

**TECHNICAL SPECIFICATIONS FOR  
GENERATOR SUPPLY, INSTALLATION AND ANCILLARY  
WORKS FOR ABA'ALA HOSPITAL  
ABA'ALA, AFAR REGION**

***Abbreviations used in the tender document***

mm	for millimetre
m	for meter
m <sup>2</sup>	for square meter
m <sup>3</sup>	for cubic meter
km	for kilometre
hr	for hour
L.S.	for a lump sum
No.	for number
E.C.	Ethiopian Calendar
PVC	for plasticised polyvinyl chloride

## **1. General Information**

### **About Expertise France**

Expertise France (EF) is a public agency created on 1st January 2015 under the supervision of the French Ministries of Foreign Affairs, and Economy and Finance with a robust inter-ministerial vocation. EF offers program engineering and technical assistance by developing and implementing international cooperation actions worldwide. EF operates in various fields of development and institutional cooperation including safety and security reform, public health, human rights, strengthening of institutions and NGOs and governance. Carrying out large-scale, multi-stakeholder programs, EF can ensure cooperation between individuals, teams and institutions with very different statuses, cultures, and specialties. Besides, EF has acquired sound experience in administrative and financial management of large-scale international programs.

## **2. Background**

Two years of conflict in northern Ethiopia, with renewed fighting in mid-2022, have created high humanitarian needs across the Afar, Tigray and Amhara regions, which remain largely unaddressed. The cessation of hostilities following a peace agreement signed in early November 2022 raises hopes for lasting peace for a region devastated by conflict. To support peace efforts, and based on lessons learned in various emergency settings, Expertise France has designed a project to rapidly resume conflict-affected communities' access to healthcare in Amhara, Afar and Tigray regions. One of the target areas for the interventions is Aba'ala Primary Hospital, located in Aba'ala town of Afar regional state.

In the frame of its assistance program, Expertise France is planning to rehabilitate the existing building blocks damaged due to the northern fighting as part of re-equipping and renovation works of Aba'ala Hospital. More specifically the services under this tender consists of generator supply, installation, integrating it with the existing electrical grid system, and supply and installation of different sizes of distribution boards and power cables.

## **3. Specifications for Generator supply, installation, and ancillary works for Aba'ala Primary Hospital**

### **3.1. GENERAL**

#### **SCOPE OF WORK**

This Specification shall apply to the following Supply and installation of a 200KVA Generator and integration of the generator with the existing electrical grid system, supply installation of main distribution board, supply and installation of sub distribution boards, supply and installation of 400Amp ATS, supply and installation of different size power cables, and grounding system.

The works includes supply and installation of the following items:

1. Main Distribution Board CMDDB
2. BLOCK-LABORATORY - MDB XRAY
3. BLOCK-OPERATION THEATER - MDB OPR

4. Automatic Transfer Switch (ATS)
5. Power Cables
6. Grounding System
7. Generator 1, Standby Power of 200 KVA, the detailed specification is attached to the **Appendix**.

The Contractor shall fulfill all requirements and obligations under all clauses of the Specification. Neither the following Clauses of this Specification any descriptions therein nor the quantities, shall limit the obligations of the Contractor under the Conditions of Contract. Where items are not included in the Bill of Quantities for any such requirements or obligations, the cost of such requirements or obligations shall be deemed to be spread over all the items of the Bills of Quantities.

All materials and workmanship shall be of the best quality throughout and shall comply with the relevant latest edition of ASTM standards or with equivalent ISO or British Standards. All materials to be permanently built - in shall be new and shall be accompanied by Manufacturer's Certificates, stating their compliance with this Specification and the standards mentioned therein and the name of the inspection authority.

#### **GENERAL DESCRIPTION**

All distribution boards, breakers, switches, accessories etc. should be genuine Legrand or approved equivalents complying with IEC standards. Distribution boards should be made of sheet metal and have separate neutral and ground bus bars/phase bars. All units in the distribution boards should be labelled to give the reference and duty of the unit. Unit price shall include all the necessary assistance civil works such as chiseling of walls, floors, beams, terrazzo, excavation, and etc. and replacing the terrazzo, re-plaster to fine finish, applying of approved type paint, etc. All the works shall be done with electrical professional with proper qualification for the works.

##### **1. Main Distribution board CMDB**

###### **1.1. CMDB 1**

Supply & installation of sheet steel fabricated dust and vermin proof, cubical type, bottom /top entry, free standing with following incoming and outgoing on floor with the help of nut & bolts and as per standard practice.

Floor standing board

The panel must be fabricated with 14/16 gauge MS sheet having two coats of red oxide & gray paint.

The panel must include:

- Digital Energy Multimeter type PM210 with CTs and fuse protection; for indication of voltage, current, KW, KWh, KVA, Power Factor, frequency, etc (with 3x 300A/5 Current transformers for each phase)
- Bus bar: for each phases and also One piece for grounding and one for neutral can hold the main load capacity (Bus-bar Capacity 400A hard drawn copper bus- bars, 3P+N)
- AC load with 380v/400v 300A with main switch gear, Fuse, bus bar, surge protection device 40Ka with appropriate isolation MCB rated 32 Amps 3 phase
- Cabinet dimension= Can propose appropriate dimension

N.B: price shall include the foundation/standing structure for the board.

The CMDB1 shall be furnished with the following components;

- 1X MCCB 300A 35 KA Incoming
- 1X MCCB 200A 35 KA 3 Ph
- 1X MCCB 125A 25 KA 3 Ph
- 1X MCB 50A 6KA 3 Ph (spare)
- 1X MCB 32A 6KA 3 Ph (spare)

The unit of measurement is Pcs.

### **3.2 BLOCK-LABORATORY**

#### **MDB XRAY**

Supply & installation of sheet steel fabricated dust and vermin proof, cubical type, bottom /top entry, compartmentalized (sectioned)

- The panel must be fabricated with 14/16 gauge MS sheet having two coats of powder paint

The panel must include:

- Bus bar/Distribution compact bus bar/phase bar for balanced distribution of phases COMPLETE WITH DIN RAIL, NEUTRAL AND EARTH TERMINALS, with 25% free space,
- Cabinet Dimension (Can propose appropriate dimension)

This distribution board shall be furnished with the following components;

- 1X MCCB 125A 25 KA Incoming
- 1X MCB 32A 6KA 3 Ph
- 1X MCB 40A 6KA 3 Ph
- 1X MCB 16A 10KA 1 Ph
- 1X MCB 20A 10KA 1 Ph
- 11X MCB 16A 6KA 1 Ph
- 1X MCB 16A 6KA 1 Ph( Spare)
- 1X MCB 10A 6KA 1 Ph( Spare)

The unit of measurement is Pcs.

#### **SDB LAB**

Supply & installation of sheet steel fabricated dust and vermin proof, cubical type, bottom /top entry, compartmentalized (sectioned)

- The panel must be fabricated with 14/16 gauge MS sheet having two coats of powder paint
- The panel must include;

- Bus bar/Distribution compact bus bar/phase bar for balanced distribution of phases COMPLETE WITH DIN RAIL, NEUTRAL AND EARTH TERMINALS, with 25% free space
- Cabinet Dimension (Can propose appropriate dimension)

This distribution board shall be furnished with the following components:

- 1X MCB 40A 6 KA Incoming
- 5X MCB 10A 6KA 1 Ph
- 4X MCB 16A 6KA 1 Ph
- 1X MCB 10A 6KA 1 Ph( Spare)
- 1X MCB 16A 6KA 1 Ph( Spare)

The unit of measurement is Pcs.

## **SDB ADMIN**

Supply & installation of sheet steel fabricated dust and vermin proof, cubical type, bottom /top entry, compartmentalized (sectioned)

- The panel must be fabricated with 14/16 gauge MS sheet having two coats of powder paint

The panel must include:

- Bus bar/Distribution compact bus bar/phase bar for balanced distribution of phases COMPLETE WITH DIN RAIL, NEUTRAL AND EARTH TERMINALS, with 25% free space
- Cabinet Dimension (can propose appropriate dimension)

This distribution board shall be furnished with the following components;

- 1X MCB 25A 6 KA Incoming
- 2X MCB 10A 6KA 1 Ph
- 3X MCB 16A 6KA 1 Ph
- 1X MCB 10A 6KA 1 Ph(Spare)
- 1X MCB 16A 6KA 1 Ph(Spare)

The unit of measurement is Pcs.

## **4. BLOCK-OPERATION THEATER**

### **4.1 MDB OPR**

Supply & installation of sheet steel fabricated dust and vermin proof, cubical type, bottom /top entry, compartmentalized (sectioned)

- The panel must be fabricated with 14/16 gauge MS sheet having two coats of powder paint

The panel must include:

- Bus bar/Distribution compact bus bar/phase bar for balanced distribution of phases COMPLETE WITH DIN RAIL, NEUTRAL AND EARTH TERMINALS, with 25% free space
- Cabinet Dimension (can propose appropriate dimension)

This distribution board shall be furnished with the following components:

- 1X MCCB 200A 35 KA Incoming
- 1X MCB 40A 6KA 3 Ph
- 1X MCB 63A 10KA 3 Ph
- 1X MCB 63A 6KA 1 Ph
- 1X MCB 20A 6KA 1 Ph
- 12X MCB 16A 6KA 1 Ph
- 1X MCB 16A 6KA 1 Ph( Spare)
- 1X MCB 10A 6KA 1 Ph( Spare)

The unit of measurement is Pcs.

### **4.2 SDB OPR**

Supply & installation of sheet steel fabricated dust and vermin proof, cubical type, bottom /top entry, compartmentalized (sectioned)

- The panel must be fabricated with 14/16 gauge MS sheet having two coats of powder paint

The panel must include:

- Bus bar/Distribution compact bus bar/phase bar for balanced distribution of phases COMPLETE WITH DIN RAIL, NEUTRAL AND EARTH TERMINALS, with 25% free space
- Cabinet Dimension (can propose appropriate dimension)

This distribution board shall be furnished with the following components:

- 1X MCB 40A 6 KA Incoming
- 4X MCB 10A 6KA 1 Ph
- 7X MCB 16A 6KA 1 Ph
- 1X MCB 10A 6KA 1 Ph( Spare)
- 1X MCB 16A 6KA 1 Ph( Spare)

The unit of measurement is Pcs.

## 5. Automatic Transfer Switch (ATS)

### 5.1 ATS1

Supply, Installation and Commissioning of **Automatic Transfer Switch (ATS)** Panel Board in sheet steel enclosure with lockable door, and consisting of :

- Floor Standing Board
- 500A rated bus bar for incoming and outgoing Connection
- Fully Automatic and Motorized 400Amp, 4 pole Automatic Transfer Switch With manual optional operation
- 1x400 A MCCB for mains incomer
- Indication for each bus power with required Control Components & protective devices for it to be controlled by the Genset controller, which must include mains and generator close relays with interlocks
- Suitable for outdoor Installation/inside on open Shed
- 25% free Spaces

**N.B** the board needs foundation/standing structure

The unit of measurement is Pcs.

## 6. Power Cable

### 6.1 From CMDDB-1 to Xray

- 3x35+16mmsq ,Cu/XLPE/PVC ,0.6/1KV

### 6.2 From CMDDB-1 to OPR

- 3x95+50mmsq ,Cu/XLPE/PVC ,0.6/1KV

### 6.3 From Transformer to ATS-1

- 240+120 mmsq ,Cu/XLPE/PVC ,0.6/1KV

### 6.4 From CMDDB-1 to ATS-1

- 240+120 mmsq ,Cu/XLPE/PVC ,0.6/1KV

### 6.5 From Gen-1 to ATS-1

- 240+120 mmsq ,Cu/XLPE/PVC ,0.6/1KV

### 6.6 From MDB Xray to SDB LAB

- 4x6mmsq ,Cu/XLPE/PVC ,0.6/1KV

### 6.7 From MDB Xray to SDB ADMIN

- 4x4mmsq ,Cu/XLPE/PVC ,0.6/1KV
- 6.8 From MDB OPR to SDB OPR
- 4x6mmsq ,Cu/XLPE/PVC ,0.6/1KV

The unit of measurement for all power cable item is meter length.

## 7. Grounding System

Complete grounding system for transformer, generator ,low voltage switch gear and all distribution boards as per IEC,EN or BS standards attain 5 ohms with complete inspection pits as per the detail drawings to be provided bare copper wire ,copper rods of appropriate size conducting materials and approved type of networks complete accessories.

Note: If the earth resistance is more than 5 ohms add additional electrode spaced at length of the electrode

- 7.1 Earthing Rod, 16mm diam, 1500 mm bare copper wire

The unit of measurement is Pcs.

- 7.2 Earthing Cable, Yellow/Green, 1x16mmsq

- 7.3 Supply and lay PVC pipe of diameter 110mm, PN 6 for power lines from transformer & standby generator to MDB. MDB-to sub distribution boards. Price includes excavation & Earth work, sand bedding, any incidental civil works and backfill in order to install the cable and connecting manhole to manholes.

The unit of measurement is meter length.

- 7.4 Manhole: Construct earthing manhole with brick wall 250mm thick on mass concrete bed of 100mm, with inside walls to be plastered in two coats of cement mortar, with reinforced concrete slab cover of 60mm thick (C-25, reinforcement bars 8 diam, centre to centre 150 mm spacing), steel bar handle and having internal dimensions of 60x60x60cms. Price also include excavation and earth work, back fill and cart away max 5 kilometers from site to complete the work.

The unit of measurement is the number of manholes.

## 8. Generator

- 8.1 Generator 1, Standby Power of 200 KVA, Caterpillar, Perkin, Magirus, SDMO, Volvo or equivalent. (See the spec attached to the Appendix)-

- 8.2 **Operation and Maintenance Training Program**

Operation and Maintenance Training Program for Hospital technical team: prepare and facilitate a 3-day training program for hospital technical team to provide effective operation and maintenance of the installed equipment (electrical boards, electrical systems, and generator).



Focused on ensuring safe, reliable, and efficient power system management within the hospital, the training covers essential topics such as the fundamentals of electrical board components, operational procedures, and critical safety measures. Delegates will receive thorough instruction on generator operation, including procedures for start-up, shutdown, and emergency handling. Additionally, participants will gain expertise in preventive maintenance, troubleshooting techniques, and corrective actions to address common issues, preparing them to manage both routine and unexpected challenges in power system operation. To support future use, a comprehensive training module will be provided, serving as an on-going resource for facility personnel.

## **Appendix**

Technical specification for Stand by Diesel Generator

### **Quality Standard**

- ISO8528
- ISO 9001
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### **FEATURES**

- Containerized type made of high quality steel and must be completely powder coated. The paint must be ensuring protection against erosion, scratching, and corrosion.
- The control panel, service doors and canopy board must adopt a waterproof design and effectively stop rain and dust intrusion.
- Anti-vibration mountings between the engines, alternators and the base significantly reduce the vibrations during operation, ensuring stable operation. All movable devices are fixed firmly, and therefore help reduce vibration.
- The Gen Set must be equipped with monitoring system, helping monitor the operation at real time DSE control module must be used for controlling ATS (must have mains sensing capability)

### **ELECTRIC SAFETY**

- Automatic control module for multi-directional monitoring meets multilevel demands and considerate protection
- All the wiring and inter connection must be installed accordingly with the Electrical safety standard
- All the generators forgoing instruments, lights and Controls be installed in the control panel of the Genet.

### **OPERATION SAFETY**

- The radiator and high-voltage parts must be guarded to avoid accidents caused by touch.
- The control panel must be lockable. Voltage regulator and circuit breakers are installed behind the door.
- Anti-vibration rubber mounts must be installed in the two sides of the doors to avoid damage to the machines when opening the doors.
- Lockable fuel filling cap.

### **ENVIRONMENTAL**

- The air cleaner and silencer assembly must be installed for suitable sound enclosure as noise level can be 85db through multiple noise control devices.

### **Detail Description**

**RATINGS:**

**Prime Power:**

Available continuously at variable load in lieu of commercially purchased power for an unlimited number of hours per year in accordance with ISO8528, and an overload of 10% permitted for one hour in every twelve hours of operation in accordance with.

***Standby Power:***

Emergency Standby Power in variable load applications in accordance with ISO8528 in the event of a utility power failure. No overload available for this service as relevant alternators are peak continuous rated at 27°C.

***Required capacities:***

- Residential type silencer Containerized type Weather Proof Gen sets
- Auto Start Controller
- Fitted at the bottom Base Fuel Tank which is used to operate continuously for eight hours
- Governor: Electronic speed governor.
- Base are made with strong steel frame with special touch.
- Industrial muffler.
- Skid and vibration isolator.
- Dry type air filter.
- Equipped with properly sized MCCB.
- Single bearing alternator IP23.
- Insulation class H/H.
- Dry type air filter, double fuel filter, oil filter, coolant filter
- Main line circuit breaker
- Permanent Magnet Generator(PMG)
- Standard control panel with AMF functionalities
- 12V batteries, rack and cable
- Ripple flex exhaust pipe, exhaust siphon, flange, muffler

***Standard Features***

Heavy duty diesel engine with:

- Four stroke, water cooled, turbocharged and aftercooler
- Direct injection fuel system
- Electronic Governor system
- 12/24 V DC starter and charge alternator
- Replaceable fuel filter, oil filter and dry element air filter
- Cooling radiator and fan
- Starter battery (with lead acid) including Rack and Cables
- Flexible fuel connection hoses and manual oil sump drain valve
- Industrial capacity exhaust silencer and steel bellows
- Jacket water heater (automatic models)
- Operation manuals and circuit diagram documents

***Alternator***

- ✓ Brushless single bearing system, flexible disc, 4 poles
- ✓ Insulation class H
- ✓ Standard degree of protection IP21 (IP22/IP23 is available)
- ✓ Self-exciting and self-regulating

- ✓ Impregnation with tropicalized epoxy varnish
- ✓ Solid state Automatic Voltage Regulator
- ✓ Stator winding with 2/3 pitch for improved harmonics

**Supply and store Operation and Maintenance Requirements**

- ✓ Operation and maintenance manuals
- ✓ Spare parts for 1 year of operation including Air cleaner, fuel filter, oil filter and radiator belt and related toolset for replacement of spare parts must be included.
- ✓ Hand toolkits set approved by the engineer