried out. The Orderer shall be responsible for the personal expenses of test engineers from the Orderer / Principal (or their representatives) for the tests and inspections in the Contractor's workshops or on the site. The delivery price must contain the personal expenses for all other test engineers.

6.3. INSPECTIONS & TESTS

Test procedures according to :

- Test plan
- Drawings, documentation, engineering approved by the Orderer
- Relevant rules, standards and guidelines as per section 4

7. TECHNICAL DOCUMENTATION

The technical documentation has to be delivered in accordance with the requirements indicated but not limited to this.

Prior to the start of manufacturing / erecting the workshop drawings / erection drawings or other engineering documents shall be submitted to the Orderer in due time in copies for approval. All the relevant information are to be furnished in the drawings/documents.

It has to be considered that the approval procedure will take at least ten working days.

The Ordered reserves the right to reject improper design and / or request parts from other vendors, provided this will not result in additional costs above a reasonable extent.

Document approval by the Ordered does not release the Contractor from his responsibility of providing a technical design of the deliveries that is in accordance with the contractual stipulations, appropriate for the requirements and free from deficiencies.

8. PACKING AND TRANSPORTATION

Unless stated otherwise in the commercial contract conditions the following requirements apply to packing and transportation:

- All assemblies and loose equipment shall be transported to the installation site.
- The Subcontractor is obliged to preassemble as much of his deliveries in the workshops as possible with respect to shipping dimensions
- All loose sensitive equipment (such as drives, electrical equipment, etc.) have to be protected against damage, vibration, rain, dirt and corrosion, and will be shrink packed on palettes or in containers.
- Smaller loose equipment (fittings, valves, etc) as well as field instruments will be shipped in separate wooden boxes or container boxes.
- Shipping shall only be carried out upon the Borderer's notification and approval.
- Each piece shall be clearly marked and identified. Codes shall also be marked on part list and erection drawing.
- Special requirements apply in case of sea transport.

In addition to these general requirements the shipping instructions, related specifications noted, shall be adhered to.

9. TECHNICAL GUARANTEES

The contractual penalties, guarantee period and the liability for any errors and the resultant costs that arise from this are stipulated on the order form.

The manufacturer shall be responsible for the quality of the work that he carries out. He guarantees that his scope of supplies is correct and complete. The work is carried out in accordance with the state of the art.

The manufacturer shall eliminate defects and faults detected by the Orderer or the authorized expert at no cost to the Principal. After remedy of defects the manufacturer undertakes to notify the Principal for the purpose of a renewed inspection. If defects are detected and complained about they must be eliminated in accordance with the documents appropriate to the contract. Faults and defects that are found shall be eliminated within the contractually agreed delivery period.

In the event of any damage the Contractor must provide proof of the correctness of the material selection, engineering, erection description and other relevant specifications.

Furthermore, the manufacturer guarantees for compliance with the following:

- Construction of the burner system according to relevant standards
- Technical performance data
- Compensation of fluctuations of the heating values within ±10%
- Consumption values for miscellaneous atomizing air and steam amounts
- Pressures drop
- Arbitrary regulation of the Start-up Burners and Lances within the indicated performance range.
- Ignition tests possible during coal firing

10. LIST OF ATTACHMENTS BY CONTRACTOR (but not limited to this list) :

Sl. No.	TITLE	DOCUMENT NO.	ISSUE	REV.	REMARKS
01	Layout/GA drawings				
02	Bill of Material				
03	Contractor Documentation				
04	Quality Inspection Plan				
05	Requirements for Electrical Equipment				
06	Painting and Coating				
07	Ref. Standards & Codes				To be furnished/quoted.

LIGHT OIL SUCTION STRAINER

(SIMPLEX TYPE)

1. **BINDING DOCUMENTS:**

   This specification shall form part of the purchase order and to be fully complied with.

2. **NOMINAL SIZE, STYLE etc.** :

   For strainer size, nozzle orientation style etc., refer to the item description in the *Purchase Enquiry.*

3. **FLOW DATA, MATERIALS, CODES & STANDARDS, DIMENSIONS AND PAINTING:**

   Shall fully comply with the details provided in sheet 02/02 of this specification and Data sheet. Nozzles and Covers shall be as per ANSI B16.5, 150# rating. **Unless specified in the *Purchase enquiry*, paint shall be Epoxy Blue over Red Primer on outside surfaces and Epoxy white over Red Primer on inside surfaces.**

4. **DRAWING APPROVAL:**

   a) Basket assembly drawing along with full dimensional & constructional details shall be got approved by purchaser before manufacture. **Free flow area of Filter Mesh shall be > 35% OR 6 times the inlet nozzle area (whichever is more) and Free flow are of Support-sheet shall be > 60%**

   b) For all other details, sheet 02/02 of this specification shall only be binding and no vendor's drawing will be reviewed or approved by the purchaser.

5. **MARKING:**

   Stainless steel nameplates with following boldly engraved shall be firmly fixed to the body :

   Maker's name & production serial number; Service; BHEL material code; Type, size, pressure rating and Degree of filtration; Vendor's drawing number for Basket assembly.

6. **PACKING**

   a) Inlet and outlet nozzles to be properly capped to prevent ingress of water and dust.

   b) Packing shall be in wooden grate with struts and packing materials and with water proof under covers.

7. **INSPECTION & TEST CERTIFICATES:**

   a) Check for Body size and all the dimensions of t, D1, D2, L, H1, H2 & F, foot, flange & cover, Basket free flow area, stub sizes, nozzles and heights etc., with reference to sheet 02/02 of this specification.

   b) Check locations of nozzles, stubs and foot; squareness and orientation (bolt holes) of nozzles & flanges.

   c) Verification of shop records for material and stage inspections.

   d) Visual inspection of weld quality and workmanship.

   e) Witnessing & verifying hydraulic testing.

   f) Verify for name plate details.

8. **INWARD INSPECTION:**

   Verify works inspection reports, workmanship, finish and selective dimensions; also watch for damages.

9. **Along with the quotation submit following documents in full for Technical Evaluation:**

   a) Basket assy. drawing as referred under sl. no 4(a) above

   b) Point to point confirmation to this specification.

   c) Details of manufacturing & inspection facilities available with the vendor

   d) Reference list.

PREPARED	CHECKED	APPROVED	DATE

FBC & HRSG / FUEL FIRING

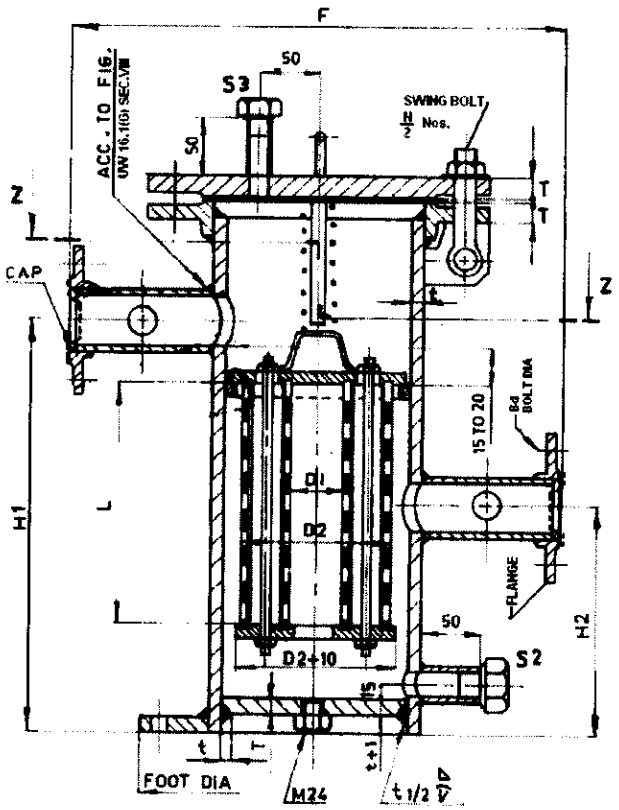
TECHNICAL SPECIFICATION

LIGHT OIL SUCTION STRAINER

(SIMPLEX TYPE)

FBH:42-010:STNR-LS/00

Sh 02/02



NOTES :

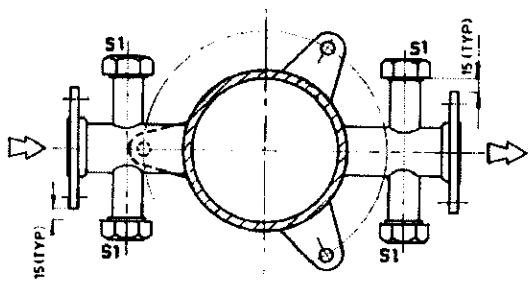
1. DESIGN & FABRICATION TO ASME SEC. VIII & IX
2. MATERIALS OF CONSTRUCTION :

FILTER MESH	:	AISI 316
SUPPORT SHEET	:	AISI 316
NOZZLES & PIPES	:	SA210Gr.A1/SA106GrB
FLANGES&COVERS	:	SA181GR1/SA105
PLATES & SHEETS	:	SA299/SA515Gr.70
SPRING	:	SPRING STEEL EN42
BOLTS & NUTS	:	SA193Gr.B7 & SA194Gr.2H (GALVANISED)
GASKETS	:	REINFORCED CAF / METALLIC

3. THICKNESS "T" : AS PER ANSI B16.5 ; 150#
4. BOLT HOLE Ø "Bd" : AS PER ANSI B16.5 ; 150#
5. THICKNESS " t " : AS PER PIPE SCHEDULE

STRAINER DATA

1	VISCOSITY	:	~15 cst
2	SP. GRAVITY	:	~ 0.85
3	FILTERATION	:	250 μ
4	ΔP CLEAN BASKET	:	0.10 kg/cm^2
5	ΔP 50% CLOGGED	:	0.15 kg/cm^2
6	DESIGN PRESSURE	:	6 kg/cm^2
7	TEST PRESSURE	:	10 kg/cm^2
8	STUBS - S1 & S2	:	OD 21.3 WITH M12 PLUG



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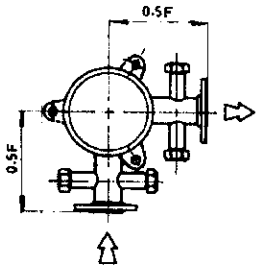

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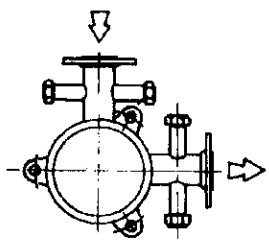

VIEW-ZZ
STYLE-C

OVERALL DIMENSIONS

SIZE NB	FLOW LPM (max)	BODY SIZE	BASKET			NOZZLE			FLANGE					FOOT		
			D1	D2	L	H1	H2	F	OD	T	PCD	N	Bd	DIA	PCD	d
40	80	6" SCH40	60	120	200	400	200	400	127	9.5	98.4	4	15.9	280	250	14
50	130	6" SCH40	60	120	300	500	200	400	152	11.1	120.7	4	19.1	280	250	14
80	285	12" SCH20	120	240	300	500	250	800	191	12.7	152.4	4	19.1	450	420	18
100	500	12" SCH20	120	240	400	600	250	800	229	12.7	190.5	8	19.1	450	420	18
150	1120	18" SCH20	180	360	400	600	300	1000	279	14.3	241.3	8	22.2	580	550	18
200	2000	18" SCH20	180	360	600	800	300	1000	343	14.3	298.5	8	22.2	580	550	18

PREPARED	CHECKED	APPROVED	DATE

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SPECIFICATION FOR DIESEL SCREW PUMP

PROJECT : KONIAMBO NICKEL PROJECT, NEW CALEDONIA
2X135 MW CFBC BOILER
l'Usine du Nord
Nouvelle-Calédonie

KONIAMBO HATCH Technip

Requisition Number:	319000-00420-PO-0150-0003
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Rev	Date DD-MMM-YYYY	Written By (name)	Check By (name)	Approved By (name)	Status
0B	23-12-2008	P.AYYAKKANNU	T.KALIRAMAKRISHNAN	V.DHANDAYUTHAM	
0A	25-09-2008	P.AYYAKKANNU	T.KALIRAMAKRISHNAN	V.DHANDAYUTHAM	

1.0 Flow data:

1.1 Fluid handled – Diesel as per Document No. 319000-00000-NM-0002-0002 Rev. 01.

1.2 Capacity 375 LPM with suction pressure of 25 kpa(ab) and 2600 kpa (ab) as delivery pressure.

1.3 RPM – 2920, direction of rotation - clockwise as seen from motor end.

2.0 Pump construction / technical requirement:

2.1 Horizontal foot mounted, carbon steel body.

2.2 Horizontal axial thru suction nozzle arranged at the end cover, vertical top delivery nozzle.

2.3 Suction nozzle 4" flange drilled to ANSI 150 # and delivery nozzle flange 3" drilled to ANSI 300 #.

2.4 Triple screw type, hydraulically balanced to eliminate end thrust, pulsation free discharge and low noise level.

2.5 Rotor shaft and idlers of nitrided steel, insert and bearing bushes of aluminium alloy, welded steel body.

2.6 Cartridge type elements for ease of maintenance and replacement.

2.7 All materials and construction shall be suitable for specified pumping temperature and to meet all performance needs.

2.8 Single acting mechanical seals.

2.9 External mounted adequately sized bearing , life lubricated.

2.10 Built-in Safety Relief valve of full capacity – spring adjustable over a range of ± 50% of the specified discharge pressure – over pressure within 10% of set value for relieving pump's maximum capacity shall be mounted on left side of the pump body as seen from motor end.

2.11 Two horizontal 50 mm long 1" SCH.40 pipe stub with taper plug, one on suction side and another on the discharge side of the body, for pressure gauges.

2.12 Adequately sized pin type flexible coupling of three-piece construction, flender N-Eupex series – B or equivalent, two half pieces of the coupling shall be supplied mounted on the pump shaft and other single piece half supplied loosely in rough bore condition.

2.13 Noise level shall be less than 80 dBA.

3.0 Marking:

3.1 Stainless steel name plate with following information boldly engraved , shall be firmly fixed to the body. Name plate shall be as per Document No. 319000-00000-SP-G349-0002Rev00.

3.2 Each spare shall be individually tagged with part name, maker's name, spare code & BHEL material code and/or as per the instructions provided along with the Purchase Enquiry.

4.0 PAINTING :

4.1 Painting shall be done in accordance with the Doc. No. 319000-00420-A0106-015-0003-4101/0C.

5.0 Packing:

5.1 Packing and packing material shall be as per ISPM No.15.

And reference shall be made to Document No. 319000-00000-WI-GPCO-0004Rev01 for packing.

5.2 Liberal packing material & struts be used to arrest rolling and to prevent from transit damage.

6.0 Documents required with offer:

6.1 Refer Document No. 319000-00000-PP-GPES-0025 Rev02 and Document No. 319000-00000-SP-GPES-0002 Rev01 for document requirements.

6.2 Pump designation with description of the designated codes, catalogues, O & M manuals etc.,

6.3 Completely filled in data sheet.

6.4 Curves for Pressure Vs flow and BHP, speed Vs torque, Pr Vs Volumetric efficiency & total efficiency.

6.5 NPSH requirements of the pump.

6.6 Relief valve capacity curve as plotted against set pressure and over pressure.

6.7 Gd^2 value of the pump and the coupling.

6.8 Dimensional drawings of the pump, coupling and seal.

6.9 Make, size and type number of bearing, seal and coupling.

6.10 Cross-sectional drawings of the pump, relief valve, seal and coupling with parts identification and material specification.

6.11 Weight of all components.

6.12 Lubricant grade, quantity per fill and frequency of filling for the bearings.

6.13 Spares requirement for 2 years operation, spares identification drg., clear description, part number etc.,

6.14 Test certificates and characteristics curve as called under motor specification.

7.0 CE MARKING & PED 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:

73/23/EEC and 93/68/EEC Low Voltage Equipment Directive and Amendment

89/336/EEC Electromagnetic Compatibility

94/9/EC Equipment and Protective Systems in Potentially Explosive Atmospheres

1999/5/EC Radio and Telecommunications Terminal Equipment

97/23/EC Pressure Equipment Directive (PED)

98/37/EC Machine Safety

The Supplier is responsible for CE Marking and PED conformity.

8.0 TEST CERTIFICATES :

Following work TCs shall be submitted along with the supplies.

7.1 Performance test on each pump and spare cartridge assy. on standard oil over the entire operating range, with the curves extrapolated for the specified oil.

7.2 Body hydraulic test certificate done at 1.5 times the cold working pressure.

7.3 Material certificate for body, inner casing (insert), screws and spindles.

7.4 As inspected data on hardware and clearances between screws and inner casing.

7.5 Dimensional certificate for overall dimensions and all terminal connections.

8.0 O & M MANUAL:

Minimum of 2 sets of O&M manual in hard copy and 2 sets of soft copy shall be furnished within one month from the date of Purchase Order. ***Documents shall be furnished both in ENGLISH and FRENCH languages.***

9.0 Guarantee :

9.1 The equipment shall be guaranteed for replacement of any defective component.

9.2 The performance guarantee shall be for a period of 18 months from the date of commissioning.

10.0 INSPECTION & TESTING:

All the equipments / components / assy. etc., shall be inspected by purchaser. Supplier shall furnish quality plan, inspection plan, painting procedure, packing procedure and all drawings for BHEL approval before manufacturing. All drawings shall be submitted in ISO standard size only. Third Party inspection applicable.

Vendor Document No.	HT Document Number:	Rev	Page no.
FBC&HRSG:FF:5312:SP:DLP	319000-00420-B1203-0150-0003-0153	0A	6 of 6

DIESEL SCREW PUMP DATA SHEET

(Left out data shall be filled-in by supplier.)

A. PERFORMANCE DATA		F. MECHANICAL SEAL	
1. Oil grade	DIESEL	1. Action	Single / Double
2. Oil pour point °C		2. Make	
3. Density @15°C	820 - 870	3. Model No. & Size	
4. Flow temp. °C	33.9	4. 'O' ring spring material	
5. Oil viscosity cSt min/max	2 – 4.5	5. Rotary ring material	
6. Capacity at min. cSt	850 kg/h	6. Stationary ring material	
7. Capacity at max. cSt	850 kg/h	7. Suction pressure max.	kg/cm²(g)
8. Suction pr. kg/cm²(g)	Flooded suction		
9. Delivery pr. kg/cm²(g)	8	G. SAFETY RELIEF VALVE - INTEGRAL	
10. NPSH reqd. mmWC@max cSt		1. Make	
11. RPM		2. Model No. & size	
12. Direction of rotation	CW seen from drive end	3. Set pressure	5 kg/cm²(g) above delivery pressure
13. BHP at min. cSt	kW	4. Over pressure	
14. BHP at max. cSt	kW	5. Spring adjust range	kg/cm²(g) to kg/cm²(g)
15. Pump efficiency	% @ min. cSt	6. Capacity	
B. PERFORMANCE GRAPHS		7. Relief outlet	Internal
1. Pressure Vs Flow & BHP		8. Relief outlet connection	inch, 300lbs flanged
2. cSt Vs NPSH required		9. Hand wheel	
3. Speed Vs Torque			
4. Pressure Vs Volumetric η		H. STEAM JACKET – Not required	
5. Pressure Vs Total η		1. Style	-
C. PUMP CONSTRUCTION DETAILS		2. Pressure - Design/Test	-
1. Mounting	Horizontal, Foot	3. Connection In / Out	-
2. Pitch & Rotor dia.	mm mm		
3. Pump Gd² kg/cm²		I. Drive motor	
4. Nozzle inlet	4" ANSI 150lbs flanged.	1. Make / frame size	
5. Nozzle outlet	3" ANSI 300lbs flanged.	2. kW, V, Phase & Hz	
6. Inlet nozzle position	Horizontal	3. Dimensional drg.	
7. Outlet nozzle position	Vertical	4. Data sheet reference	
8. Body & cover material			
9. Insert material		J. PERFORMANCE TEST GUARENTEE	
10. Rotor shaft material & BHN		1. As per VDMA 24284 Group-II	
11. Idler material & BHN			
12. Bearing bush material		K. TEST CERTIFICATES & INSPECTION	
13. Base frame material		1. Body Hydro test	
14. Body design / test pressure	30 kg/cm²g 45 kg/cm²g	2. Relief valve over pressure test	
15. Noise Level	< 80 dBA	3. Performance test on each cartridge	
D. BEARINGS		4. Third party inspection	
1. Type and Number off		L. O&M REF. DOCUMENTS	
2. Position	External	1. Pump designation sheet	
3. ISO No. & clearance		2. Performance graphs as per Sec.B	
4. Lubricant Grade		3. Dimensional drawings	
5. Lubricant Qty.& filling frqn.		i. Pump	
		ii. Cartridge	
E. COUPLING (3 piece, Pin-Push)		iii. Relief valve	
1. Make		iv. Coupling	
2. Model no. & size			
3. Gd² kg / cm²			
4. Double piece side	Side fitted on to pump shaft in flush	4. Sectional drg. with spares identification. i) Pump body ii) Cartridge iii) Relief vlv. iv) Coup.	
5. Single piece	To fit on motor shaft in rough bore condition	5. O&M instructions i. Pump ii. Coupling iii. Seal	
6. Coupling guard		6. Copies of manual -6 hard+2soft	
M. Marking, Painting , Packing and Special Requirement		As per specification	

LOW VOLTAGE MOTORS

Document Category : C

05	17/Mar/2008	Pankaj Hedaoo	Paul Hanoun	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
Rev.	Date (dd/mmm/yyyy)	Author (Name)	Checked (Name)	Approved (Name)	Approved (Name)	Status
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 detailed 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.

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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. 03

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

6.4 Service Rating

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

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.

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.

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. 05

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. 05

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 05

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 05

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

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

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

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.

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. V-Belt 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.

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.

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.

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 document 319000-00000-JSS-1601-0002. 09

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) 09
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 09

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). 09

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. 05

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. 09

ANNEXURE-2 – ECI (SPECIFICATION FOR LV MOTORS)

BHEL -TIRUCHY
FBC&HRSG
ELECTRICALS, CONTROLS & INSTRUMENTATION

REF: FBC&HRSG: CI: 5312:LVM2
Rev:00 (2-Sheets)

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)

BHEL -TIRUCHY
FBC&HRSG
ELECTRICALS, CONTROLS & INSTRUMENTATION

REF: FBC&HRSG: CI: 5312:LVM2
Rev:00 (2-Sheets)
PAGE02 OF02

□ 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

KONAMBO NICKEL PROJECT (CUST No. 5312, 5313)

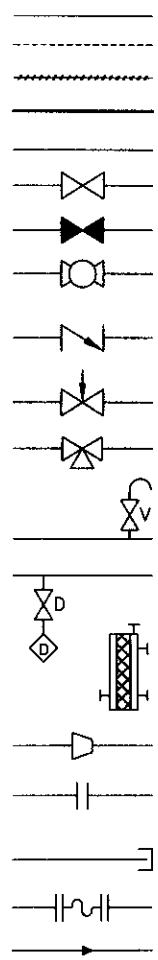
DIESEL FIRING SYSTEM

FBC&HRSG:FF:5312:LEG/00

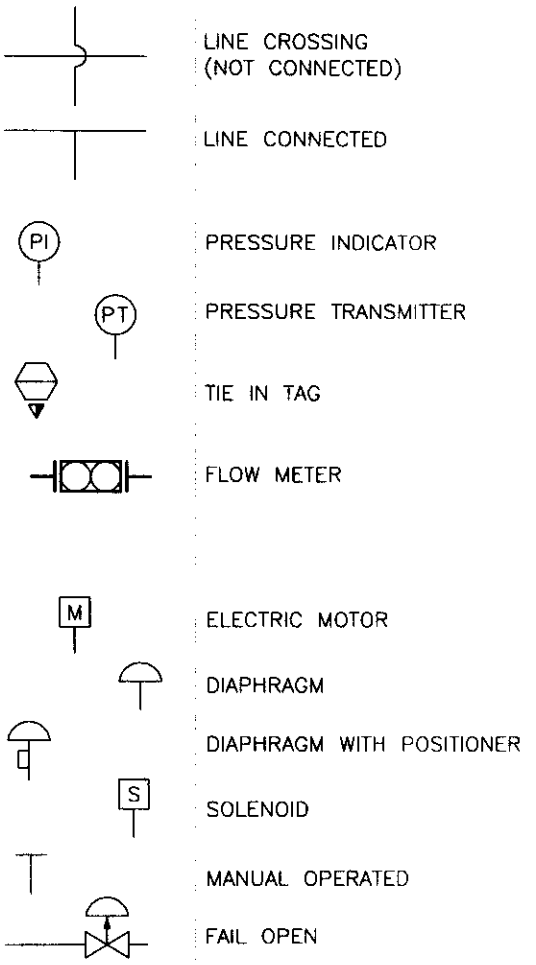
PARAMETERS

P	=	PRESSURE
T	=	TEMPERATURE
F	=	FLOW
DP	=	DIFFERENTIAL PRESSURE

SYMBOLS



INSTRUMENT LINE
ELECTRICAL SIGNAL
PNEUMATIC SIGNAL
MAJOR PROCESS LINE
SECONDARY PROCESS LINE
OPEN GATE VALVE
CLOSED GATE VALVE
OPEN BALL VALVE
CHECK VALVE
OPEN REGULATING VALVE
THREE WAY VALVE
VENT TO ATMOSPHERE
DRAIN TO COLLECTION NETWORK
STRAINER
CONCENTRIC REDUCER
FLANGED CONNECTION
BLIND FLANGE
FLEXIBLE HOSE
FLOW DIRECTION



LINE CROSSING (NOT CONNECTED)
LINE CONNECTED
PRESSURE INDICATOR
PRESSURE TRANSMITTER
TIE IN TAG
FLOW METER
ELECTRIC MOTOR
DIAPHRAGM
DIAPHRAGM WITH POSITIONER
SOLENOID
MANUAL OPERATED
FAIL OPEN

KONAMBO NICKEL PROJECT (CUST No. 5312, 5313)

DIESEL FIRING SYSTEM

PID No. FBC&HRSG:FF:5312:DOP/0A

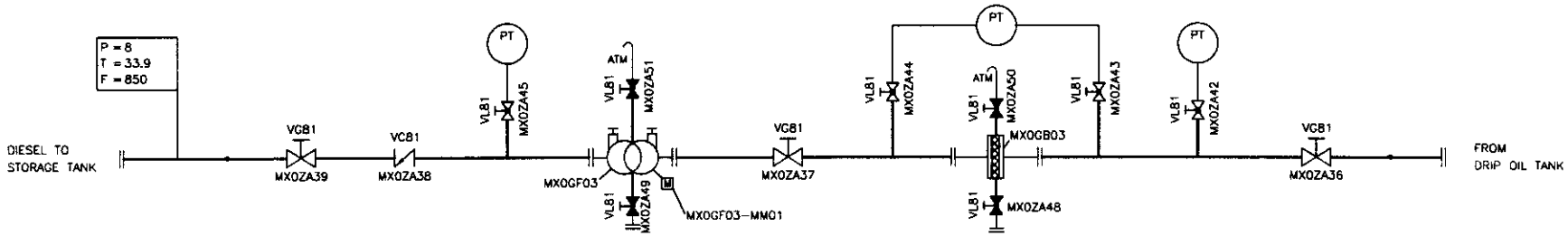
DRIP OIL PUMPING UNIT

NOTES:

01. PI & PT ARE NOT IN SUPPLIER'S SCOPE. SUPPLIER TO TERMINATE AT THE OUTLET OF INSTRUMENT ROOT VALVES.

02. TAG Nos. OF VALVES & EQUIPEMENT SHOWN ARE FOR ONE SKID ONLY. FOR OTHER SKIDS TAG Nos. SHALL BE AS PROVIDED BY THE ORDERER.

03. ALL THE DRAINS AND VENTS TO BE CONNECTED TO A COMMON OUTLET.



The CHAZOP shall be conducted after:

- The associated process has undergone a SIL study (where applicable).
- HAZOP have been completed.
- The associated control system functional specifications are complete.

4. Standards and Statutory Requirements

4.1 General

Unless noted otherwise, the publications as shown below form part of this Design Criteria. Each publication shall be the latest revision and/or addendum in effect of issue of this job specification unless indicated otherwise.

All applicable codes and standards are to be approved by a third party.

The following precedence shall be applied to design standards:

- 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.

4.2 Codes and Standards

All instrument and control, associated electrical components and materials shall comply in design, manufacture, testing and performance, with the current issue of all relevant French and local standards, French and local codes, French and local regulations and French and local directives having jurisdiction over plant manufacture, installation and operation in New Caledonia. Any deviation should be review and approved by HT prior to start any work.

The following table lists the minimum relevant mandatory codes:

Authority Name & Relevant Codes	Descriptions
AFNOR	Association française de normalisation
NF C 15-100	Low-voltage electrical installations
NF EN 61131-2	Programmable Controllers – Equipment requirements and test
C12-101	Statutory regulations for the protection of workers in premises which make use of electric currents.
C12-330	Statutory regulations for the protection of workers in mines and quarries which make use of electric currents.
NF X 44 052	Installations classées pour la protection de l'environnement.
X 43 310	Qualité de l'air - Emissions de sources fixes – Evaluation des caractéristiques des chaînes automatiques de mesurage du dioxyde de souffre sur site.
X 43-300	Qualité de l'air - Emissions de sources fixes – Echantillonnage de gaz en continu par méthode extractive.
X 43-301	Qualité de l'air - Emissions de sources fixes – Détermination d'un indice relatif aux composés organiques en phase gazeuse – Méthode par ionisation de flamme.

2 - 1

Authority Name & Relevant Codes	Descriptions
IEC	International Electrotechnical Commission
IEC 60079	Electrical apparatus for explosive gas atmosphere
IEC 60204 – 1	Safety of Machinery
IEC 60331	Fire resisting characteristics of electric cables
IEC 60332	Test on electric cables under fire condition
IEC 60364	Electrical installation of buildings
IEC 60529	Degree of protection provided by enclosures (IP code)
IEC 60848	Preparation of Function charts for Control Systems
IEC 60050-351	International electrotechnical vocabulary. Chapter 351 Automatic control
IEC 61000	Electromagnetic compatibility
IEC 61000-6-2	Electromagnetic compatibility - Part 6-2: Generic standards - Immunity for industrial environments
IEC 61000-6-4	Electromagnetic compatibility - Part 6-4: Generic standards - Emission standard for industrial environments
IEC 61010	Safety requirements for electrical equipment for measurement, Control and laboratory use.
IEC 62305	Protection Against Lightning
IEC 61285	Industrial process control – Safety of analyser houses
IEC 61508	Functional safety : safety of electrical/electronic/programmable electronic safety related systems
IEC 60617	Graphic symbols for diagrams
IEC 60751	Industrial platinum resistance thermometer sensors
IEC 60584	Thermocouples
IEC 61131	Programmable controllers
IEC 60848	Grafcet Specification
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"

4.3 International Standards Recommendations

International codes and standards may be used, provided that all equipment supplied conforms to the current issue of the relevant New Caledonian codes and standards.

Authority Name & Relevant Codes	Description
ISO	International Standards Organisation
ISO 5167	Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full - Part 1: general principles and requirements
ISO 7194	Measurement of fluid flow in closed conduits. Velocity-area methods of flow measurement in swirling or asymmetric flow conditions in circular ducts by means of current-meters or pilot static tubes.
ISO 6817	Measurement of conductive liquid flow in closed conduits -- Method using electromagnetic flowmeters
ISO 13849	Safety of machinery - Safety-related parts of control systems - Part 2 : validation
ISO 5048	Continuous mechanical handling equipment - Belt conveyors with carrying idlers - Calculation of operating power and tensile forces

Authority Name & Relevant Codes	Description
AFNOR	Association Française de Normalisation
NF C32	Insulated cables and flexible cords for ins tallations.
NF A91-701	Surface treatment. Identification of workshop tanks, piping and equipment. Safety marking.
NF EN 50091	Uninterruptible power systems (UPS)
NF EN 50262	Metric cable glands for electrical installations
NF EN 50394-1	Electrical apparatus for potentially explosive atmospheres - Group I - Intrinsically safe systems - Part 1: construction and testing
NF EN 60204	Safety of machinery - Electrical equipment of machines - Part 1 : general requirements
NF EN 60751	Industrial platinum resistance thermometer sensors.
NF EN 61000-6	Electromagnetic compatibility (EMC).
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 61666	Industrial systems, installations and equipment and industrial products. Identification of terminals within a system.
NF EN 62262	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK codes)
NF M87-202	Petroleum industry. Instrumentation cables. Specifications.
NF EN 50112	Measurement, control, regulation. Electrical temperature sensors. Metal protecting tubes for tc assemblies.
NF EN 50113	Measurement, control, regulation. Electrical temperature sensors. Isolating tubes for thermocouples.
NF EN 60793	Optical fibres - Part 1-1 : measurement methods and test procedures - General and guidance
NF EN 60794	Optical fibre cables - Part 1-1 : generic specification - General
NF EN 61935 (Part 1)	Generic cabling systems - Specification for the testing of balanced communication cabling in accordance with EN 50173 - Part 1 : installed cabling
NF EN 60244 (Part 1)	Methods of measurement for radio transmitters - Part 1 : general characteristics for broadcast transmitters
NF EN 50173 (Part 1)	Information technology - Generic cabling systems - Part 1 : general requirements and office areas
NF EN 50174 (Parts 1, 2, 3)	Information technology - Cabling installation - Part 1 : specification and quality assurance
NF EN 50346	Information technology - Cabling installation - Testing of installed cabling
NF EN 60966 (Part 2)	Radio-frequency cables - Part 2 : sectional specification for semi-rigid radio-frequency and coaxial cables with polytetrafluoroethylene (PTFE) insulation
NF EN 61152	Dimensions of metal-sheathed thermometer elements.
NF EN 60654 (Parts 1, 3, 4)	Operating conditions for industrial-process measurement and control equipment.
NF EN 61298 (Part 1)	Process measurement and control devices. General methods and procedures for evaluating performance.
NF C46-101	Industrial-process measurement and control. Analogue D.C. current signals.
NF EN 61115	Expression of performance of sample handling systems for process analyzers.
NF EN 61207 (Part 1)	Expression of performance of gas analyzers.
NF EN 60770 (Part 1)	Transmitters for us e in industrial-process control systems.
NF EN 60534 (Parts 2-1, 2-5, 5)	Industrial-process control valves.
NF EN 61158 (Part 2)	Digital data communication for measurement and control - Fieldbus for use in industrial control systems
NF EN 61069 (Part 1)	Industrial-process measurement and control. Evaluation of system properties for the purpose of system assessment.
NF ISO 8573 (Part 1)	Compressed air - Part 1 : contaminants and purity classes

Authority Name & Relevant Codes	Description
NF EN 298	Automatic gas burner control systems for gas burners and gas burning appliances with or without fans
IEC 7731 / NF EN ISO 7731	Ergonomics danger signals for public and works areas – Auditory danger signals.
NF EN 842	Safety of machinery. Visual danger signals. General requirements, design and testing.
NF M61-002 and -003	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 EN 61496	Safety of machinery
NF H 95-103	Code de sécurité des transporteurs à courroie - Exemples de protecteurs aux ponts d'enroulement
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.
IEC	International Electrotechnical Commission
IEC 60050 - 121	International Electrotechnical Vocabulary - Electromagnetism
IEC 60050 - 131	International Electrotechnical Vocabulary - Circuit Theory
IEC 60050 - 141	International Electrotechnical Vocabulary - Polyphase systems and circuits
IEC 60050 - 151	International Electrotechnical Vocabulary - Electrical and magnetic devices
IEC 60027	Letter symbols for use in electrical technology.
IEC 60617-DB-12M	Graphical symbols for diagrams.
IEC 60757-Ed. 1.0	Code for designation of colours
IEC 61557 (part 1)	Electrical safety in low voltage distribution systems up to 1 kV A.C. and 1.5 kV D.C. Equipment for testing, measuring or monitoring of protective measures. Part 1: general requirements.
IEC 304	Colour Code for Optical Fibres
ISO/IEC 11801 - Ed. 2.0 - English	Information technology - Generic cabling for customer premises
IEC 62061	Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems.
ISA	The Instrumentation, Systems and Automation Society
ISA S5.1	Instrument symbols and identification
ISA S5.3	Graphic symbols for distributed control/shared displayed instrumentation logic and computer system
ISA S5.4	Instrument loop diagrams
ISA S7.0.01	Quality standard for instrument air
ISA S18.1	Annunciator sequences and specification (R1992)
ISA S75-01	Flow equation for sizing control valves (R1995)
ISA S75-02	Control valve capacity test procedures
ISA S75-03	Face to face dimensions for integral flanged globe style control valves bodies
ISA S75-04	Face to face dimensions for flangeless control valves
ISA S75.12	Face to face dimensions for socket weld-end and screwed-end globe-style control valves
ISA S75.15	Face to face dimensions for buttweld-end globe-style control valves
ISA S75.16	Face to face dimensions for flanged globe style control valves bodies
ISA S75-19	Hydraulic testing of control valves

Authority Name & Relevant Codes	Description
ANSI	American National Standards Institute
ANSI B 16.1	Cast Iron pipe flanges and flanged fittings
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	Valves-flanged, threaded and welding end
FCI	Fluid Controls Institute Inc.
FCI 70-2	Control valve seat leakage
ASME	American Society Of Mechanical Engineers
ASME –Section VIII, Div1 part UG 125 through136 - Div2 part AR	Unfired pressure vessel - Pressure relief devices
ASME –Section I,	Rules for construction power boilers.
ASME, section IX	Boiler and pressure vessel code - Welding & Brazing qualification
API	American Petroleum Institute (where applicable)
UTE	Union Technique de l'Electricite
UTE C18-510	Collection of general provisions for electrical safety.
UTE C18-530	Collection of electrical safety requirements for authorized personnel non-electrician worker (B0, H0), electrical executant (b1, h1), maintenance supervisor (BR).
UTE C18-540	Collection of general provisions for electrical safety
UTE C91-005	Electromagnetic compatibility (EMC). Part 5: installation and mitigation guidelines.
UTE C46-302	Industrial-process measurement and control. Acceptance tests for absolute pressure, relative pressure, and differential pressure transmitters.
EU	European Union Regulations
	(where applicable)
NFPA	National Fire Protection Authority
	(where applicable)

Where the above codes and standards are used, the design shall still comply with all laws or regulations of local authorities.

4.4 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

	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	Seal 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.

5. Diesel (Fuel Oil)

The following table summarises the fuel oil properties:

Table 5-1: Diesel Properties (Ref. 11)

Test	Unit	Limit
Density @ 15°C (NF EN ISO 3675 : 1998)/ (NF EN ISO 12185 : 1996+ Cor1 : 2001)*	kg/m³	820 ~ 870
Distillation (NF EN ISO 3405: 2000) % (v/v) Recovered at 250°C 95% (v/v) recovered	 % °C	 65 360
Viscosity @ 40°C (NF EN ISO 3104:1996)	mm²/s	2.0 ~ 4..5
Sulphur content *(NF EN ISO 20846: 2004)/ (NF EN ISO 20884:2004)	mg/kg	50
Water content (NF EN ISO 12937: 2001)*	mg/kg	500 maximum
Total Contamination (NF EN ISO 12662: 1998)*	mg/kg	24 maximum
Ash Content (NF EN ISO 6245:2002)*	m/m	0.01% maximum
Cetane Index (NF EN ISO 4264:1997)		46 minimum
Carbon Residue (NF EN ISO 10370: 1995)*	m/m	0.3% maximum
Copper Corrosion (NF EN ISO 2160:1998)*	-	1
Oxidation stability (NF EN ISO 12205:1996)*	g/m³	25 maximum
Flash Point	°C	55
Lubricity wear scar diameter (NF EN ISO 12156-1:2000)	mm	0.46 maximum
Cloud Point (NF EN ISO 23015:1994)*	°C	12 maximum
Filtratability Temperature Limit (NF EN ISO 116: 1998)*	°C	12 maximum
Hydrocarbon Aromatic Polycyclic (NF EN ISO 12916:2000)*		11%
Typical Energy	MJ / kg MJ / L	45.6 38.0
Conductivity @ 20°C (NF EN ISO 3170: 2004)	pS/m	150 minimum

6.2 Junction Boxes

6.2.1 General Requirement for Junction Boxes

6.2.1.1 Cable Entries and Glands

All cable entries for main run cables shall be located at the bottom and individual secondary cables (M20 or M16 to be confirmed according to the selected cable gland supplier) located at bottom of the junction boxes also.

Cable entry diameter for multi-conductors or multi-pairs will be specified according to the cable supplier specification.

Gland plate shall be pre-drilled by the supplier with clearance holes, suitably size for cable glands. All holes shall be installed with temporary plastic plugs to prevent unwanted material or insects entering the box before installation.

6.2.1.2 Wire Termination

All junction boxes shall be provided with sufficient space inside to ensure ease of termination.

Terminals shall be compression clamp type terminal blocks c/w terminal markers 1 to n on both ends, DIN rail mounted, suitable for maximum 2.5mm² stranded wire, with wire markers (both sides), end section and end stop.

All terminals shall be grey in color except for IS circuits, which shall be blue.

All terminals shall be mounted vertically on one or two rails as specified on the junction box schedule with the specified quantities of terminals. The terminal blocks shall be provided with complete lengths of cross-connections links (equivalent to the numbers of terminals) and screws for cable screens link where indicated.

6.2.1.3 Combined Drain & Breather

Combined drain & breather size shall be 20mm ISO, fitted with entry thread seal (nylon o-ring) to comply with IP65 and supplied with compatible locknut located at the bottom of the junction box.

6.2.1.4 Junction Box Construction

Junction box material shall be stainless steel 316L SS and fitted with 316SS hinges, lockable door, and have a minimum Ingress Protection of IP65.
Junction box shall be supplied complete with terminal blocks, cross-connection links, mounting rails, end/stop plate, mounting plate, mounting bracket, earth stud, 316SS drain & breather and drawing pocket mounted inside the enclosure.

Non metallic junction boxes can be accepted in some particular areas on HT approval.

Junction box shall be suitable for wall mounting. All mounting hardware such as brackets nuts, screws shall be 316SS and rails shall be zinc bichromate plated steel or stainless steel.

Junction box design shall incorporate a rain channel to prevent rainwater collecting against the door seals. Door and gland plates shall be fitted with oil resistant neoprene gasket.

Junction box shall be provided with identification nameplate on the front of junction box. Material shall be laminated triplex plastic. Nameplates shall be generally black on white, white on red for fire & gas, and white on blue for IS circuits. The identification plate shall be attached permanently to the junction box in such a manner that the junction box certification will not be invalidated. Character height shall be 25mm. Minimum plate dimension shall be 150mm W X 40mm H.

All I.S. junction boxes shall have an additional label with white characters of 6mm height on blue background mounting on the door bearing the following statement:

IMPORTANT

ONLY INTRINSICALLY SAFE

CIRCUITS TO BE CONNECTED

WITHIN THIS BOX

ATTENTION

LES CIRCUITS DE SECURITE INTRINSEQUE

UNIQUEMENT PEUVENT ETRE CONNECTES

DANS CETTE BOITE.

Where certification is required, the certification provided by the supplier shall cover the complete junction box, terminal blocks, combined breather and drain, earth stud and gland plates.

6.2.2 Junction Box Dimensions

Junction box dimensions shown are proposed only. Where dimensions offered are different from the table below, supplier shall indicate appropriate dimensions to accommodate the terminals and also sufficient space inside to ensure ease of termination.

JB TYPE	PROPOSED DIMENSION	NO OF COLUMN X TERMINALS	TERM. COLOUR	CERT	CROSS-CONNECTION LINK REQUIRED
JB-01	200mmH x 200mmW x 180mmD	1 X 15	GREY		YES
JB-02	200mmH x 200mmW x 180mmD	1 X 20	GREY		YES
JB-03	200mmH x 300mmW x 180mmD	2 X 15	GREY		YES
JB-04	300mmH x 300mmW x 200mmD	2 X 20	GREY		YES
JB-05	300mmH x 400mmW x 200mmD	2 X 30	GREY		YES
JB-06	400mmH x 400mmW x 200mmD	2 X 40	GREY		YES
JB-07	400mmH x 400mmW x 200mmD	2 X 45	GREY		YES
JB-08	500mmH x 400mmW x 200mmD	2 X 60	GREY		YES
JB-11	200mmH x 200mmW x 180mmD	1 X 15	GREY	EEx'e'	YES
JB-12	200mmH x 200mmW x 180mmD	1 X 20	GREY	EEx'e'	YES
JB-13	200mmH x 300mmW x 180mmD	2 X 15	GREY	EEx'e'	YES
JB-14	300mmH x 300mmW x 200mmD	2 X 20	GREY	EEx'e'	YES
JB-15	300mmH x 400mmW x 200mmD	2 X 30	GREY	EEx'e'	YES
JB-16	400mmH x 400mmW x 200mmD	2 X 40	GREY	EEx'e'	YES
JB-17	400mmH x 400mmW x 200mmD	2 X 45	GREY	EEx'e'	YES
JB-18	500mmH x 400mmW x 200mmD	2 X 60	GREY	EEx'e'	YES
JB-21	200mmH x 200mmW x 180mmD	1 X 15	BLUE	EEx'e'	YES
JB-22	200mmH x 200mmW x 180mmD	1 X 20	BLUE	EEx'e'	YES
JB-23	200mmH x 300mmW x 180mmD	2 X 15	BLUE	EEx'e'	YES
JB-24	300mmH x 300mmW x 200mmD	2 X 20	BLUE	EEx'e'	YES
JB-25	300mmH x 400mmW x 200mmD	2 X 30	BLUE	EEx'e'	YES
JB-26	400mmH x 400mmW x 200mmD	2 X 40	BLUE	EEx'e'	YES
JB-27	400mmH x 400mmW x 200mmD	2 X 45	BLUE	EEx'e'	YES
JB-28	500mmH x 400mmW x 200mmD	2 X 60	BLUE	EEx'e'	YES
JB-41	200mmH x 200mmW x 180mmD	1 X 10	GREY		NO
JB-42	200mmH x 200mmW x 180mmD	1 X 20	GREY		NO
JB-43	200mmH x 300mmW x 180mmD	2 X 15	GREY		NO
JB-44	300mmH x 300mmW x 200mmD	2 X 20	GREY		NO
JB-41	200mmH x 200mmW x 180mmD	1 X 10	GREY	EEx'e'	NO
JB-42	200mmH x 200mmW x 180mmD	1 X 20	GREY	EEx'e'	NO
JB-43	200mmH x 300mmW x 180mmD	2 X 15	GREY	EEx'e'	NO
JB-44	300mmH x 300mmW x 200mmD	2 X 20	GREY	EEx'e'	NO

6.2.3 Marking

Each Junction Boxes shall be provided with a permanently attached stainless steel plate with the following data:

Manufacturer name.

Type or model number

Serial number.

Electrical classification – certification number

Degree of mechanical protection

Protection index

CE Marking.

6.3 Cable Glands and Accessories

6.3.1 Cable Glands for Junction Boxes

Cable glands shall be nickel-plated brass material, suitable for unarmoured cable with metric ISO thread form and fitted with, preferably compatible integral entry thread seal o-ring or seal washer to comply with minimum IP 65 rating. Certification shall be EEx 'e' where required.

Cable glands shall have thermoplastic elastomer seals for sheathing which will not damage cables that have "cold flow" characteristics. Minimum operating temperature shall be in the range of –20°C to 70°C.

The following table shows the type of cable gland sizes with the acceptable dimensions to be confirmed according to the chosen supplier:

ACCEPTABLE CABLE DIMENSIONS FOR CABLE GLAND			
Type	**Entry Thread Size**	**Outer Sheath Diameter (mm)**	**Hazardous Certification**
M 16	16mm ISO	5.5 – 9.5	General Purpose
M 20	20mm ISO	8.5 – 13.0	General Purpose
M 25	25mm ISO	12.0 – 17.0	General Purpose
M 32	32mm ISO	15.0 – 22.0	General Purpose
M 40	40mm ISO	19.5 – 28.0	General Purpose
M 50	50mm ISO	25.5 – 36.0	General Purpose
M 63	63mm ISO	33.0 – 46.0	General Purpose
M 16	16mm ISO	6.0 – 11.0	EEx 'e'
M 20	20mm ISO	8.5 – 13.0	EEx 'e'
M 25	25mm ISO	13.5 – 18.0	EEx 'e'
M 32	32mm ISO	17.5 – 25.0	EEx 'e'
M 40	40mm ISO	24.5 – 33.5	EEx 'e'
M 50	50mm ISO	33.0 – 43.0	EEx 'e'
M 63	63mm ISO	45.5 – 55.0	EEx 'e'

6.3.2 Cable Cable Glands for EEx 'd' Junction Boxes or Instruments

Cable glands shall be nickel plated brass material, suitable for unarmoured cable with metric ISO thread form and fitted with, preferable compatibly integral entry thread seal o-ring or seal washer to comply with enclosure IP rating and suitable for EEx'd' enclosures.

6.3.3 Locknuts

Locknuts are used for fastening cable glands to the gland plates. Locknuts shall be nickel plated brass material, and compatible with cable glands supplied.

Type	Thread Size
M 16	16mm ISO
M 20	20mm ISO
M 25	25mm ISO
M 32	32mm ISO
M 40	40mm ISO
M 50	50mm ISO
M 63	63mm ISO

6.3.4 Blank Plugs c/w Locknut and Washer

Blank plugs are for spare cable entries in junction boxes. Blank plugs shall be nickel plated brass or polyamide material, fitted with integral entry thread seal o-ring to comply with IP65 and supplied with compatible nickel plated brass or polyamide material Locknut. Certification shall be EEx 'e' or EEx 'd' where required.

Type	Thread Size	Hazardous Certification
M 16	16 mm ISO	General Purpose, EEx 'e' or EEx 'd'
M 20	20mm ISO	General Purpose, EEx 'e' or EEx 'd'
M 25	25mm ISO	General Purpose, EEx 'e' or EEx 'd'
M 32	32mm ISO	General Purpose, EEx 'e' or EEx 'd'
M 40	40mm ISO	General Purpose, EEx 'e' or EEx 'd'
M 50	50mm ISO	General Purpose, EEx 'e' or EEx 'd'
M 63	63mm ISO	General Purpose, EEx 'e' or EEx 'd'

6.3.5 Markings

All cable glands shall be stamped with type and size of glands, type and size of entry thread and the relevant approval details.

7. Materials

All junction boxes and cable glands herein shall be new and unused, of current manufacture, of the highest grade and free from all defects and imperfections affecting performance.

8. Quality Control Plan

The General QA/QC requirement is attached to the Requisition and defines the minimum requirements to be adhered to by the Supplier.

The Supplier shall carry out standard manufacturing testing in addition to those mentioned in Inspection and Test Plan (ITP) attached in the Requisition

The Supplier shall allow HT's Representative all reasonable access to his manufacturing facility for the purpose of assessing and reporting on the quality and progress of the work. The Supplier shall also impose a similar condition on all sub-vendors.

In addition to the required "Test and Inspection Documents" the Supplier shall supply a certificate stating that the junction boxes and cable glands comply in all respects with this Specification, Requisition and Purchase Order, including the test requirements as per order.

9. Packing, Marking and Shipment

The supplier shall follow the "Packing, Marking and Shipping Instruction" (PMS) attached to the Purchase Order.

All necessary precautions shall be taken for adequate protection of the junction boxes and cable glands during shipment and storage at their destination.

Sound Level Specification: Equipment

CATEGORY: C

Note: This document was previously Sound Level Specification: Equipment (319000-00000-SP-B349-0002 rev.0C) now superseded by 319000-00000-SP-6000-0001 rev.0A.

0A	08/APR/2008	T.KELSALL	S.PASQUIER	J.ADHIBAN	K.BROWN	Issue for Review
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1. Application

This sound level specification applies to all equipment within the package including any motors or drives supplied by others. Where no motor from an approved supplier will allow the noise requirement to be met, the project team shall be informed and an alternate motor or other solution recommended. Unless otherwise indicated, the more restrictive of the provisions in this document or in the noise data sheets shall apply.

The following tests and the project noise requirements require acoustical expertise to understand and to carry out. The supplier shall ensure that qualified personnel, for example, an acoustical consultant with experience in industrial noise, assemble this information.

2. Definitions

Acoustics terminology shall be defined according to either ISO 25417:2007 or ANSI S1.1-1994 (R 2004), in that order.

3. References

ISO 25417:2007 Acoustics -- Definitions of basic quantities and terms

ANSI S1.1-1994 (R 2004) American National Standard Acoustical Terminology

ISO 8297, 1994 **Acoustics - Determination of sound power levels of multisource industrial** plants **for evaluation of sound pressure levels in the environment - Engineering method**

ISO 4871, 1996 **Acoustics - Declaration and verification of noise emission values of** machinery **and equipment**

ISO 3740 or 11200 series standards

4. Emission Sound Pressure Level from Individual Equipment

4.1 Sound Level Requirements

The supplier's equipment shall meet the sound requirements on the attached noise emission data sheet.

Equipment at or above 100kW (motor nameplate or equivalent power in another form, e.g. diesel) shall produce 80 dBA or less at 1m or beyond and equipment below 100kW shall produce 75 dBA or less at 1m or beyond.

Indoor fan ductwork shall be insulated and the fan silenced to produce 75 dBA at 1m or less. Isolated outdoor fans may produce 80 dBA at 1m.

Valves shall produce 80 dBA at 1m or less, 1m downstream.

The intent is to ensure that the noise exposure of employees within the facility is below 85 dBA $L_{ex,8h}$. It is likely that employees may work 12h shifts, so their average equivalent sound level over the shift should be 83 dBA or below. To achieve this, sound levels in most areas where they work should be 83 dBA or below.

5 dB shall be added to the reported A-weighted sound level or unweighted octave sound power level before comparing it to the above requirements if any octave or third octave band exceeds the average of its neighbours by more than 5 dB.

4.1.1 Intermittent Sound

For intermittent sounds, an estimated one hour equivalent sound level meeting the noise requirements will be acceptable but must be identified as such in the bid and approved. For example, a 200 kW source producing 95 dBA at 1m for less than 2 minutes per hour would be acceptable provided the noise source was quiet at other times.

No sound level may exceed 115 dBA Fast at 1m.

4.1.2 Exceptions

It is recognised that some equipment may be unable to meet the 80 dBA at 1m requirement. Where such equipment is outdoors and not near other equipment 83 dBA at 1m may be permitted, subject to approval. Any such equipment shall be identified in the bid.

Where higher sound levels are contemplated, measures shall be proposed in the bid to adequately separate employees from sound levels above 83 dBA under normal and under predictable upset or start-up/shutdown conditions likely to regularly occur for more than 15 minutes in a work week or for longer than 3 hours a year.

Where equipment is isolated and it can be demonstrated that employee noise exposure can meet 85 dBA $L_{ex,8h}$, including other likely activities during their workday, higher sound levels may be allowed subject to approval and demonstration that all reasonable noise controls have been provided. For example, where an employee is expected to spend 4 hours within the package battery limits, i.e. 1/3 of a shift, and the remaining 8 hours outside those limits, intermittent exposure to sound levels above 83 dBA would require proving that this would not produce more than 1/3 of his allowable noise exposure for the day. Similarly, a vent 10m from any area where employees would normally work or visit could be allowed to produce 80 dBA at 10m, provided the package sound power level requirement was not exceeded.

True emergency conditions, i.e. conditions not reasonably expected to occur, may be exempted from these requirements, but all such emergency equipment, engines, vents, etc. expected to operate under reasonably foreseeable operating, start-up or shutdown conditions shall be equipped with noise controls to produce less than 85 dBA in areas where employees normally work.

4.2 Test Procedure

ISO 3740 or 11200 series or other recognized standard or test code specific to the equipment being measured. Where a recognized standard or test code for the equipment exists, it is the preferred procedure. For example, fans may be tested according to ARI 300 or ISO 13347-3.

Noise emission values shall be for the operating condition which generates the highest normally occurring noise level and shall be measured with the equipment loaded and processing material (if any). Specifically, motor noise data shall represent sound levels when the motor is under load and chute sound levels when material is flowing through the chute.

5. Total Emission Sound Power Level from Package

5.1 Sound Power Level Requirements

The total summed sound powers from all the supplier's equipment shall meet the sound power level requirements in each octave band on the attached noise emission data sheet. The intent is to sum the sound emission to the environment from all equipment in the package. Information shall be provided and summed for each piece of equipment to get a total for the package. Alternatively, the sound power can be estimated for the entire package, e.g. from measurements taken at a distance from a similar facility.

Note that the spectrum requirement is more restrictive in the low to mid frequencies since these octave bands are expected to travel 3km to the nearest plant neighbours.

5 dB shall be added to the reported A-weighted sound level or unweighted octave sound power level before comparing it to the above requirement if any octave or third octave band exceeds the average of its neighbours by more than 5 dB.

For short term intermittent sounds, an estimated one hour equivalent sound level meeting the noise requirements will be acceptable but must be identified as such in the bid and approved by the owner.

True emergency conditions, i.e. conditions not reasonably expected to occur, e.g a vent intended to prevent a vessel from bursting, may be exempted from these requirements, but all emergency equipment, engines, vents, etc. expected to operate under reasonably foreseeable operating, start-up or shutdown conditions shall be equipped with noise controls to produce less than 70 dBA at 100m.

5.2 Test Procedure – Individual Items of Equipment

ISO 3740 or 11200 series or other recognized standard or test code specific to the equipment being measured. Where a recognized standard or test code for the equipment exists, it is the preferred procedure. For example, fans may be tested according to ARI 300 or ISO 13347-3.

Noise emission values shall be for the operating condition which generates the highest normally occurring noise level and shall be measured with the equipment loaded and processing material (if any). Specifically, motor noise data shall represent sound levels when the motor is under load and chute sound levels when material is flowing through the chute.

Where equipment is inside a building, allowance may be made for the insertion loss of the building in summing the sound power emitted to the environment. The insertion loss shall not exceed the following unless the building or room was specifically designed to contain noise.

	31.5	63	125	250	500	1000	2000	4000	8000
Insertion Loss (dB)	5	5	5	8	10	15	15	15	15

No reduction shall be assumed for equipment located under a roof or rain shelter where the walls are not closed, for example on the upper floors of the metallurgical plant.

Where sound power information is not available, the energy average sound pressure level at 4 equally spaced locations 100m from the package centre may be approximately converted to sound power levels by adding 40 dB to each measured octave band, provided the package does not exceed more than 30m in extent. Similar measurements at 10m may be converted to sound power levels by adding 30 dB to each measured octave band, provided the package does not exceed more than 3m in extent.

5.3 Test Procedure – Entire Package

ISO 8297 may be used to estimate the expected sound power level from the entire package from measurements at a similar facility. Such data must be supported by a comparison between the facility measured and the package being quoted.

5.4 Tonality

No 1/3 octave band in the total summed sound power level from the package shall exceed the energy average of either the two bands above or the two bands below by more than 5 dB (10 dB below 400 Hz).

6. Sound Level Information

The emission sound pressure level for each piece of equipment in the package shall be provided in a noise emission declaration prepared according to ISO 4871. This shall include any motors or drives. The uncertainty of the measurement shall be added to the result before comparing to the requirements.

In addition, the total package sound power level measured at a similar facility or unweighted octave or third octave band sound power levels for each piece of equipment shall be provided.
A sample Noise Emission Declaration is provided, but the manufacturer's standard noise emission declaration form is preferred, provided it includes all required information.

7. Certification of Sound Levels

Bidders shall provide sufficient information with their bid to allow comparison with the data sheet requirements.

The supplier shall properly document and certify sound power levels and sound pressure levels at the drawing approval stage. A certified noise emission declaration following ISO 4871 but including at least octave band data is the preferred documentation. This information shall also be provided on the equipment drawing.

8. Acceptance Tests

Where requested, the supplier shall provide test data to confirm the sound level information before shipping and shall give the HT adequate opportunity to witness these tests. Supplier shall provide certified copies of the test results to HT within one month of completing the tests, or sooner as required.

Sound level testing may also be carried out by HT or, if requested, by the supplier during commissioning. The other party shall be given ample opportunity to attend such testing. Testing shall be according to an agreed protocol to exclude other sound sources as much as is feasible or take into account their effect.

9. Guarantees

Where testing shows that the equipment supplied exceeds the requirements of this specification or the noise data sheets, supplier shall provide noise controls at their expense, and approved by HT and the owner, to achieve the required sound levels.

10. Noise Control

Where noise control measures are required to meet the above requirement, they shall be quoted as a separate item for approval by HT and their insertion loss shall be provided in octave bands. Enclosures and insulation are to be avoided whenever possible. All noise controls shall be industrial grade and allow for cleanability, access for maintenance and operations and adequate cooling. All impacts shall be cushioned.

10.1 Silencers

All air, steam and gas exhausts shall include silencers. Fans shall include inlet and outlet silencers unless they meet the project noise requirements without them or are specifically exempted. Fan requirements are to be taken before the inlet silencer or after the outlet silencer.

Silencers shall be heavy duty industrial grade with a casing thickness at least equal to the adjacent ductwork and shall be provided with flexible joints with a transmission loss at least equal to that of the fan casing.

All silencers shall be constructed to allow access to the splitters or centre bullet so that they can be removed and cleaned or replaced. Supplier shall indicate the required steps to remove and replace these components and the space and access requirements around the silencer in order to allow this operation to take place. Removable components shall be sized and supplied with handles or other devices to allow safe lifting by two people, or supplied with lifting brackets and procedures and provision for their safe removal and replacement shall be supplied.

Solid and perforated materials of silencers shall be selected to handle the gas being handled and any other materials present. Where the gas may contain water mist or droplets the media shall be enclosed in waterproof bags and the quoted insertion losses shall include an allowance for their effect. Suitable drainage shall be provided. Where solids or dust are likely to collect on the perforations supplier shall state what measures are in place to prevent them from degrading silencer performance.

10.2 Enclosures

Any noise enclosures shall be heavy duty industrial grade, suitable for outdoor installation where required. All enclosures shall be designed to withstand the considerable wind speeds which will be present, especially at higher levels. They shall be provided with adequate ventilation, lighting, fire protection (where required) and shall be provided with the doors and windows necessary for inspection and maintenance and provided with heavy duty industrial grade seals and hardware. Where enclosures include demountable panels they shall be sized and provided with handles to allow safe lifting by two people, or lifting brackets and other provisions required for their safe removal and replacement shall be supplied.

Acoustical enclosures shall be designed to minimise personnel entry. Any controls, instrumentation or auxiliary equipment requiring access or inspection while the equipment is in operation shall be located outside the enclosure. Where more than one piece of similar equipment is provided, with the intent that one or more may operate while another is being maintained, then each unit shall be in a separate enclosure, or provision shall be made to acoustically partition the enclosure or building such that the employees doing maintenance on one piece of equipment will not be exposed to sound levels above 83 dBA from the other equipment.

Solid and perforated materials of enclosures shall be selected to handle the other materials present. Where there could reasonably be exposure to oil or water mist or droplets the media shall be enclosed in waterproof bags and the quoted insertion losses shall include an allowance for their effect. Suitable drainage shall be provided. Where solids or dust are likely to collect on the perforations supplier shall state what measures are in place to prevent them from degrading performance.

10.3 Building Treatment

Where the supplier requires sound absorption treatment or other measures to be incorporated in the building in order to achieve these requirements they shall advise HT of this requirement in the bid.

11. Control Rooms, Offices, etc.

Any control room, lunch room, or other similar occupied facility provided in the package shall be designed to meet 60 dBA throughout under normal operations and predictable upset, start-up and shutdown conditions with doors closed and HVAC equipment operating normally.

Laboratories where people have desks for paperwork and speaking on the phone would also fall into this requirement. Laboratories which are essentially industrial spaces, e.g. primarily used to crush or grind material, would not.

Offices and other non-industrial areas where people work full time shall meet RC50(n).

11.1 HVAC

HVAC should be designed to produce sound levels 5 dB below the requirements for other equipment in the space. E.g. 75 dBA in general plant areas and 55 dBA in control rooms.

00	03/APR/2008	T.KELSALL	OP.MURALI	J.ADHIBAN	NA	Issued for Purchase
Rev.	Date (dd/mmm/yyyy)	Author (Name)	Checked (Name)	Approved (Name)	Approved (Name)	Status
HT					Owner	

1. NOISE REQUIREMENTS FOR POWER HOUSE EQUIPMENT

1.1 Individual Equipment Emission Sound Pressure Level (fill in for each item of equipment)

1.1.1 SOUND LEVEL REQUIREMENT: 80 dBA (re 20 μPa) from specified equipment **at 1 m** (and at any greater distance) from machine envelope using stated test procedure and at workstation.

1.1.2 WORK AREAS – Equivalent sound levels in work areas with all equipment operating shall not exceed 83 dBA 1m or more from equipment. Vendor to advise if interior should be made sound absorbing to help achieve this limit.

1.1.3 ENCLOSURES - Where noisy equipment must be isolated in an enclosure or room to meet these requirements, only one item of equipment shall be enclosed in any such room or enclosure so that it the room or enclosure is quiet for maintenance purposes when the equipment is off and all controls and ancillary equipment requiring maintenance shall be outside the room or enclosure. Windows and lights shall be provided for any required visual inspection.

1.1.4 CONTROL ROOM REQUIREMENT – Any office, lunch room, control room, etc. provided shall be designed to provide sound levels of 60 dBA or below.

1.2 Total Package Unweighted Emission Sound Power Level

Sound Power Level Requirement: L_W re 10^{-12} Watts from entire package shall not exceed the following spectrum:

	63	125	250	500	1000	2000	4000	8000 Hz
Source LW	111	105	103	103	104	111	111	111

1/3 octave band sound power levels shall be 5 dB lower than the nearest octave band above.

1.3 Both of the above requirements shall apply. Higher values must be approved by the equipment engineer, project acoustics staff and the owner.

2. DATA BY TENDERER

2.1 Individual Equipment Emission Sound Pressure Level (fill in for each item of equipment)

2.1.1 The Sound Level Specification calls for a Noise Emission Declaration According to ISO 4871. The following is adapted from this standard and may be used in the absence of the manufacturer's standard declaration.

Machinery Tested:	Manufacturing process:
Manufacturer:	Processed material:
Model No:	No-load speed:
Type:	Full load speed:
Serial No:	Operating capacity:
Year of Manufacture:	Motor Drive:

Operating Conditions: Full Load and Processing Material (if any):	
Declared dual-number noise emission values in accordance with ISO 4871 Lp + k ≦ 80 dBA at 1m (Fill in extra forms for each piece of equipment as required)	
A-weighted maximum Fast emission sound pressure level, L_{pAFmax}, in dB re 20 µPa at 1 m or at the following workstation:_____	_____ dBA at 1 m
Uncertainty, K_{pAFmax}, in dB:	_____ dB
A-weighted time-averaged emission Sound Pressure Level, L_{pAeq}, in dB re 20 µPa at 1 m Or at the following workstation:_____	_____ dBA at 1m (not to exceed 80 dBA at 1m)
Uncertainty, K_{pAeq}, in dB:	_____ dB

2.2 Total Package Unweighted Emission Sound Power Level

2.2.1 Data for Entire Package (if available)

Unweighted Octave Emission Band Sound Power Levels from entire Package L_W in dB re 10^{-12}W	63	125	250	500	1k	1k	4k	8 kHz	L_{WA}
Measured according to ISO 8297 at Similar Facility (note any differences from proposed package):									

2.2.2 If data for entire package is unavailable, fill in below for each piece of equipment and sum logarithmically:

Unweighted Octave Emission Band Sound Power Levels from Individual Equipment Items
L_W in dB re 10^{-12}W
(Please add lines as required) Note below if building attenuation has been subtracted from entry.

Equipment	**Measurement Standard and any adjustments**	63	125	250	500	1k	1k	4k	8 kHz	L_{WA}
Total Unweighted Octave Emission Band Sound Power Levels from Package L_W in dB re 10^{-12}W										
Measured according to ISO 3740 or 11200 series using Test Code:										

1. Scope of Document

This document covers the minimum technical requirements of Equipment Nameplates for the Koniambo Nickel Project. It shall be used in conjunction with other equipment specifications and applies to all items of mechanical equipment supplied to the project.

2. Codes, Standards and Registration

2.1 General

The equipment shall comply with the requirements of New Caledonian laws, regulations, codes and standards as well as French codes and standards (AFNOR - Association francaise 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.

2.2 Codes and Standards

For equipment supplied to comply with codes and standards the nameplate shall contain the information specified in those codes and standards with the additional information required by this specification.

2.3 Registration

Where required by New Caledonian Regulations the equipment(s) shall be registered with local authorities. The nameplate shall have space for information on design registration and equipment registration details.

3. Design

3.1 General

The minimum information required on the nameplate is listed below in both French and English.

EQUIPMENT NUMBER	As identified on P&IDs and PO
EQUIPMENT NAME	As identified on P&IDs and PO
MANUFACTURER	The equipment brand
SUPPLIER	The Vendor named on the PO
MODEL	The manufacturer's model No.
SERIAL NUMBER	The manufacture's sequence No.
PURCHASE ORDER NUMBER	Number on the PO

Additional information required where applicable.

DESIGN REGISTRATION NUMBER	For registered equipment
EQUIPMENT REGISTRATION NUMBER	For registered equipment
DESIGN PRESSURE	
DESIGN TEMPERATURE	
MINIMUM DESIGN TEMPERATURE	
HYDROTEST PRESSURE	
MAXIMUM SPEED	
CE Mark	

And any other information required by regulations, codes and standards.

3.2 Size

The lettering and numbers shall be at least 8mm high. The overall dimensions of the nameplate shall allow a 12mm text free border around the perimeter of the information.

3.3 Permanence

The information letters and numbers shall be engraved to a depth of at least 0.6mm. The nameplate shall be at least 3mm thick. The attachment fastening shall be tamperproof.

3.4 Visibility

The engraving shall be filled with black paint to contrast with the unpainted background.

3.5 Material of Construction

The nameplate shall be of 316 stainless steel plate. Attachment to the equipment shall be with stainless steel fasteners that are compatible with the nameplate and equipment surface.

3.6 Units

All values shall be accompanied by the units of measurement. Units shall be SI units.

3.7 Other Nameplates

Where the manufacture normally attaches a nameplate of his own standard design then this will be acceptable if it meets the intent of this specification. An additional nameplate shall be added to include required information not covered in the manufacturer's standard nameplate.

3.8 Typical Layout

NUMERO D' EQUIPMENT / EQUIPMENT NUMBER	
NOM D' EQUIPMENT	
EQUIPMENT NAME	
FABRICANT / MANUFACTURER	
FOURNISSEUR / SUPPLIER	
MODELE / MODEL	
NUMERO DE SERIE / SERIAL NUMBER	
NUMERO D' COMMANDE / PURCHASE ORDER NUMBER	
VITESSE MAXIMUM / MAXIMUM SPEED	

4. FABRICATION AND ASSEMBLY

Nameplates shall be machine made with corner radius at least 10mm. Sharp edges shall be removed to uniform radius of at least 2mm. Engraving shall be performed by machine using a clear, legible font.

5. NAMEPLATES FOR SPECIFIC EQUIPMENT

(HOLD)

BHARAT HEAVY ELECTRICALS LIMITED
A Government of India Undertaking
High Pressure Boiler Plant, Tiruchirappalli 620 014, INDIA
Department: : ***PLANT LABORATORY***
Telephone : ***91–(0431) – 2571073***
Fax : ***91–(0431) – 2520265***
e-Mail : ***drgravi@bheltry.co.in***

Plant Lab Document No.	Rev.	Pages
Q:PL:C3 – PS / 5312 Dated:05/ 12/2008	0B	7

CONSOLIDATED PAINTING SCHEDULE FOR BOI

KONIAMBO HATCH Technip

Requisition Number:	319000-00420-MR-0150-0003
Purchase Order Number:	319000-00420-PO-0150-0003-0006
Equipment / Item Tag:	----
Equipment / Item Description:	**PAINTING SCHEDULE FOR BOUGHT OUT ITEMS**
HT Document Number:	**319000-00420-AO 106-0150-0003-4101**
Document Category:	Information

Comment given in this document does not relieve vendor of his/her responsibility for the correct engineering design and fabrication. This equipment or product shall be made as per the codes, requisition, specification, project procedures, and international standards.

Rev	Date DD-MMM-YYYY	Written By (name)	Check By (name)	Approved By (name)	Status
OB OA	05-12-2008 23-10-2008	L. GRAGORI	P.S.GURUCHANDRAN	Dr G RAVICHANDRAN	

33-970	WELD MESH SS	350	I	PCS 8	NA
33-970	COPPER WIRE	$		NA	NA
34-611	ROOF SHEETING	60	U	PCS 4	TRAFFIC WHITE-RAL 9016
34-820	STEP TREAD	60	U	PCS 6	GALVANISING
35-611	M.P. SH 0.63X1060(C.W.930)X1600	60	U	PCS 4	TRAFFIC WHITE-RAL 9016
35-612	PVC DRAIN PIPES	60	U	NA	NA
36-810	32X900X995	60	U	PCS 6	GALVANISING
36-810	CADMIUM PLATED CLIP	60	U	PCS 6	GALVANISING
36-811	FLOOR GRILLS	60	U	PCS 6	GALVANISING
36-811	CLIPS & STUDS	60	U	PCS 6	GALVANISING
36-820	STEP TREAD	60	U	PCS 6	GALVANISING
36-820	CADMIUM PLATED STUD & NUT	60	U	PCS 6	GALVANISING
36-821	STEP TREAD	60	U	PCS 6	GALVANISING
36-821	CADMIUM PLATED STUD & NUT	60	U	PCS 6	GALVANISING
36-822	STEP TREAD	60	U	PCS 6	GALVANISING
36-822	CADMIUM PLATED STUD & NUT	60	U	PCS 6	GALVANISING
36-823	STEP TREAD	60	U	PCS 6	GALVANISING
36-823	CADMIUM PLATED STUD & NUT	60	U	PCS 6	GALVANISING
37-810	ALUMINIUM SHEET - RIBBED	$		NA	NA
38-611	LIFT SIDE SHEETING	60	U	PCS 4	TRAFFIC YELLOW-RAL 1023
41-141	START-UP BURNER ASSY	850	I	VENDOR SCOPE	NA
42-010	LDO SUCTION STRAINERS	34	U	PCS 4	TRAFFIC GREY A -RAL 7042
42-210	PRESSURE CONTROL VALVE – LDO	34		PCS 4	TRAFFIC GREY A -RAL 7042
42-045	PUMP AND MOTOR ASSY(LDO) FOR DO SYSTEM	34	U	PCS 4	MANUFACTURE'S BLUE
42-156	FLOW CONTROL & TRIP VALVE	34	U	PCS 4	TRAFFIC GREY A -RAL 7042
42-252	FLOW CONTROL & TRIP VALVE	34	U	PCS 4	TRAFFIC GREY A -RAL 7042
42-270	FLOW CONTROL & TRIP VALVE	34	U	PCS 4	TRAFFIC GREY A -RAL 7042
42-156	BALL VALVE	34	U	PCS 4	TRAFFIC GREY A -RAL 7042
43-202	SCANNER AIR FAN WITH DC MOTOR	34	U	PCS 4	TRAFFIC BLUE RAL 5017
43-202	BUTTERFLY VALVE O-C (PNEUMATIC)	34	U	PCS 4	TRAFFIC GREY A -RAL 7042
43-202	SOLENOID VALVES	34	U	PCS 4	TRAFFIC GREY A -RAL 7042
43-202	AIR FILTER REGULATOR	34	U	PCS 4	STEEL BLUE –RAL 5011
43-208	SOLENOID VALVES	34	U	PCS 4	TRAFFIC GREY A -RAL 7042
43-208	SS HOSES NB 25	34	U	NA	NA
44-417	ASH DRAIN GATES (MANUAL & MOTOR)	900	I	VENDOR SCOPE	NA
44-422	ASH DISCHARGE VALVE	60	U	PCS 3	ALUMINIUM-RAL 9006
44-425	TEFLON SLIDE BEARING PLATES	60	U	PCS 4	TRAFFIC GREY B-RAL 7043
44-428	GATES - ASH COOLER DRAINS	500	I	PCS 9	ALUMINIUM-RAL 9006

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INTERNATIONAL STANDARDS FOR
PHYTOSANITARY MEASURES

ISPM No. 15

GUIDELINES FOR REGULATING WOOD PACKAGING MATERIAL IN INTERNATIONAL TRADE

(2002)

with modifications to Annex I (2006)

Produced by the Secretariat of the International Plant Protection Convention

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ENDORSEMENT

This standard was endorsed by the Interim Commission on Phytosanitary Measures in March 2002. Modifications to Annex I were endorsed by the Commission on Phytosanitary Measures in April 2006.

INTRODUCTION

SCOPE

This standard describes phytosanitary measures to reduce the risk of introduction and/or spread of quarantine pests associated with wood packaging material (including dunnage), made of coniferous and non-coniferous raw wood, in use in international trade.

REFERENCES

Agreement on the Application of Sanitary and Phytosanitary Measures, 1994. World Trade Organization, Geneva.
Export certification system, 1997. ISPM No. 7, FAO, Rome.
Glossary of phytosanitary terms, 2001. ISPM No. 5, FAO, Rome.
Guidelines for phytosanitary certificates, 2001. ISPM No. 12, FAO, Rome.
Guidelines on notification of non-compliance and emergency action, 2001. ISPM No. 13, FAO, Rome.
ISO 3166-1-ALPHA-2 CODE ELEMENTS (http://www.din.de/gremien/nas/nabd/iso3166ma/codlstp1/en_listp1.html)
International Plant Protection Convention, 1997. FAO, Rome.
Principles of plant quarantine as related to international trade, 1995. ISPM No. 1, FAO, Rome.

DEFINITIONS

Definitions of phytosanitary terms used in the present standard can be found in ISPM No. 5 (*Glossary of phytosanitary terms*).

OUTLINE OF REQUIREMENTS

Wood packaging material made of unprocessed raw wood is a pathway for the introduction and spread of pests. Because the origin of wood packaging material is often difficult to determine, globally approved measures that significantly reduce the risk of pest spread are described. NPPOs are encouraged to accept wood packaging material that has been subjected to an approved measure without further requirements. Such wood packaging material includes dunnage, but excludes processed wood packaging material.

Procedures to verify that an approved measure, including the application of a globally recognized mark, has been applied should be in place in both exporting and importing countries. Other measures agreed to under a bilateral arrangement are also considered in this standard. Wood packaging material that does not comply with the requirements of this standard should be disposed of in an approved manner.

REGULATORY REQUIREMENTS

1. Basis for Regulating

Wood packaging material is frequently made of raw wood that may not have undergone sufficient processing or treatment to remove or kill pests and therefore becomes a pathway for the introduction and spread of pests. Furthermore, wood packaging material is very often re-used, recycled or re-manufactured (in that packaging received with an imported consignment may be re-used to accompany another consignment for export). The true origin of any piece of wood packaging material is difficult to determine and thus its phytosanitary status cannot be ascertained. Therefore the normal process of undertaking risk analysis to determine if measures are necessary and the strength of such measures is frequently not possible for wood packaging material because its origin and phytosanitary status may not be known. For this reason, this standard describes globally accepted measures that are approved and that may be applied to wood packaging material by all countries to practically eliminate the risk for most quarantine pests and significantly reduce the risk from a number of other pests that may be associated with that material.

Countries should have technical justification for requiring the application of the approved measures as described in this standard for imported wood packaging material. Requiring phytosanitary measures beyond an approved measure as described in this standard also requires technical justification.

2. Regulated Wood Packaging Material

These guidelines are for coniferous and non-coniferous raw wood packaging material that may serve as a pathway for plant pests posing a threat mainly to living trees. They cover wood packaging material such as pallets, dunnage, crating, packing blocks, drums, cases, load boards, pallet collars, and skids which can be present in almost any imported consignment, including consignments which would not normally be the target of phytosanitary inspection.

Wood packaging made wholly of wood-based products such as plywood, particle board, oriented strand board or veneer that have been created using glue, heat and pressure or a combination thereof should be considered sufficiently processed to have eliminated the risk associated with the raw wood. It is unlikely to be infested by raw wood pests during its use and therefore should not be regulated for these pests.

Wood packaging material such as veneer peeler cores[1], sawdust, wood wool, and shavings, and raw wood cut into thin[2] pieces may not be pathways for introduction of quarantine pests and should not be regulated unless technically justified.

3. Measures for Wood Packaging Material

3.1 Approved measures

Any treatment, process, or a combination of these that is significantly effective against most pests should be considered effective in mitigating pest risks associated with wood packaging material used in transport. The choice of a measure for wood packaging material is based on consideration of:

- the range of pests that may be affected
- the efficacy of the measure
- the technical and/or commercial feasibility.

Approved measures should be accepted by all NPPOs as the basis for authorizing the entry of wood packaging material without further requirements except where it is determined through interceptions and/or PRA that specific quarantine pests associated with certain types of wood packaging material from specific sources require more rigorous measures.

Approved measures are specified in Annex I.

Wood packaging material subjected to these approved measures should display a specified mark shown in Annex II.

The use of marks addresses the operational difficulties associated with the verification of compliance with treatment for wood packaging material. A universally recognized, non-language specific mark facilitates verification during inspection at the point of export, at the point of entry or elsewhere.

References for supporting documentation on approved measures are available from the IPPC Secretariat.

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[1] Veneer peeler cores are a by-product of veneer production involving high temperatures and comprising the center of a log remaining after the peeling process.

[2] Thin wood is considered to be 6mm thickness or less according to the Customs Harmonized Commodity Description and Coding System (the Harmonized System or HS).

3.2 Measures pending approval

Other treatments or processes for wood packaging material will be approved when it can be demonstrated that they provide an appropriate level of phytosanitary protection (Annex III). The currently measures identified in Annex I continue to be under review, and new research may point, for example, to other temperature/time combinations. New measures may also reduce risk by changing the character of the wood packaging material. NPPOs should be aware that measures may be added or changed and should have sufficiently flexible import requirements for wood packaging to accommodate changes as they are approved.

3.3 Other measures

NPPOs may accept any measures other than those listed in Annex I by arrangement with their trading partners, especially in cases where the measures listed in Annex I cannot be applied or verified in the exporting country. Such measures should be technically justified and respect the principles of transparency, non-discrimination and equivalence.

The NPPOs of importing countries should consider other arrangements for wood packaging material associated with exports from any country (or particular source) where evidence is provided which demonstrates that the pest risk is adequately managed or absent (e.g. areas with similar phytosanitary situations or pest free areas).

Certain movements of wood packaging material (e.g. tropical hardwoods associated with exports to temperate countries) may be considered by the importing NPPO not to carry a phytosanitary risk and thus can be exempted from measures.

Subject to technical justification, countries may require that imported wood packaging material subjected to an approved measure be made from debarked wood and display a mark as shown in Annex II.

3.4 Review of measures

The approved measures specified in Annex I and the list of measures under consideration in Annex III should be reviewed based on new information provided to the Secretariat by NPPOs. This standard should be amended appropriately by the ICPM.

OPERATIONAL REQUIREMENTS

To meet the objective of preventing the spread of pests, both exporting and importing countries should verify that the requirements of this standard have been met.

4. Dunnage

Ideally, dunnage should also be marked in accordance with Annex II of this standard as having been subjected to an approved measure. If not, it requires special consideration and should, as a minimum, be made from bark-free wood that is free from pests and signs of live pests. Otherwise it should be refused entry or immediately disposed of in authorized manner (see section 6).

5. Procedures Used Prior to Export

5.1 Compliance checks on procedures applied prior to export

The NPPO of the exporting country has responsibility for ensuring that systems for exports meet the requirements set out in this standard. It includes monitoring certification and marking systems that verify compliance, and establishing inspection procedures (see also ISPM No. 7: *Export certification system), registration or accreditation and auditing of commercial companies that apply the measures*, etc.

5.2 Transit arrangements

Where consignments moving in transit have exposed wood packaging material that has not met the requirements for approved measures, the NPPOs of the transit countries may require measures in addition to those of the importing country to ensure that wood packaging material does not present an unacceptable risk.

6. Procedures upon Import

The regulation of wood packaging material requires that NPPOs have policies and procedures for other aspects of their responsibilities related to wood packaging material.

Since wood packaging materials are associated with almost all shipments, including those not normally the target of phytosanitary inspections, cooperation with agencies, organizations, etc. not normally involved with meeting phytosanitary export conditions or import requirements is important. For example, cooperation with Customs

organizations should be reviewed to ensure effectiveness in detecting potential non-compliance of wood packaging material. Cooperation with the producers of wood packaging material also needs to be developed.

6.1 Measures for non-compliance at point of entry

Where wood packaging material does not carry the required mark, action may be taken unless other bilateral arrangements are in place. This action may take the form of treatment, disposal or refused entry. The NPPO of the exporting country may be notified (see ISPM No. 13: *Guidelines on notification of non-compliance and emergency action*). Where the wood packaging material does carry the required mark, and evidence of live pests is found, action can be taken. These actions may take the form of treatment, disposal or refused entry. The NPPO of the exporting country should be notified in cases where live pests are found, and may be notified in other cases (see ISPM No. 13: *Guidelines on notification of non-compliance and emergency action*).

6.2 Disposal

Disposal of wood packaging material is a risk management option that may be used by the NPPO of the importing country upon arrival of the wood packaging material where treatment is not available or desirable. The following methods are recommended for the disposal of wood packaging material where this is required. Wood packaging material that requires emergency action should be appropriately safeguarded prior to treatment or disposal to prevent escape of any pest between the time of the detection of the pest posing the threat and the time of treatment or disposal.

Incineration

Complete burning

Burial

Deep burial in sites approved by appropriate authorities. (Note: not a suitable disposal option for wood infested with termites). The depth of the burial may depend on climatic conditions and the pest, but is recommended to be at least 1 metre. The material should be covered immediately after burial and should remain buried.

Processing

Chipping and further processing in a manner approved by the NPPO of the importing country for the elimination of pests of concern (e.g. manufacture of oriented strand board).

Other methods

Procedures endorsed by the NPPO as effective for the pests of concern.

The methods should be applied with the least possible delay.

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ANNEX I (modified in 2006)

APPROVED MEASURES ASSOCIATED WITH WOOD PACKAGING MATERIAL

Heat treatment (HT)

Wood packaging material should be heated in accordance with a specific time-temperature schedule that achieves a minimum wood core temperature of 56°C for a minimum of 30 minutes[3].

Kiln-drying (KD), chemical pressure impregnation (CPI), or other treatments may be considered HT treatments to the extent that these meet the HT specifications. For example, CPI may meet the HT specification through the use of steam, hot water, or dry heat.

Heat treatment is indicated by the mark HT. (see Annex II)

Methyl bromide (MB) fumigation for wood packaging material (modified in 2006[4])

The wood packaging material should be fumigated with methyl bromide. The treatment is indicated by the mark MB. The minimum standard for methyl bromide fumigation treatment for wood packaging material is as follows:

Temperature	Dosage (g/m^3)	Minimum concentration (g/m^3) at:			
		2hrs.	4hrs.	12hrs.	24hrs.
21°C or above	48	36	31	28	24
16°C or above	56	42	36	32	28
10°C or above	64	48	42	36	32

The minimum temperature should not be less than 10°C and the minimum exposure time should be 24 hours. Monitoring of concentrations should be carried out at a minimum at 2, 4 and 24 hrs.

List of most significant pests targeted by HT and MB

Members of the following pest groups associated with wood packaging material are practically eliminated by HT and MB treatment in accordance with the specifications listed above:

Pest group
Insects
Anobiidae
Bostrichidae
Buprestidae
Cerambycidae
Curculionidae
Isoptera
Lyctidae (with some exceptions for HT)
Oedemeridae
Scolytidae
Siricidae
Nematodes
Bursaphelenchus xylophilus

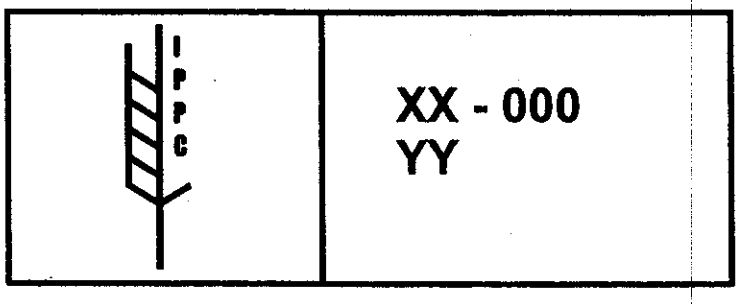
[3] A minimum core temperature of 56° C for a minimum of 30 min. is chosen in consideration of the wide range of pests for which this combination is documented to be lethal and a commercially feasible treatment. Although it is recognized that some pests are known to have a higher thermal tolerance, quarantine pests in this category are managed by NPPOs on a case by case basis.

[4] When a revised schedule is adopted for treatment of wood packaging, material treated under the previous treatment schedule does not need to be retreated, remarked or recertified.

ANNEX II

MARKING FOR APPROVED MEASURES

The mark shown below is to certify that the wood packaging material that bears the mark has been subjected to an approved measure.



The mark should at minimum include the:

- symbol
- ISO two letter country code followed by a unique number assigned by the NPPO to the producer of the wood packaging material, who is responsible for ensuring appropriate wood is used and properly marked
- IPPC abbreviation according to Annex I for the approved measure used (e.g. HT, MB).

NPPOs, producers or suppliers may at their discretion add control numbers or other information used for identifying specific lots. Where debarking is required the letters DB should be added to the abbreviation of the approved measure. Other information may also be included provided it is not confusing, misleading, or deceptive.

Markings should be:

- according to the model shown here
- legible
- permanent and not transferable
- placed in a visible location, preferably on at least two opposite sides of the article being certified.

The use of red or orange should be avoided since these colors are used in the labeling of dangerous goods.

Recycled, remanufactured or repaired wood packaging material should be re-certified and re-marked. All components of such material should have been treated.

Shippers should be encouraged to use appropriately marked wood for dunnage.

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ANNEX III

MEASURES BEING CONSIDERED FOR APPROVAL UNDER THIS STANDARD

Treatments[5] being considered and which may be approved when appropriate data becomes available, include but are not limited to:

Fumigation

Phosphine
Sulfuryl fluoride
Carbonyl sulphide

CPI

High-pressure/vacuum process
Double vacuum process
Hot and cold open tank process
Sap displacement method

Irradiation

Gamma radiation
X-rays
Microwaves
Infra red
Electron beam treatment

Controlled atmosphere

[5] Certain treatments such as phosphine fumigation and some CPI treatments are generally believed to be very effective but at present lack experimental data concerning efficacy which would allow them to be approved measures. This present lack of data is specifically in relation to the elimination of raw wood pests present at the time of application of the treatment.

1. PURPOSE

This document describes the requirements for the purchasing of spare parts, for the Koniambo Nickel Project.

2. DEFINITIONS

"HT"	means a Joint Venture formed between Hatch and Technip, acting as Owner's Representative with full authority to manage and direct the activities of the SUPPLIER.
"OWNER"	means Koniambo Nickel SAS.
"FACILITY"	means any of the structures, equipment or materials to be engineered, furnished, constructed, and permanently installed or assembled by HT, at the final installation Site.
"SUPPLIER"	means the person or company bound to execute the work under the PURCHASE ORDER.
"PURCHASE ORDER"	means a formal document between OWNER and SUPPLIER, evidencing the terms of the agreement between the parties for the supply equipment/materials and related services. The term also encompasses, in this procedure, any amendment(s) to this agreement.

3. CLASSIFICATION OF SPARE PARTS

The types of spare parts are:

3.1 Installation, Pre-Operational Testing, Commissioning and Performance Tests Spare Parts

Spare parts required for installation, pre-operational testing, commissioning and performance tests of the equipment. These are spares that may be consumed, broken, worn out, plugged up, or otherwise fail, as systems are being installed, tested and commissioned or otherwise fail before the FACILITY reaches a state of normal operation. Examples are gaskets, seals, bolts, bearings, filters, miscellaneous instruments and electrical items.

- Bidder's shall submit spare parts recommendations for installation, pre-operational testing, commissioning and performance tests, with the original bid.
- These spares may be included in the same PURCHASE ORDER as the main equipment.
- These spares shall be delivered and shipped with the main equipment and shall be separately packed and adequately marked for easy identification and warehousing.

3.2 Capital Spare Parts

Capital spares are major individual items or sub-assemblies or equipment (e.g. compressor rotor, special valves, etc.). Capital spares generally meet the following criteria:

- Minimum quantity of important replacement parts or assemblies required to be kept on hand to ensure continued operation without undue delay or stoppage (critical to on-going operation),
- High unit cost,
- Very low failure rate (long mean time between failure) and an unpredictable failure pattern – not expected to be replaced during the life of the equipment,
- Straight in-out swap, obsolete when equipment is redundant (unique to equipment or system) – operating life equals equipment life, and

- Restricted use / applicability, not used in routine maintenance.

Unless specifically identified in the Material Requisition for inquiry, Bidder's shall furnish a documented recommendation of Capital Spare Parts with the original bid

These spares may be included in the same PURCHASE ORDER as the main equipment.

These capital spares shall be delivered and shipped with the main equipment and shall be separately packed and adequately marked for easy identification and warehousing

3.3 Two (2) Year Spare Parts

The two (2) year spare parts include all those parts that are normally required to maintain the FACILITY in a satisfactory working condition over a period of two (2) years of continuous operation after FACILITY commissioning and start-up.

Bidder will submit as far as feasible, the quotation of the two (2) year spare parts together with the quotation for the main equipment.

Two (2) year spare parts may be purchased by OWNER, under a separate PURCHASE ORDER.

4. SPECIAL TOOLS

Special tools, (if required) are designed and fabricated, by the equipment Supplier, to be used for installation, on-site repair or dismantling/maintenance purposes.

Such special tools will be quoted with the original bid and may be included in the scope of the main PURCHASE ORDER.

Such special tools shall be delivered and shipped with the main equipment and shall be separately packed and adequately marked for easy identification and warehousing.

5. PREPARATION OF BID

Bidders are requested to submit quotations for the above categories of spare parts, where applicable.

The Bidders proposal shall include:

- Quotation for capital spare parts and special tools, if any, together with delivery times,
- Recommendation for spares for installation, pre-operational testing, commissioning and performance tests.,
- Recommendation for two (2) years spares,
- Spare part number together with identification cross sectional drawings,
- Proposed quantity per spare part item,
- Unit prices and total prices for proposed spares,
- Delivery times.

5.1 Two (2) Year Spare Parts Quotation

Bidder shall return the completed two (2) year spare parts quotation together with the original bid, wherever practical.

The price and delivery of the two (2) years spare parts quotations shall be valid for twenty-four (24) months after the corresponding PURCHASE ORDER award.

If not practical, a complete recommended spare parts list on the Spare Parts List and Inter-changeability Record (SPIR) Form, as per Appendix 1, shall be submitted at around 50% mechanical fabrication of main equipment and packages and will be tied to a milestone payment in the PURCHASE ORDER.

An electronic copy of the SPIR Form is also enclosed with this Request for Quotation (RFQ) package and is to be completed by the Bidder and returned to HT, with bid submission.

Two (2) year spare parts quotations shall be submitted in a separate **sealed envelope.**

All spare parts shall be furnished with adequate packing. All packing shall bear lasting and visible identification with a description of the parent equipment, with the part identification number(s), as well as the quantities.

The spare parts shall be identical to and fully interchangeable with the parts supplied with the parent equipment.

All proposed spare parts lists shall be backed-up as per the reliability analysis performed by the Bidders.

6. PRESERVATION OF TWO (2) YEAR SPARE PARTS

6.1 Preservation/Packing

Shall be in accordance with the Packing, Marking and Shipping Instructions, 319000-00000-WI-GPCO-0001.

6.2 Storage Period

In no case shall preservation be for less than two (2) years.

7. GUARANTEES

In accordance with the Purchasing Conditions, Bidder expressly guarantees that the two (2) year spare parts shall be available for a period of ten (10) years from start-up of the parent equipment.

8. APPENDICES

Appendix A – Spare Parts List and Inter-changeability Record (SPIR) Form

Appendix A

Spare Parts List and Inter-changeability Record (SPIR) Form

SPARE PARTS LIST FOR INTERCHANGEABILITY RECORD

THE COMPLETION OF THE SPIR FORM BY MANUFACTURER(S)/SUPPLIE(S)

The SPIR form consists of a main sheet and continuation sheets, format A3. The completed forms shall be distributed on A3 formats as specified in the PURCHASE order. The manufacturer/supplier is requested to complete all the columns, except the bold laced columns of the form as described below :
All information shall be clearly stated in English language

Explanation of column no's

Column 1 — EQUIPMENT REG. or TAG NO.
Enter the equipment registration or tag number for each piece of equipment as stated in the requisition or purchaser order.

Column 2 — MANUFACTURER'S MODEL or TYPE
State model, type of other positive identification reference of the equipment / instrument ordered.

Column 3 — MANUFACTURER'S SERIAL NO
State serial number of other utilize identification reference of the equipment / instrument ordered.

Column 4 — NO. OF UNITS
Enter the total no of pieces of identical equipment / instrument as quoted in columns 1, 2 and 3.

Column 5 — NUMBER OF PARTS PER UNIT
For each unit or group of identical units enter in the appropriate space the number of parts fitted in each unit of equipment / instrument.

Column 6 — MESC NUMBER EQUIPMENT / ORDER REFERENCE NO
If known, filled in by manufacturer.

Column 7 — CLASSIFICATION OF EQUIPMENT
v - vital, e - essential, a - auxiliary

Column 8 — TOTAL NUMBER OF IDENTICAL PARTS INSTALLED
Enter the total number of identical parts covered by the equipment specified in the case of identical units multiply the quantity of column 5 by the number of units given in column 4.

Column 9 — ITEM NUMBER OF PARTS

Column 10 — DESCRIPTION OF PARTS
List all parts which should be carried in stock for initial and normal operation including slow-wearing parts.

If all items is interchangeable between two or more visits it should be listed only once (refer to columns 15, 16)

Column 11 — MATERIAL SPECIFICATION
Enter material specification in terms of full International Standards and accepted conventions not manufacturer's or sub manufacturer's reference including material certificates if required.

Column 12 — DRAWING NUMBER (including POs NOS)
For each part in column 10 enter the manufacturer's parts list and/or drawing number
Documents referred to must always be attached to the SPIR form by the manufacturer or supplier.

Column 13 — NAME SUPPLIER AND/OR REMARKS
Note supplier's name for items shown in column 16

Column 14 — MANUFACTURER OF ORIGIN
Note manufacturers name

Column 15 — MANUFACTURER'S PART NUMBER
Enter the manufacturer's unique reference number or other information, which specifically identifies each part in the manufacturer's organization.

Column 16 — SUPPLIER'S PART NUMBER
Enter the supplier's unique identification number of items from third party manufacturers (bought-out items) such as ball bearings, oil seals, mechanical seals, gaskets, couplings, instruments, electrical pans, fuses, relays etc.

SPARE PARTS LIST FOR INTERCHANGEABILITY RECORD

Column 17 — UNIT OF MEASURE
For example pc - piece, st - set. The build-up of a set shall be explained in column 10

Column 18 — UNIT PRICE (Firm for One year)
State the ex works price per piece of each part in the currency shown at the top of the column.

Column 19 — DELIVERY TIME IN WEEKS

Column 20 — COMMISSIONING SPARE PARTS RECOMMENDED BY MANUFACTURER
Commissioning Spare Parts are parts required to prepare the equipment ready for start up.

Column 21 — INITIAL (START UP) SPARE PARTS FOR NORMAL OPERATION SPARE PARTS RECOMMENDED BY MANUFACTURER
Initial spare parts are to safeguard the operation of equipment during the running in and starting up periods and the first year of operation.

Column 22 — CRITICAL SPARE PARTS
Based on manufacturer's experience

Column 23 — COMMISSIONING SPARE PARTS RECOMMENDED BY OWNER

Column 24 — INITIAL (START-UP) AND NORMAL OPERATION SPARES RECOMMENDED BY OWNER

Column 25 — CRITICAL SPARE PARTS RECOMMENDED BY OWNER

Column 26 — QUANTITY TO BE ORDERED TO BE FILLED IN BY MATERIALS DEPT OF OWNER
Taking into accounts the established min / max stock levels.

Column 27 — SPIR NUMBER
Enter the SPIR registration / filing number.

Column 28 — AUTHORISED FOR PURCHASE
Enter name responsible person.

Column 29 — REQUIRED ON SITE DATE
In case the SPIR form is used for purchase, enter the required on site data.

Column 30 — STATUS / REVISION OF SPIR LIST
F - final, P - preliminary. Revisions to be marked as O - original, a, b, c, etc.

Column 31 — MANUFACTURER'S FOCAL POINT
Name of manufacturer's focal point on spare parts issues for this equipment. Include Telephone and Fax.

Column 32 — NOTES
NOTES FOR 15, 16 :
In view of the wide variety of systems in use to identification of parts, it is not possible to lay down firm rules for completion of these columns.

Manufacturers / suppliers should give whatever identification system they use to positively identify parts and to show interchangeability with other existing.

Manufacturer's supplier's final cross-sectional drawings, workshop drawings and real part numbers may not always be available in the early stage of manufacture.

This should not delay the completion of the SPIR form and subsequent

SPARE PARTS LIST AND INTERCHANGEABILITY RECORD

SPIR NUMBER 27

AUTHORISED FOR PURCHASE BY 28

REQUIRED ON SITE DATE 29

For explanation of columns see sheet 3

MANUFACTURER'S /SUPPLIER'S SPARE PARTS DATA

1	EQUIPMENT REG OR TAG NO								
2	MANUFACTURER'S MODEL OR TYPE								
3	MANUFACTURER'S SERIAL NO								
4	NO OF UNITS								

5	NUMBER OF PARTS PER UNIT	TOTAL NO OF IDENTICAL PARTS INSTALLED	ITEM NUMBER	DESCRIPTION OF PARTS	MATERIAL SPECIFICATION	DRAWING NO INCL. POS. NO.	SUPPLIER OR REMARKS	MANUFACTURER OF ORIGIN	PART NUMBER		UNIT OF MEASURE	UNIT PRICE EXW CURRENCY	DELIVERY TIME IN WEEKS :	Spare Parts Recommended by Manufacturer			Spare Parts Recommended by OWNER			QUANTITY TO BE ORDERED
									MANUFACTURER	SUPPLIER				COMMISSIONING :	INITIAL & NORMAL OPERATION	CRITICAL :	COMMISSIONING	INITIAL & NORMAL OPERATION	CRITICAL	
		8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
			1																	
			2																	
			3																	
			4																	
			5																	
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			25																	

6	NOTES : 32	REMINDER : MANUFACTURER S TO ATTACH TO THIS FORM ALL DRAWINGS AND PARTS LIST	EQUIPMENT		STATUS OF SPIR 30
			MANUFACTURER		REVISION
			SUPPLIER		DATE
		FOCAL POINT MANUACTURER/SUPPLIER 31	PROJECT	KONIAMBO NICKEL PROJECT	SIGNATURE
		INCLUDING PHONE NUMBER	PLANT		SHEET NO OF
7	CLASSIFICATION OF EQUIPMENT		COMPANY	XSTRATA NICKEL	REQUISITION NO

SPARE PARTS AND INTERCHANGEABILITY RECORD
CONTINUATION SHEET

	EQUIPMENT ORDER/REF NO	NUMBER OF PARTS PER UNIT																									NO OF UNITS	MANUFACTURER'S SERIAL NO	MANUFACTURER'S MODEL OR TYPE	EQUIPMENT REF OR TAG NO
		25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1				

REQUISITION NO.	SHEET NO. OF	SIGNATURE	DATE	REVISION	STATUS OF SPIR	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	REMARKS	NOTES	COMPANY	PLANT	PROJECT	SUPPLIER	MANUFACTURER	EQUIPMENT	SPIR NUMBER

Consequently, SUPPLIER shall:

- After technical acceptance of the GOODS by HT, define the expected necessary packing preparation period.
- Prior to scheduled packing inspection date, provide HT Expediting Department with packing lists and packing notes.
- Advise HT's Expediting Department by fax, stating expected date and location of packing inspection to be performed.

After packing acceptance, notified by HT Expediting Department, proceed to:

- Shrink wrapping operation, as well as vacuum sealing, if applicable.
- Closing of cases and/or crates together with incorporation of the appropriate packing lists and packing notes as per article 9.1.

In the event that packing operations are performed by HT's packer, SUPPLIER shall comply with following procedure:

- Packing performed at SUPPLIER'S premises:

With respect to heavy and/or over-sized GOODS, SUPPLIER shall be equipped with suitable cranes (either mobile or travelling cranes) to execute lift on/lift off operations.

SUPPLIER shall ensure free access to a working area within SUPPLIER premises, to allow HT's packer to carry out the packing.

- Packing performed in HT's packer's premises:

SUPPLIER shall load onto HT packer's means of transportation, using his own lifting equipment. Lashing and securing of the GOODS, on to HT's packer's means of transportation, shall be carried out by SUPPLIER.

10. Services

In addition to the packing and shipping documents, SUPPLIER must also carry out the following services, which shall be included in his quotation:

Carriage of SUPPLIER's sub-contracted equipment and material, which must be re-grouped in SUPPLIER's or PACKER's workshops, whilst waiting for packaging.

HT reserves the right to postpone the shipping of the GOODS. In this event, any storage and insurance costs during the first ninety (90) days shall be borne by the SUPPLIER.

Loading, including lifting, securing, lashing, and stowing, of all cases, crates, or packages onto means of transportation such as, but not limited to, trailers, containers, etc.

Stuffing of containers, when required.

Preparation of accurate transport drawings, under the conditions as described in article 12 and Appendix F.

11. Responsibilities and Guarantees

SUPPLIER is responsible for the choice of category for packing according to the transport facilities used, and on the basis of the present document. In case of doubt or disagreement regarding the choice, SUPPLIER must inform HT prior to packing and await HT's approval.

All phases of packaging, marking, loading, etc. will be subject to HT's inspection.

HT reserves the right to reject the packing when the packing does not conform to these instructions and/or when the packing does not ensure perfect protection of the GOODS.

SUPPLIER is responsible for the weights and dimensions declared, and the marking of the packages. The documents must be in strict conformity with the packing contents.

The packing specified in these "Packing, Marking and Shipping Instructions" is guaranteed for a twelve (12) months storage period after delivery on site.

SUPPLIER is responsible for providing storage recommendation adapted to the GOODS. In the event of long storage, SUPPLIER or his designated representative shall be given access to the "packed" equipment where the warranty conditions require pre-operational maintenance (eg turning of motors).

According to this guarantee, SUPPLIER is held responsible in the event of goods becoming useless, damaged or broken, as a result of poor packing and/or stowing, or due to corrosion, subsequent to insufficient or inadequate protection. All direct or indirect costs resulting thereof, will be back-charged to SUPPLIER.

12. Shipping Instructions

12.1 Instructions for Heavy Lift and Over-dimensioned Equipment

12.1.1 Load Distribution

As far as transport drawings issued by SUPPLIER are concerned, SUPPLIER shall control the adequacy of the supports and/or saddles and ensure that load distribution is in compliance with HT's nominated Freight Forwarder's requirements, with respect to road and sea transportation as well as local road regulations, prior to saddle fabrication.

Note: In all cases, the maximum load distribution will never exceed 10 MT/M2

12.1.2 Preparation for Sea Fastening Operations

For any contractual delivery terms stated in the Purchase Order (EX WORKS, FCA, FAS, FOB, as per the Incoterms 2000) , SUPPLIER shall carry out the preparation of sea fastening operations according to the instructions which will be given by the shipping company through HT's Freight Forwarder and as per the following indications :

The unpacked equipment shall be prepared and equipped with:

- Lifting lugs to be calculated, defined and shown on the transport drawings. They will be used for any handling operations onto trucks for road transportation and onto vessels for sea transportation and onto wagon for rail transportation.
- Lashing points to be calculated in order to support all forces crosswise, lengthwise, and so on . They will be clearly marked on the equipment and transport drawings.

When the equipment requires utilization of special tools/equipment, such as lifting beams, slings, etc. for handling operations, **SUPPLIER SHALL INCLUDE SUCH A LIST OF SPECIAL TOOLS/EQUIPMENT IN HIS ORIGINAL PRPOSAL** which will be included in the scope of supply of the Purchase Order.

Non-compliance to the above shall be at SUPPLIER'S sole risk.

12.2 Documentation

12.2.1 Preliminary Packing Lists

Within eight (8) weeks after issuance of the Purchase Order, SUPPLIER shall furnish to HT's Expediting Department:

Three (3) copies of preliminary packing list as per HT forms, including the number of packages with their respective dimensions and weights and indicating the applicable storage code.

Three (3) copies of preliminary transportation drawings for heavy or over dimensional packages where weights and/or dimensions are equal or greater than:

- Weight 20 MT
- Length 13.50 m
- Width 3 m
- Height 3 m

With the following indications:

- Three planes view of equipment.
- Actual position of all nozzles and protruding parts.
- Net and gross weights.
- Position of the centre of gravity on the three planes.
- Accurate size and overall dimensions of cases, crates or packages.
- Slinging points of equipment or package on all planes.
- The mention of presence of nitrogen purging, where applicable.

12.2.2 Transportation Drawing

Eight (8) weeks prior to the contractual delivery date of the GOODS for shipment, SUPPLIER shall confirm to HT's Expediting Department that the transportation drawing(s) are unchanged. In the event that such drawings have been modified, SUPPLIER shall forward three (3) copies of the revised drawings.

12.2.3 Final Packing List

Four (4) weeks prior to the contractual delivery date of the GOODS for shipment, SUPPLIER shall confirm the final packing list and issue, by e-mail to HT's Expediting Department.

12.2.4 Shipping Documents

Prior to date of inspection, if any, the following SUPPLIER's documentation is to be issued to HT's Expediting Department.

1. Packing list
Five (5) copies. To be prepared on HT's form, as per Appendix C.

2. Packing Note
Five (5) copies. To be prepared on HT's form, as per Appendix D.

3. Pro-forma Invoice
Five (5) copies of SUPPLIER's pro-forma invoice shall be addressed to HT indicating following information:

- consignee
- number of delivered items (complete or partial or balance of Purchase Order scope).
- detailed designation of the GOODS.
- weights/volume.
- unit and total value.
- place and terms of delivery.
- Customs HS Code.

Particular attention shall be given to HAZARDOUS GOODS which shall be identified on a separate invoice and packing list to those for non-hazardous material.

The appropriate hazard class and technical or proper shipping terminology shall identify all hazardous material.

- When applicable, multimodal attestation of transport of hazardous material, safety data sheet and all specific documentation that may be required at origin, during transit and at destination.

  Three (3) copies of such certificates/attestations duly stamped and signed by SUPPLIER, shall be transmitted to HT, with the above requested documents.

- Certificate of origin

  SUPPLIER shall provide HT with a certificate of origin stating the country of origin for all materials manufactured **outside the E.U.**, duly stamped by SUPPLIER's local Chamber of Commerce.

  For materials manufactured **inside the E.U.**, SUPPLIER shall provide HT with an attestation of origin with indication of the manufacturing place.

12.3 Forwarding Agent

HT's designated Freight Forwarder will be nominated at a later date and advised to SUPPLIER accordingly.

The Freight Forwarder will be the sole entity contracted to perform, in the event of EXWORKS, FCA, FAS or FOB delivery terms:

- Call forward of the GOODS ready to be shipped.
- Freight booking's on appropriate means of transport.

Appendix A

Main Shipping Mark

MAIN SHIPPING MARK
PLAQUE DE MARQUAGE

Contract / Contrat	:	**KONIAMBO NICKEL PROJECT**	
Port of Destination / Port de Destination	:		
Consignee / Destinataire	:	**KONIAMBO NICKEL SAS**	
Supplier's Name: Nom du Fournisseur	:		
P.O. / Commande	:		
Requisition No.	:		
Indent Code /Code d'identite (4)	:		
P.L.N°. /Note de Colisage N°	:		
Package Nr. / Colis N°	:		
N. W.....kg / G.W.....kg Poids Net (kg) Poids Brut (kg)	:		
Dimension in cm	:	**L x W x H**	Longueur / Largeur/ Hauteur
Storage Code / Code de Stockage	:		

1. Two copies of the Packing Note are to be attached to the outside of each package in waterproof plastic cover underneath a nailed plate. In the event equipment is dispatched unpacked, this plate should be welded on the metal pats (spot welding) or attached permanently to the package in another way depending on the material. One copy of the Packing Note is to be placed in a clearly visible point in the boxes / crates in a waterproof plastic cover.
2. The storage code shall be selected in Appendix B.
3. For complete marking (marking location, type and size of graphics, use of symbols, dangerous items....) please refer to Article 7.
4. Material Track System (Marian) Code defined in the Material Requisition.

1. Deux copies de la liste de Colisage doivent être placées dans une enveloppe plastique étanche à l'extérieur de chaque colis. Dans le cas ou l'équipement est expédié non emballé, la plaque de marquage doit être soudée sur une partie métallique (point de soudure) ou attachée d'une façon permanente au colis d'une façon appropriée. Une copie de la liste de Colisage sous enveloppe plastique étanche dort être placée dans la caisse á un endroit visible.
2. Le code de stockage doit être déterminé selon l'Annexe B.
3. Le marquage doit être complet (localisation de la plaque, type et dimensions de caractères symboles etc....) conformément aux spécifications du chapitre 7.
4. Code d'identification Marian (systeme de management du materiel) defini dans la *Requisition de Materiel*.

Appendix B

Equipment Storage Codes

EQUIPMENT STORAGE CODES

	STORAGE IN AIR CONDITIONED PREMISES	STORAGE IN COVERED OR ENCLOSED PREMISES	STORAGE UNDER TARPAULIN	STORAGE OUTDOOR WITHOUT COVERS
STORAGE CODES	xxxx	xxx	xx	X
STRUCTURAL STEEL				
-Panels, beams, columns, grating				X
- bolting			X	
-Material for civil work				X
EQUIPMENT				
-Towers, vessels, kiln, mills, air coolers,			X	
boilers			X	
-Pumps, compressors, blowers, fans,		X		
mixers, reducers		X		
-Tower and vessels internals		X		
-Bolting and special small items			X	
-Mechanical parts		X		
PIPING				
-Flanges, fittings 6" and smaller than 6"		X		
- valves 6" and smaller than 6"		X		
-Pipe and remaining valves, fittings and				X
flanges		X		
-Gaskets and bolting		X		
-Welding rods		X		
INSTRUMENTATION. LABORATORY				
-Cable tray conduit and support			X	
-Control room panels, racks, cabinets				
and associated instrumentation	X			
-All other items	X			
ELECTRICAL				
-Cable reels, conduit and cable trays			X	
-Electrical motors designed for outdoors			X	
service				
-Electrical motors designed for indoors		X		
service				
-Supporting steel, stanchions, saddles,				X
etc...				
--Lighting equipment	X			
-Panel boards, racks cabinets and	X			
associated electrical				
- transformers	X			
-U.P.S., batteries	X			
-All other materials	X			
Telecommunication Equipment	X			

	STORAGE IN AIR CONDITIONED PREMISES	STORAGE IN COVERED OR ENCLOSED PREMISES	STORAGE UNDER TARPAULIN	STORAGE OUTDOOR WITHOUT COVERS
STORAGE CODE	xxxx	xxx	xx	x
REFRACTORY LINING -Refractory liquid, mortar, mixes, ceramic fibres Expanded polystyrene, paper adhesive coatings, paints... -Dense fire bricks, steel parts, insulating fire bricks and blocks		X	X X	
INSULATION -Ceramic fibre and calcium silicate material, metal sheeting -Minerals wool blankets, supporting rings, fasteners,		X X		
PAINTS, THINNERS, etc.. -All materials		X (Separate Warehouse)		
CIVIL -Anchor bolts -Reinforcing steel -Cement (in bags), bricks		X	X	X

- The storage code shall be shown on each package with the appropriate symbol

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Appendix C

Packing List

KONIAMBO

PROJET KONIAMBO
l'Usine du Nord
Nouvelle-Calédonie

HATCH Technip

Document No: 319000-FM-GPCO-0054
Rev: 01
Page 1

HATCH Technip	KONIAMBO NICKEL PROJECT, NEW CALEDONIA 319000	SUPPLIER - *Fournisseur*	**PACKING LIST** ***Liste de colisage***	PL N°

N° PO Chrono	PO	Unit-Unité	Code Eng	N°Ordre / Ordre	Amd /Mvt

Number of Packages *Nombre de colis*	Total Net Weight kg *Poids Net Total* ..... kg	Total Gross Weight .....kg *Poids Brut Total* ..... kg	Total Volume *Volume Total* ..... m³

Package N° *Colis N°*	Type of Package *Nature du colis*	Unit weight in kg *Poids unitaire en kg*		Measurement (in centimetres) Length x Width x Height *Dimensions (en centimetres)* *Longueur x Largeur x Hauteur*	Unit volume in m³ *Volume unitaire en m³*	ITEM *ITAG N°*	Quantity *Quantities*	Description of Goods *Désignation des marchandises*
		Net *Net*	Gross *Brut*					
To continue – à reporter		0	0		0.000			Country of origin/Pays d' origine:

Appendix D

Packing Note

KONIAMBO

PROJET KONIAMBO
l'Usine du Nord
Nouvelle-Calédonie

HATCH Technip

HATCH Technip		CONSIGNEE - Destinataire		SUPPLIER - Fournisseur	
				Packing list N° Liste de Colisage N°	
REQUISITION N° /Rev N°	P.O. Chrono N°	**PACKING NOTE** ***Bordereau de colis***		Package N° *Colis N°*	
Net Weight *Poids Net* *kg*	Gross Weight *Poids* Brut *kg*	Length *Longueur* *Cm*	Width *Largeur* cm	Height *Hauteur* cm	Volume m^3
ITEM N° TAG N° MR N°	Quantity *Quantité*	Detailed description of the package content *Description détaillée du contenu des colis*			Page …/……

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Appendix E

Position of Shipping Mark

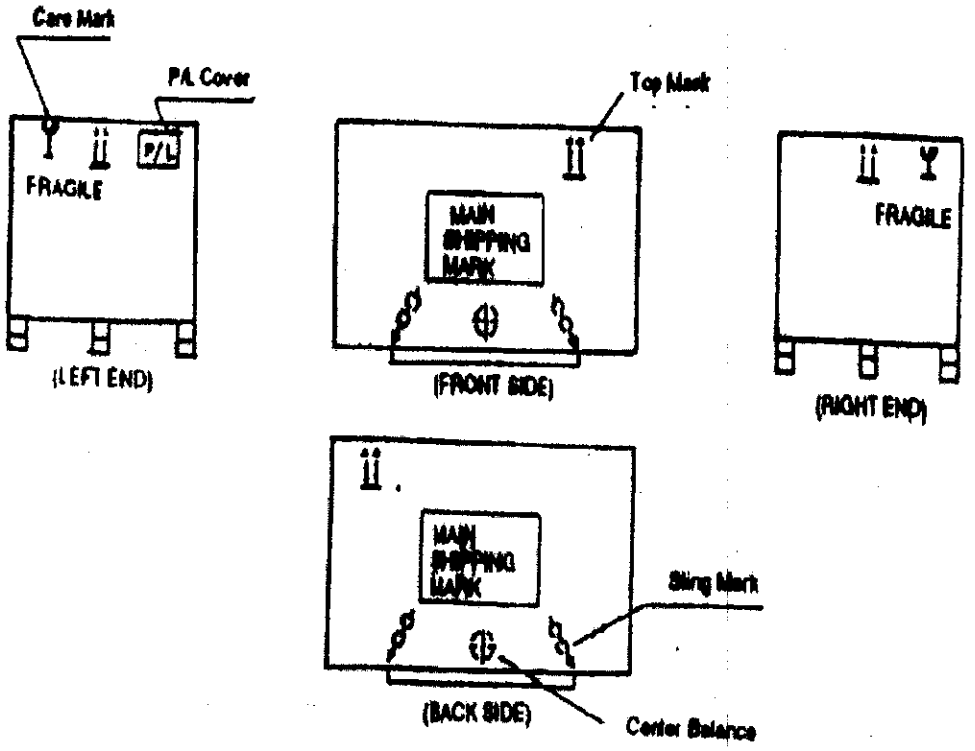
Care Mark

Centre of Gravity Mark

PROJET KONIAMBO
l'Usine du Nord
Nouvelle-Calédonie

DOCUMENT NO:

POSITION OF SHIPPING MARK – CARE MARK – CENTRE OF GRAVITY MARK



Appendix F

Transportation Drawing

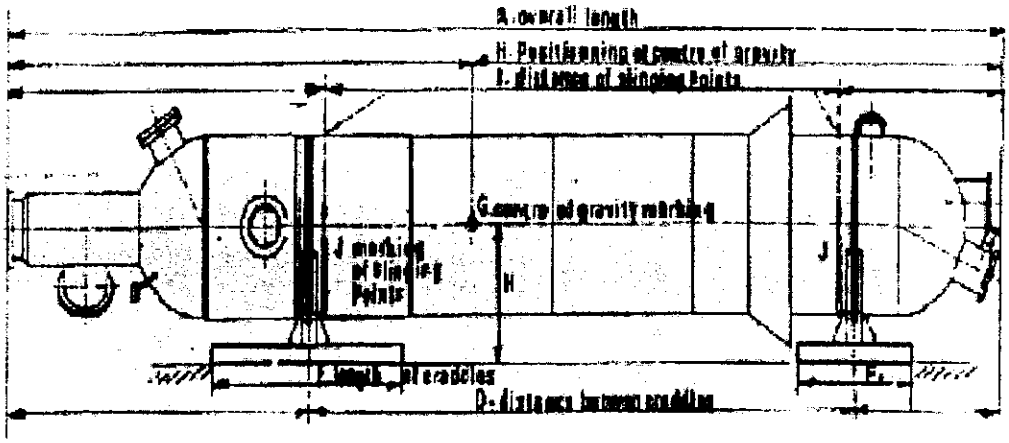
PROJET KONIAMBO
l'Usine du Nord
Nouvelle-Calédonie

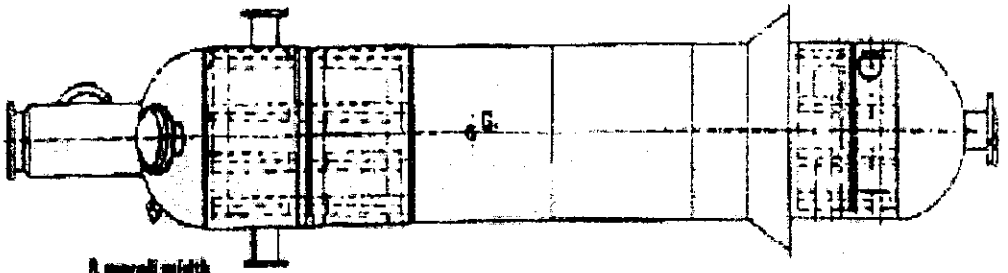
HATCH Technip

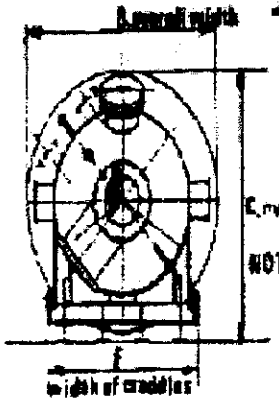
DOCUMENT NO:

TRANSPORTATION DRAWING

EXAMPLE







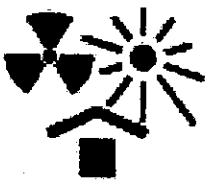
THIS SKETCH SHALL BE DRAWN ON A-3 FORMAT

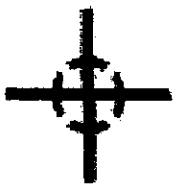
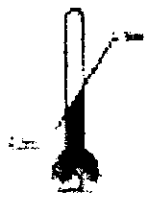
NOTE It is understood that cradles must be built in such a way that they may support transportation constraints including domestic transport - pick up lift off operations - sea transportation - oncarriage transportation up to site

CONTRACT N°	
TRANSPORT DRAWING N°	Rev
EQUIPMENT REF	
NET WEIGHT	
GROSS WEIGHT	

Appendix G

International Standard Graphic Symbols

key	symbol	function
1 fragile handle with care		indicates: a) that the content of the transport packaging is fragile b) that it must be handled with care
2 use no hooks		indicates that hooks may not be used to lift the transport packaging
3 top		indicates correct upright position of transport packaging
4 keep away from heat		indicates that the transport packaging must be kept away from heat
5 keep away from heat and radioactivity		indicates that the content of the packaging may be damaged or made completely unusable by heat or penetrating radiation
6 sling here		shows where slings should be attached to lift the transport packaging

key	symbol	function
7 keep away from moisture		indicates that the transport packaging must be kept in a dry environment
8 centre of gravity		indicates the centre of gravity of the transport packaging
9 do not roll		indicates that the transport packaging must not be rolled
10 no trolley this side		identifies locations on transport packaging where trolleys or trucks must not be placed
11 storage limits		indicates limited storage capability of transport packaging
12 clamp sides		shows where clamps should be placed for handling of transport packaging
13 temperature limits		indicates temperature limits between which transport packaging must be kept