TENDER NAME: BT/Supply & Installation of DG Sets/2021

Bhutan Telecom invites ELIGIBLE bidders for submitting ebid through eprocurement systems for supply and installation of DG Sets subject to below conditions and as per the **scope of work** and details provided in **Annexure 1,II &III:**

1. **Instruction to Bidders**
   1.1 Bidders are requested to read RFP before creating Quotation for the tender
   1.2 Bidders are requested to read the Manual for Bidding before bidding in the eprocurement Systems.
   1.3 Bidders are requested to update the documents (Trade License & Trade License) if expired before creating the Quotation for the tender.
   1.4 Bidders are requested to submit ***eBid*** in the systems first and then also submit EMD **a day before actual submission date** of the system's date (**i,e by 1st March 2021**) to avoid disqualifying of bid submission.
   1.5. ebid & EMD to be submitted by 1st March 2021 failing which shall it shall not be accepted.Bid will be opened on 2nd March 2021 (14:00 hrs)

2. **Bid Security**

2.1 EMD (2%) of the total bid value in a sealed envelope to be submitted to Accounts Section in any of our nearest Branch Office indicating the Tender Name.

2.2 The bid security shall be in the form of unconditional bank guarantee/Banker's Cheque/ Cash Warrant/ Demand Draft or as specified in the bidding documents and shall be enforceable in any Bank in Bhutan.

2.3 The Bid Security shall be in the name of **Chief Executive Officer, Bhutan Telecom Ltd.Thimphu Bhutan**. Bid Security must be issued by any scheduled Bank and acceptable to Bhutanese Bank and shall have to be valid for three months from the date of bid opening.

2.4 Bid Security of bidders whose bids have been declared "Non-Responsive" shall be returned after such declaration.

2.5 Bid Security of "Responsive" but unsuccessful bidders will be returned after receiving Performance Security from the "successful bidder".

2.6 Bid Security of "successful bidder" will be returned after receiving Performance Security.

3. **Forfeiture of Bid Security**

3.1 If a Bidder withdraws its bid during the period of bid validity his Bid Security shall be forfeited.

3.2 If the "Successful Bidder", to whom the Notification of Award for the supply is presented, refuses or neglects or fails to furnish the required Performance Security, his Bid Security shall be forfeited.

4. **Taxes and Duties**

4.1 The bidder shall be entirely responsible for all applicable taxes, duties, TDS and other such levies imposed outside and inside Bhutan.

5. **Performance Security**

5.1 Upon receipt of notification of award, the successful Bidder shall furnish a "Performance Security" to the purchaser within two weeks from the date of issuance of Purchase Order (PO). "Performance Security to be submitted to nearest BTL, Office.

5.2 The amount of such "Performance Security" shall be not less than 10% (ten percent) of the total "Evaluated Price" of bidder's offer.

5.3 The "Performance Security" shall be denominated in the currencies of the contract and shall be in the form of Cash Warrant/Demand Draft/ an irrevocable Bank Guarantee to be given by any branch of scheduled banks in Bhutan.

5.4 The proceeds of this "Performance Security" shall be payable to the purchaser as compensation for any failure of the Bidder to complete his obligations stipulated in the contract.

5.5 If supplier fails to deposit "performance Security" within one week from the date of issuance of PO, the order shall be treated as cancelled and it shall be placed to the 2nd Lowest Bidder.

5.6 The "Performance Security" shall be discharged with or without deductions (as applicable) to the supplier upon his completion of performance obligations as described in the contract terms.

6. Payment Terms

6.1 Equipment: 100% payment shall be released within 10 days from the date of delivery (CIF, Phuentsholing) of the total volume of the purchase order & after testing of the DG. No part payment whatever will be entertained during execution of the contract.

6.2 Services: 100% payment after completion of installation of DG Sets for full order qty. If incase BT carry out the installation services for any site, the particular work portion to be deleted and the payment shall not be paid/ deducted from the order. Site completion report to be certified & submitted by respective site incharge/Manager with has to be verified by PM for releasing of payment.

7. Liquidated Damages

7.1 Delivery (CIF, Phuentsholing) to be completed within 60 days from the date of issue of our purchase order failing of which liquidated damages of 0.1% of the purchase order value for every day's delay will be levied subject to a maximum rate of 10%. Purchase order shall be treated cancelled thereafter and will be awarded to the next lowest bidder. In case of such event, the clause no.9 shall come into force/effect.

7.2 Installation Services to be completed within 2 weeks from the date of start of the work failing which LD shall be applicable as above clause (7.1).

8. Prices

8.1 Price quoted by the bidder shall be **CIF, Phuentsholing**

8.2 The bidder should quote as per the specification provided in BOM and delivery schedule

8.3 All prices quoted shall be on a per unit basis and valid till **for 12 months from the date of bid opening**. The selected bidders shall be contacted for additional supply of any enlisted item in future on repeat order basis for the entire contract period.

8.4 Prices should be inclusive loading charges. If the vendor wish to use BT's forklift, the charges to be paid separately during unloading of equipment.

9. Purchaser's Right

9.1 Bhutan Telecom reserves the right to reject all or in part, the item supplied by the successful bidders during physical verification/technical testing if it believes that the goods supplied are non standard/non specific and unreliable in terms of quality.

9.2 Bhutan Telecom reserves the right to accept or reject any bid and to annul the bidding process and reject all bids at any time prior to award of contract, without thereby incurring any liability to the affected bidder or bidders or any obligation to inform the affected bidders of the grounds for the purchaser's action.

9.3 Bhutan Telecom reserves the right at the time of the contract to increase or decrease the quantity of item tendered, without any change in price or other terms and conditions.

9.4 Bhutan Telecom also reserves the right to call quotations and receive the same in the form of email or fax, directly from the manufacturers in India and other countries and compare the rates with those offered by the local suppliers.

9.5 If need be, Bhutan Telecom also reserve the right to purchase the items directly without assigning any reasons thereof.

9.6 If the selected bidder fails to supply the full quantity of the bid, Bhutan Telecom shall cancel the order for the quantity not supplied and place the order to the next bidder in succession. However, Bhutan Telecom shall recover as liquidated damages, the difference between the contracted rates and the actual price paid to the next bidder for the quantity not supplied.

10. Responsibility of the Purchaser

10.1 The transportation of DG sets to the respective sites shall be taken care by BT.

10.2 Civil works to be constructed by BT for the DG Set for each location.

11. Responsibility of Supplier

11.1 Supply of DG Sets as per the specification / data sheet /purchase order.

11.2 Installation and commissioning of DG Sets.

11.3 Applicable Taxes if any inside Bhutan to be borne by Supplier.

12. Mandatory Documents to be submitted with the bid.

a. **Bidders shall download Integrity Pact and resubmit/ upload duly filled, signed with Legal Stamp and completed form in original scan. Failing to upload, tender shall be considered non-responsive.**

b. **OEM (Original Equipment Manufacture) Certificate/ Dealership Certifcate to be submitted failing which bid shall be considered non-responsive.**

c. **Datasheet to be provided failing which the bid shall be considered non-responsive.**

d. **Complaince sheet to be submitted by vendor (with sealed and signed).**

e. **Vendor should Submit Rates as per BOM/BOQ for DG Sets available in systems (for information purpose)**

f. **Vendor should submit Rates (separately as attachment) for services if different to various locations. If the rates against each location is same, the rates in lot to be filled in the systems BOM/BOQ.**

13. Warranty

The equipment should be delivered at Phuentsholing without any damage & defects and one year warranty to be covered after delivery of the equipment.

14. **Technical Support and Queries:** please send your queries to manager.procurement@bt.bt/jigme.wangchuk434@bt.bt/sandeep.monger@bt.bt

15. **Scope of Work: Supply and installation as mentioned above.**

Annexure-1: BOM/BOQ/Site Details

	Total BOM/BoQ + Site Details				
SN	**Region**	**PC**	**Location**	**Equipment**	**Set**
1	CR	Bumthang	Tangsibi	20 KVA, 1 Ph.	1
2	CR	Bumthang	Tangbi	20 KVA, 1 Ph.	1
3	CR	Sarpang	Gaychudara	20 KVA, 1 Ph.	1
4	CR	Sarpang	Relangthang	20 KVA, 1 Ph.	1
5	CR	Sarpang	Tenjurey	20 KVA, 1 Ph.	1
7	CR	Damphu	Manidara	20 KVA, 1 Ph.	1
8	CR	Zhemgang	Wamling	20 KVA, 1 Ph.	1
9	CR	Trongsa	Yourmong	20 KVA, 1 Ph.	1
10	CR	Trongsa	Yotula	20 KVA, 1 Ph.	1
		Total			**9**
SN	**Region**	**PC**	**Location**	**Equipment**	**Set**
1	ER	Lhuntse	Tshengkhar Top	20 KVA, 1 Ph.	1
2	ER	Mongar	KHP Top	20 KVA, 1 Ph.	1
3	ER	Samdrupjongkhar	Jomotshankha Exg	20 KVA, 1 Ph.	1
4	ER	Samdrupjongkhar	Narphung	20 KVA, 1 Ph.	1
5	ER	Trashigang	Khentongmani	20 KVA, 1 Ph.	1
6	ER	Trashigang	Wamrong	20 KVA, 1 Ph.	1
7	ER	Trashigang	Yelchen	20 KVA, 1 Ph.	1
		Total		**Total**	**7**

SN	**Region**	**PC**	**Location**	**Equipment**	**Set**
1	SWR	Samtse	D-bindu	20 KVA, 1 Ph.	1

2	SWR		Yoeseltse	20 KVA, 1 Ph.	1
3	SWR	Phuntsholing	K-goenpa	20 KVA, 1 Ph.	1
4	SWR	Tshimasham	Tshimalakha	20 KVA, 1 Ph.	**1**
		Total		**Total**	**4**
SN	**Region**	**PC**	**Location**	**Equipment**	**Set**
1	CR	Gelephu exchange	Installation not required	12.5KVA 1 Ph.	**1**

		SI	**Total BOM**	**Qty**	**UOM**
		1.1	**20KVA DG Set**	**20**	**sets**
		1.2	**Total Chemical Earthing Set**	**49**	**sets**
		2	**Installation / Commissioning of DG Sets**	**20**	**sites**
		3	**12.5KVA Portable DG Exclude installation however test needs to fulfilled**	**1**	**set**

Annexure-II (Technical Specification)

SI	**Make/Brand**	**Item**	**DG Specification**
1	DG & Engine Make: Kirloskar/Cummins/ Jakson/Kohler/Sterling/TMTL&Eicher/Icon	DG 20KVA (20 sets)	20 KVA, Single Phase (230V, 50Hz), 1500rpm and 0.8 PF, sound and weather proof canopy outdoor unit including cold starting kit with starting battery, AMF Panel with inbuilt DC-DC Converter (48V input & 12V output), Fuel Tank and its stand (300Litres), 25Sqmm single phase armored PVC insulated copper cable with 20 meters per site and including Chemical earthing set as per below specifications Details spec attached in **Annexure-IV**
		Chemical Earthing for 20KVA DG (49 sets)	Maintenance free Chemical Earthing:- Tri-rod 100% copper (5 ft long 17mm Dia # 2 set) welded together and with connection strip & fitted with 4 sets for connecting ,· GEM (Carbon Chemical) # 2X40 kg ,· Copper revit # 10 nos ,· Earth Distribution bus bar # 2 Nos, · Earth pit cover - 2 nos., · Copper (100% copper) strip 25X3 mm- 30 mtr , · Salt- 2 X 10 kg per set, · Charcoal # 2 x 5 kg per set. Connectors, lugs, clamps, etc
2		DG 12.5KVA (1 set)	Portable 12 KVA, Single phase (230V,50 Hz), 1500rpm and 0.8 PF, sound and weather proof canopy outdoor unit including cold starting kit, AMF Panel with inbuilt Dc-Dc converter (48V input and 12V output), Details spec attached in **Annexure-V**

Annexure-III- Compliance Sheet

Specifications for Diesel Generator 20KVA

Natural aspirated industrial diesel engine with superior efficiency and economy

- Integral vibration isolation eliminates the need for under-unit vibration spring isolators
- Advanced Digital Controller (ADC) with 3 auto crank cycles
- Alternator features:

ú Alternator meets Indian and international standards
ú Self-ventilated and dirtproof of IP23 construction
ú Superior voltage waveform by 2/3 pitch wound stator
ú Sustained short circuit current of up to 300% of the rated current for 3 seconds

- Silencer located inside canopy
- On field convertibility from manual to AMF

Standard Features

- Engine coupled, skid mounted alternator
- Single - bearing alternator with insulation Class H
- Unit mounted radiator with 50°C ambient temperature
- Base frame mounted fuel tank with minimum 8 hrs running capacity
- Dry type air filter
- DG circuit breaker
- Electric start with battery
- Fuel water separator
- Conveniently located fuel level indicator
- Exhaust tail pipe as standard scope of supply
- Weather proof enclosure to withstand harsh climate
- All routine service points on one side of canopy
- Four-point bottom lifting

Conformance Standards

- ISO 3046
- BS 5514
- ISO 8528
- IS 4722
- IEC 34
- BS 5000 (Part 99)
- IS: 13364 (Part 1&2)

Generator Set Ratings

Engine	Voltage	Phase	Hz	Prime Rating		Amps
				kW	kVA	
G20-II	230	1	50	16	20	87

PRIME POWER RATINGS: Prime power ratings apply to installations where utility power is unavailable or unreliable. At varying load, the number of generators set operating hours is unlimited. A 10% overload capacity is available for one hour in twelve. Ratings are in accordance with ISO-8528/1, overload power in accordance with ISO-3046/1 and BS 5514. For limited running time and base load ratings, consult the factory. Obtain the technical information bulletin (TIB-101) on ratings guidelines for the complete ratings definitions.

Control panel

White powder coated control panel manufactured with CRCA sheet;
Control Panel is having following Features:

- - MCB of suitable rating with short circuit protection
- Controller which displays voltage, current, KW, PF, Frequency, KWh.
- Indicating lamps for "Load On" and "Set Running"
- Current transformers of suitable ratings
- Copper cables of suitable capacity with incoming and Outgoing terminations
- Control fuses duly wired and ferruled

Power cables: Uninyvin copper conductor cables between Alternator & Control panel inside the canopy.
Document: Operation Manual. General maintenance & installation Guideline and Foundation Drawing
Parts manual

Annexure-IV Engine Specifications for 20KVA DG

Specifications	20 kVA
Engine: model, type	G20-II, Natural aspiration
No. of cylinders	3
Cylinder arrangement	Inline
Displacement, L (cu. in.)	2.15 (131.2)
Bore and stroke, mm (in.)	91 x 110 (3.58 x 4.33)
Compression ratio	17.5:1
Governor: type, Class	Mechanical, Class A2
Frequency regulation, steady state	ISO 8528 G2
Air cleaner type, Qty	Dry, 1
Unit-mounted radiator ambient temperature °C (°F)	50 (122)
Max. power kWm (BHP) @ rated speed (rpm)	19 (25) @ 1500
Diesel Fuel Consumption	
100% Load (Lph)	5.3
75% Load (Lph)	4
Lube Oil Consumption	
100% load	0.1 % of SFC
Fuel System	
Fuel prime pump	Mechanical
Fuel filter : Type, Qty	Combo fuel filter, 1
Recommended fuel	HSD
Fuel tank capacity, attached with DG	90 Litre
Fuel filter change period	Initial - 100 hrs / 3 months, Subsequent 500 hrs / 6 months whichever is earlier
Lubrication System	
System type	Forced Lubrication
Lube oil type	20/40W Oil
Oil pan capacity with filter, L	6
Oil filter: Quantity, Type	2, spin on & by-pass
Oil and oil filter change period	Initial - 100 hrs / 3 months, Subsequent 500 hrs / 6 months whichever is earlier
Exhaust System	
Maximum allowable back pressure, KPa (in.Hg)	4 (1.18)
Exhaust outlet size at engine hookup, mm (in)	50 (1.97)
Silencer Type, Quantity	Residential, 1
Exhaust temperature at rated kW, dry exhaust, °C (°F)	600 (1112)

Cooling System	
Ambient temperature, °C (°F)	50 (122)
Coolant capacity including engine, L (gal)	10.9 (2.9)
Water pump type	Impeller
Fan diameter, including blades, mm (in.)	406.5 (16)
Engine Electrical System (Option-1)	
Starter Motor rated voltage VDC	12 V
Battery charging alternator	12 V, 35 Amp
Ground (negative/positive)	Negative
Battery type- Amp/hour Quantity	Flooded type, Maintenance free 90 1
Battery voltage, VDC	12
Engine Electrical System (Option-2)	
DG Cranking unit (For DG starting)	12VDC, Cranking unit in place of 12V DC external battery

Alternator Specifications

Specifications	20 kVA
Type	4 Pole
Exciter type	Brushless
Voltage regulator	AVR SR-7/3
Insulation - Material - Temperature rise, Prime	 Class H 125°C
Bearing: Quantity, Type	1, Sealed
Coupling	Flexible disk
Voltage regulation	+/-1%
Excitation	Self-excitation
Frequency, Fixed, Hz	50
Short circuit ratio	0.365
Full load current - 3 Phase, Full load current - 1 Phase	28 87
Prime at 125° C, kVA	20

Advanced Digital Controller

Standard Features

- Master switch: Control On/Off
- Event Log
- Remote two-wire start/stop capability
- One-source responsibility for generating system & accessories
- Automatic start with programmed cranking cycle
- Field software upgrade possibility
- Operating temperature: -20°C to 70°C (-4°F to 158°F)
- Storage temperature: -20°C to 70°C (-4°F to 158°F)
- Humidity: 0-95% condensing
- Control Panel
  - Alternator to control panel connection with copper cable only
  - MCCB/MCB details: with short circuit and overload protection
  - Output copper cable size (Sq. mm): 1 run/ph

	20 kVA-phase
Output copper cable size (Sq. mm): 1 run/ph	35

Features

- Microprocessor based AMF control panel capable of extending Remote monitoring system
- GPRS/EDGE/WCDMA/LTE based generator for remote monitoring system.

Controller Information

LCD Display	LCD Display Faults	Display Warnings	Optional Accessories	Power Requirements
Runtime hours	High engine temperature	Low battery voltage	Battery charger 12 V	6 to 36 VDC with fuse protection
Engine speed	Low oil pressure	High battery voltage	Mains sensing relay	250 mA @ 12 VDC
Power factor KVAr	Overspeed / under speed	Low fuel level	Earth leakage protection	125 mA @ 24 VDC
Current	Over and under voltage	Maintenance alarm	VAF meter (multifunction)	
Voltage	Over and under frequency		kW-hr display	
Frequency	E-stop			
Engine temperature	Auxiliary fault			
Engine oil pressure	Low fuel level			
Battery voltage	Over load current			
Kilowatt & kVA	Phase reversal			
Fuel level (digital I/P)				

Automatic Mains Failure (AMF)

1. AMF capacity should be as per the BOQ.
2. When the AC mains power fails or deviates from the specified voltage limit, the standby diesel engine generator shall start automatically take over the load after the specified voltage is generated.
3. When the AC mains power has recovered from the failure or has been resorted to normal conditions, the load shall be transferred back to the AC mains supply and the standby engine generator shall stop automatically.
4. The start/stop control and load change over shall be possible by manual operation also.
5. When any of the following trouble occurs, the diesel engine generator shall stop immediately and shall generate the alarm.

- Abnormal output voltage
- Excessive output current
- Over speed

Fire / Smoke

- Low lubricant oil pressure
- Low fuel
- Failure of starting of diesel engine generator after 3 consecutive attempts.

6. An emergency stop button shall be provided to shut down the generator. Upon operation all generator control function shall be locked out so that it cannot be started until manually reset.
7. An hour counter shall be provided to monitor the generator hours run. It shall be calibrated to read up to 99,999 hrs.
8. The control panel shall have the facility to start / stop the Genset manually in manual mode.
9. On receipt of the stop signal the Genset shall be allowed to run for a cooling down period. Once the engine has shut down, the panel should restore itself to a state of readiness to respond to any new start-up operation automatically without the necessity of any manual resetting.
10. AMF should have the facility to activate Cold Start facility.
11. A constant potential, current limited type battery charger shall be provided. It shall have a nominal input 230V +/- 10% and output of 13.5-volt DC and should be installed inside the AMF Panel. The rating shall be minimum 10 amps. Suitable unarmoured multi strand copper cables from AMF to both Battery shall be provided by the bidder.
12. Metering shall be provided to monitor the voltage, current, frequency, Power Factor and Output Power (KVA and KW) of the Mains and Diesel Generator output.
13. ENGINE PROTECTION:

Mechanical Protection of the Engine: Low Lubricating Oil Pressure (LLOP) High Engine Temperature (HCT) Low Fuel Level
Electrical Protection of Engine: Over Voltage & Under Voltage Protection and Over Load
14. Remote Start / Stop: AMF should have facility to start /stop the engine from central server.
Remote Monitoring: System should have the following Modbus data on RS485 for Mains & DG Parameter with DG Alarm data for monitoring from Central Server.

Sl No	Description	Modbus Address	Range
Parameters			
1	Mains Voltage	1061	0 to 720
2	Mains Frequency	1065	0 to 70
3	DG Voltage	1033	0 to 720
4	DG Frequency	1031	0 to 70
5	DG Power Factor	1555	-1 to +1
6	Load Current	1046	0 to 99999
7	DG Battery Voltage	1029	0 to 40
8	DG Fuel Level	1027	0 to 130
9	Engine Temperature	1025	-50 to 200
10	Engine Oil Pressure	1024	0 to 10000
11	Engine Speed	1030	0 to 6000
12	DG Run Hour	1799	0 to 4.29×10^9 sec
13	DG Maintenance Due	1837	-2.14×10^9 to $+2.14 \times 10^9$ sec
DG Alarms			
1	Emergency Stop	39426	0011 0000 0000 0000
2	Low Oil Pressure	39426	0000 0011 0000 0000
3	High Engine Temperature	39426	0000 0000 0010 0000
4	Engine Under Speed	39427	0011 0000 0000 0000
5	Engine Over Speed	39427	0000 0011 0000 0000
6	DG Low Frequency	39427	0000 0000 0010 0000
7	DG High Frequency	39427	0000 0000 0000 0010
8	DG Low Voltage	39428	0010 0000 0000 0000
9	DG High Voltage	39428	0000 0010 0000 0000
10	DG Low Battery	39428	0000 0000 0010 0000
11	DG High Battery	39428	0000 0000 0000 0010
12	DG Fail to Stop	39429	0000 0000 0010 0000
13	DG Fail to Start	39429	0000 0010 0000 0000
14	DG High Current	39431	0011 0000 0000 0000
15	Low Fuel Level	39435	0000 0011 0000 0000

Compliance

Specifications	20 kVA
As per ISO 8178-5 mode cycle (Engine emission)	CPCB-II compliant
Noise level measured at 1 meter distance	< 75 dB (A)

Dimensions and weight

Specifications	20 kVA
Overall Size, L x W x H (mm)	2000 x 950 x 1250
Weight, dry, max (kg) with its base frame	770-800Max

galvanized	
External Tank (Litres) should be galvanized	300

Fig

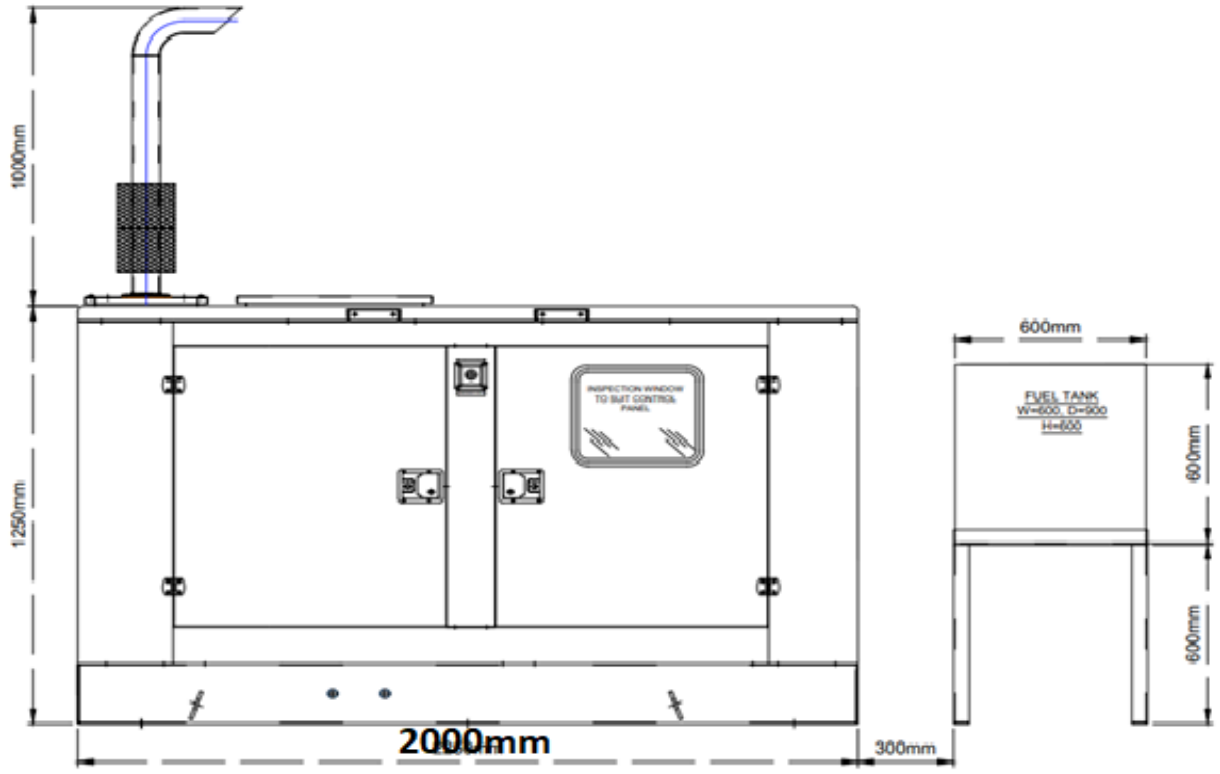


Fig. 1 20KVA DG diagram

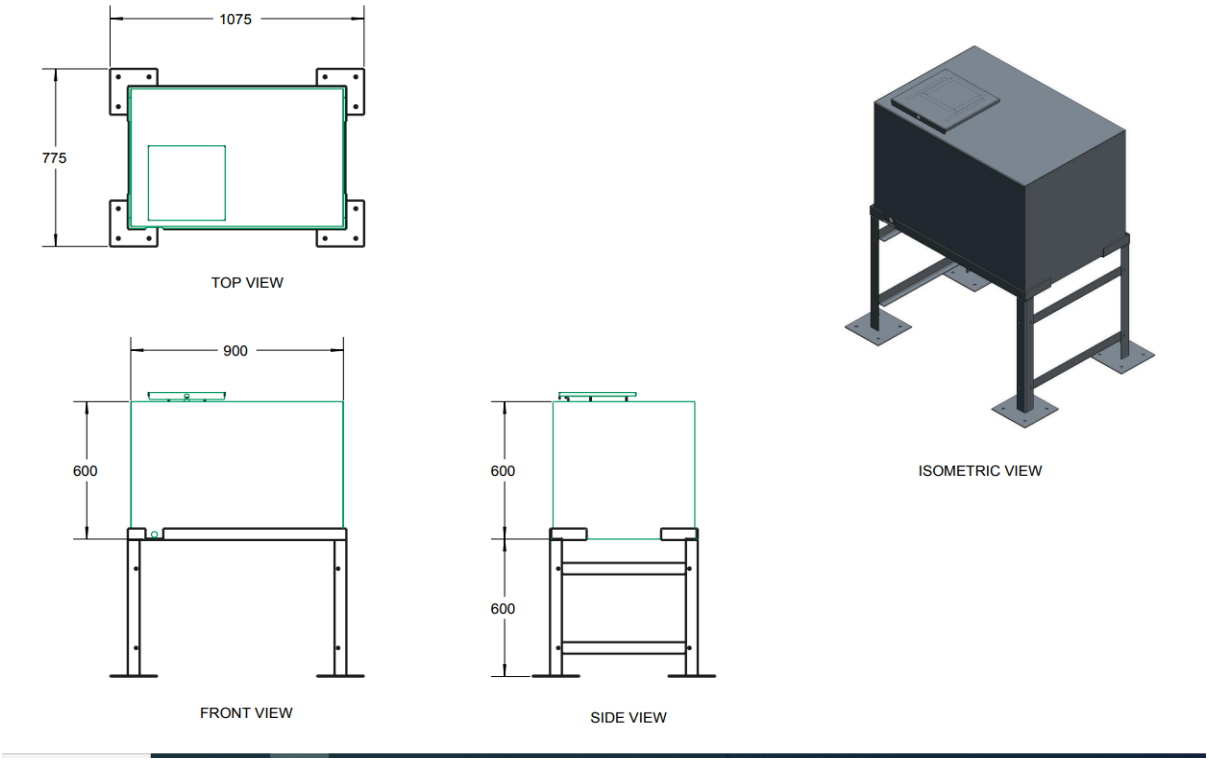


Fig. 2 20KVA DG External Fuel Tank of 300 Litres

Annexure-V Engine Specifications for 12.5KVA portable DG

Specifications	20 kVA
Engine: model, type	G20-II, Natural aspiration
No. of cylinders	3
Cylinder arrangement	Inline
Displacement, L (cu. in.)	1.08 (65.9)
Bore and stroke, mm (in.)	91 x 110 (3.58 x 4.33)
Compression ratio	17.5:1
Governor: type, Class	Mechanical, Class A2
Frequency regulation, steady state	ISO 8528 G2
Air cleaner type, Qty	Dry, 1
Unit-mounted radiator ambient temperature °C (°F)	50 (122)
Max. power kWm (BHP) @ rated speed (rpm)	19 (25) @ 1500
Diesel Fuel Consumption	
100% Load (Lph)	5.3
75% Load (Lph)	4
Lube Oil Consumption	
100% load	0.1 % of SFC

Fuel System	
Fuel prime pump	Mechanical
Fuel filter : Type, Qty	Combo fuel filter, 1
Recommended fuel	HSD
Fuel tank capacity, attached on the top of the DG.	60 Liter
Fuel filter change period	Initial - 100 hrs / 3 months, Subsequent 500 hrs / 6 months whichever is earlier
Lubrication System	
System type	Forced Lubrication
Lube oil type	20/40W Oil
Oil pan capacity with filter, L	6
Oil filter: Quantity, Type	2, spin on & by- pass
Oil and oil filter change period	Initial - 100 hrs / 3 months, Subsequent 500 hrs / 6 months whichever is earlier
Exhaust System	
Maximum allowable back pressure, KPa (in.Hg)	4 (1.18)
Exhaust outlet size at engine hookup, mm (in)	50 (1.97)
Silencer Type, Quantity	Residential, 1
Exhaust temperature at rated kW, dry exhaust, °C (°F)	600 (1112)
Cooling System	
Ambient temperature, °C (°F)	50 (122)
Coolant capacity including engine, L (gal)	10.9 (2.9)
Water pump type	Impeller
Fan diameter, including blades, mm (in.)	406.5 (16)
Engine Electrical System (Option-1)	
Starter Motor rated voltage VDC	12 V
Battery charging alternator	12 V, 35 Amp
Ground (negative/positive)	Negative
Battery type- Amp/hour Quantity	Flooded type, Maintenance free 90 1
Battery voltage, VDC	12
Engine Electrical System (Option-2)	
DG Cranking unit (For DG starting)	12VDC, Cranking unit in place of 12V DC external battery
Power cables	
Power Cable 25sqmm PVC copper unarmored with robust double jacket flexible with its industrial socket attached which will be readily available to connect to	

its output	
DG output point	
DG should be designed its output point facility to connect the above power cable with its cover with water proof.	

Compliance

Specifications	20 kVA
As per ISO 8178-5 mode cycle (Engine emission)	CPCB-II compliant
Noise level measured at 1 meter distance	< 75 dB (A)

Dimensions and weight

Specifications	20 kVA
Overall Size, L x W x H (mm) with its hand carrier handled from both the sites required to lift.	1400 x 850 x 1050
Weight, dry, max (kg) with its base frame galvanized	350-400Max