



**NATIONAL POWER CORPORATION**

**SUPPLEMENTAL /BID BULLETIN NO. 1**  
to the Bid Documents for the  
**SUPPLY, DELIVERY, INSTALLATION, TEST & COMMISSIONING OF 1 X 200 KW AND 1 X 100 KW MODULAR DIESEL GENSETS AND ASSOCIATED ELECTRICAL EQUIPMENT FOR KALAYAAN DPP UNDER PR NO. HO-PIG22-002/ REF. NO. PB220228-NA**

**21 February 2022**

All prospective bidders and authorized copyholders of the bid documents are hereby informed of the change in:

**A. SECTION VI – TECHNICAL SPECIFICATIONS PART II - TECHNICAL DATA SHEETS, MW-MECHANICAL WORKS**

**Please refer to the attached revised pages:**

- pp. VI-TDS(MW)-1 to VI-TDS(MW)-21 (twenty-one pages)

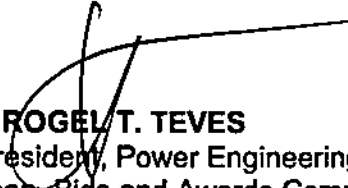
**B. SECTION III – BID DATA SHEET CLAUSE 10.5 AND NPCSD-GOODS-01 (Technical Documents)**

<b>FROM</b>	<b>TO</b>
Drawings & Documents to be submitted with the Proposal as specified in Sections M-1.0, M-2.0, Annexes A.1 to A.2 for Mechanical Works and Sections E-1.0 and E-2.0 for Electrical Works, Section VI – Part II Technical Data Sheets.	Drawings & Documents to be submitted with the Proposal as specified in Sections M-1.0, M-2.0, Annexes A.1 to <u>A.3</u> for Mechanical Works and Sections E-1.0 and E-2.0 for Electrical Works, Section VI – Part II Technical Data Sheets.

All other terms and conditions shall remain the same.

For the information and guidance of all authorized copyholders of the Terms of Reference (TOR) and prospective bidders.

For the Bids and Awards Committee:

  
**ATTY. ROGEL T. TEVES**  
Vice President, Power Engineering Services and  
Chairman, Bids and Awards Committee



**PART II – TECHNICAL DATA SHEETS**  
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<b>Annex A.1</b>	<b>Letter of Authorization and Guarantee Statement either from: 1) Original Equipment Manufacturer (OEM) or 2) Licensee/Agreement from OEM as a Licensee or 3) Authorized Distributor/Dealer (accompanied by a Certificate of Authorized Distributorship/Dealership from the OEM/Licensee of the OEM). If from the Licensee, a Certification from the OEM as a Licensee or the Licensee agreement must also be submitted), for the Diesel Generating Sets.</b>	<b>Attachment As Annex A.1</b>
<b>Annex A.2</b>	<b>“Diesel Generating Set (Engine + AC Generator) Performance Curve” @ Reference Site Conditions issued by the Manufacturer/Assembler/Integrator (duly signed with full name) of the Diesel Generating Set Model/Type being offered</b>	<b>Attachment As Annex A.2</b>
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M-7.0	<b>Standard Certification of the proposed offered model of Diesel Generating Set from any of the following internationally recognized certifying body/organization:</b>  a) Canadian Standard Association (CSA) b) Underwriter's Laboratories (UL) c) Japanese Industrial Standards (JIS) d) European Commission (CE) e) Lloyd's Register (LR) f) Germanischer Lloyd (GL) g) Nippon Kaiji Kyokai (NKK) h) American Bureau of Shipping (ABS)	
M-8.0	<b>Power Derate Curves and Details or Certificate/Statement from Diesel Generating Set's Manufacturer/Assembler/ Integrator that the proposed Diesel Engine-Generator Set have no deration at Reference Site Conditions.</b>	
M-9.0	<b>Manufacturer/Assembler/Integrator's General Data, Catalogue and Brochures of model/type of equipment offered and published as standard products for the Diesel Generating Set which contain the following information:</b>  b) Manufacturer/Assembler c) Model/Type d) Prime Rated Power e) Voltage f) Power Factor g) Frequency h) Rated Speed i) Arrangement and Number of Cylinders	
M-10.0	<b>Technical Data for Engine and Auxiliaries</b>	See Attached Forms on page VI-TDS(MW)-16
M-11.0	<b>Supplier/Manufacturer/Assembler Drawings, Brochures, Instruction Manuals and other Documents as specified in Clause GW-6.3 and other relevant Clauses of the Technical Specifications</b>	

**PART II – TECHNICAL DATA SHEETS**

**MW – MECHANICAL WORKS**

**DOCUMENTS TO BE SUBMITTED DURING THE BID OPENING**  
**(Sections M-1.0, M-2.0, Annexes A.1, A.2 & A.3)**

**NOTES**

1. The Bidder shall complete this technical data sheet and submit the filled-up forms with the technical proposal. The Bidder shall use additional sheets as necessary for any other additional information following the format shown herein or by reproducing the same.
2. The data required are technical features and characteristics of the Equipment to be provided by the bidder. Bidder's proposal shall at least be equal or superior to the requirements specified by NPC.
3. Deviation from the requirements indicated in the technical data sheets M-1.0, M-2.0 and non-submission of the required documents listed as Annexes A.1, A.2 and A.3 shall be ground for disqualification.
4. All data and information shall be in English language.

\_\_\_\_\_  
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**M-1.0 DIESEL ENGINE-GENERATOR AND ASSOCIATED EQUIPMENT DATA SUMMARY**

ITEM	DESCRIPTION	NPC REQUIREMENT	SUPPLIER'S DATA
M-1.1	DG Set (Diesel Engine + AC Generator) – PRIME DUTY *	Designed, manufactured & tested in compliance with the latest version of the standards* listed below, mounted on heavy duty steel baseframe with anti-vibration pads contained in a sound attenuated & weatherproof enclosure	
M-1.2	Manufacturer/Assembler/Integrator of DG Set being offered	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-1.3	Brand Name of DG Set being offered	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-1.4	Model of DG Set being offered	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-1.5	DG Set Manufacturer/Assembler/ Integrator Experience, Year	5 (Minimum)	<u>200kW:</u> <u>100kW:</u>
M-1.6	DG Set Guaranteed Prime Rated Power at Reference Site Conditions* & 0.8 Power Factor, kW	200 (min.) & 100 (min.)	<u>200kW:</u> <u>100kW:</u>
M-1.7	DG set Guaranteed Fuel Rate at Required DG Set Prime Power Output and at Reference Site Conditions, 100 % Rated Load, li/kW-hr	<u>200kW:</u> 0.30 (max.) <u>100kW:</u> 0.30 (max.)	<u>200kW:</u> <u>100kW:</u>
M-1.8	Voltage, V	480 (± 5%)	
M-1.9	Power factor	0.80 (min.)	
M-1.10	Frequency, Hz	60	
M-1.11	No. of Phases, Ø	3	
M-1.12	Rated Speed, RPM	1800	
M-1.13	Governor	Electronic	
M-1.14	Arrangement & Number of Cylinders	In-line & Multi-cylinder	

- NOTES:**
- \* IEC 60034, IEC 60085, IEC60529, ISO 9001 and ISO 3046
  - Guaranteed Fuel Consumption which is more than the specified maximum value will be ground for rejection of the equipment being offered.
  - Experience less than what is required will be ground for rejection of the equipment being offered.

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**M-1.0 DIESEL ENGINE-GENERATOR AND ASSOCIATED EQUIPMENT DATA SUMMARY**

ITEM	DESCRIPTION	NPC REQUIREMENT	SUPPLIER'S DATA
M-1.15	Maximum Sound Pressure Level @ 1-meter distance, dBA	85	<u>200kW;</u> <u>100kW;</u>
M-1.16	Maximum Permissible NOx, mg/Nm <sup>3</sup>	2000 as NO <sub>2</sub>	<u>200kW;</u> <u>100kW;</u>
M-1.17	Maximum Permissible Sox, mg/Nm <sup>3</sup>	700 as SO <sub>2</sub>	<u>200kW;</u> <u>100kW;</u>
M-1.18	Maximum Permissible CO, mg/Nm <sup>3</sup>	500 as CO	<u>200kW;</u> <u>100kW;</u>
M-1.19	Particulates, mg/Nm <sup>3</sup>	200	<u>200kW;</u> <u>100kW;</u>
M-1.1.20	"Diesel Generating Set (Engine + AC Generator) Performance Curve" @ Reference Site Conditions issued by the Manufacturer/Assembler/Integrator (duly signed with full name) of the Diesel Generating Set Model/Type being offered	To be Submitted/Attachment as Annex A.2	
M-1.2	Diesel Engine		
M-1.2.1	Manufacturer	By Supplier	
M-1.2.2	Manufacturer's Experience, years	10	
M-1.2.3	Place of Manufacture	By Supplier	
M-1.2.4	Brand Name of Diesel Engine being offered	By Supplier	
M-1.2.5	Model/Type	By Supplier	
M-1.2.6	Engine Prime Brake Power Output at Reference Site Conditions, kWm or BHP	By Supplier	
M-1.2.7	"Engine Performance Curve" @ Reference Site Conditions issued by the Diesel Engine Manufacturer or Diesel Generating Set Manufacturer/Assembler/Integrator (duly signed with full name) for the Diesel Engine Model/Type being offered	To be Submitted/Attachment as Annex A.3	

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**M-2.0 – FUEL CONSUMPTION FOR DIESEL ENGINE-GENERATOR SETS**

A	B**	C	D*	E
DG Set Guaranteed Prime Rated Power at Reference Site Conditions (Minimum KW)	DG Set Guaranteed Fuel Rate at Required Prime Rated Power & at Reference Site Conditions (liters/kilowatt-hour)	Cost of Fuel (PhP/ltr)	No. of operating hours per year (hrs)	1-Year Cost of Fuel Consumption, (A x B x C x D) (PhP)
200		40.40	3,427	
100		40.40	3,427	

**NOTES:** \* For evaluation Purposes: The estimated number of operating hours per year is based on 16 hrs/day operation, 25 days PMS, 10% Outages and assumed 70% Utilization Factor.

\*\* Write the Guaranteed Fuel Rate in three decimal places, i.e. 0.270 L/kW-hr. If Fuel Rate is indicated in more than three decimal places, only the first three decimal numbers will be considered regardless of any number written in the fourth decimal number.

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**PART II – TECHNICAL DATA SHEETS****MW – MECHANICAL WORKS****DOCUMENTS TO BE SUBMITTED DURING POST-QUALIFICATION  
BUT NOT LIMITED TO:****(Sections M-3.0 to M-5.1)****NOTES**

1. The Bidder shall complete this technical data sheet and submit the filled-up forms during the post-qualification which shall only serve as reference for the review and approval of brochure/drawings during implementation stage. The Bidder shall use additional sheets as necessary for any other additional information following the format shown herein or by reproducing the same.
2. The data required are technical features and characteristics of the Equipment to be provided by the bidder which shall at least be equal or superior to the requirements specified by NPC.
3. The lists of Spares and Tools (Items M-4.1 to M-5.1) are preliminary and subject to changes to conform with the final design and model/brand of the proposed equipment (per manufacturer's standard).

The Bidder shall indicate "N/A" to the respective items in the said lists (Items M-4.1 to M-5.1) if found not applicable to the brand/model of the proposed equipment. However, NPC reserves the right to request the Supplier to provide the same or its equivalent if it is determined as "deemed necessary or standard tool/inherent part or optional item" during the evaluation, checking and review/approval of the final lists to be submitted by the Supplier during the Contract Stage at no cost to NPC.

4. Non submission of the above documents shall be a ground for disqualifications.

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**M-3.0 DIESEL ENGINE**

ITEM	DESCRIPTION	NPC REQUIREMENT	SUPPLIER'S DATA
<b>M-3.1</b>	<b>DIESEL ENGINE</b>		
M-3.1.1	1. Manufacturer	By Supplier	
	2. Manufacturer's Experience, yr.	10	
M-3.1.2	Place of Manufacture	By Supplier	
M-3.1.3	Model/Type	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-3.1.4	Engine Prime Rated Brake Power at Reference Site Conditions, kWm or BHP	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-3.1.5	Number of Cylinders	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-3.1.6	Bore and Stroke, mm	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-3.1.7	Piston Displacement, L	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-3.1.8	Piston Speed, m/s	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-3.1.9	Engine Mean Effective Pressure, kg/cm <sup>2</sup>	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-3.1.10	Compression Ratio	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-3.1.11	Overall Dimension of Complete Unit, L x W x H, mxmxm	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-3.1.12	Maximum Weight of Diesel Engine Generator Set on Skid, kg	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-3.1.13	Heat Dissipation including (Generating set), kJ/hr	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-3.1.14	Factory Acceptance Test	Yes	<u>200kW:</u> <u>100kW:</u>

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**M-4.2 SPARE PARTS PER UNIT OF 100 KW DG SET DURING THE WARRANTY PERIOD (Minimum Requirements as Specified in the Technical Specifications and Manufacturer’s Standard and Recommended Spare Parts) \***

ITEM	DESCRIPTION	PART NO.	MINIMUM QTY.**	SUPPLIER'S DATA
M-4.2a	Air Filter Element		6 pcs/size	
M-4.2b	Lube Oil Filter Element		30 pcs/size	
M-4.2c	Fuel Filter Element		15 pcs/size	
M-4.2d	Water Filter Element		6 pcs/size	
M-4.2e	Fan Belt		3 pcs/size	
M-4.2f	Alternator Belt		3 pcs/size	
M-4.2g	Coolant		4 gallons	
M-4.2h	Expected spares to be consumed during the performance test		1 lot	
M-4.2i	Other spare parts recommended by Manufacturer		1 lot	
M-4.2i.1				
M-4.2i.2				
M-4.2i.3				
M-4.2i.4				
M-4.2i.5				
M-4.2i.6				
M-4.2i.7				
M-4.2i.8				
M-4.2i.9				
M-4.2i.10				

**NOTES:**

\* *The above list is preliminary which is subject to changes to conform with the final design and model/brand of the proposed equipment (per manufacturer's standard). NOTE #3 of page VI-TDS (MW)-7.*

\*\* *Quantities may be increased depending on manufacturer's required replacement intervals.*

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**M-4.3 SPARE PARTS PER TOTAL UNITS OF 200 KW DG SET SUPPLIED AND DELIVERED AT KALAYAAN DPP \***

ITEM	DESCRIPTION	PART NO.	MINIMUM QUANTITY**	SUPPLIER'S DATA
M-4.3a	Fuel Injector Assembly		2 pcs	
M-4.3b	Top Overhauling Kit		1 set	
M-4.3c	Actuator		1 set	
M-4.3d	Jacket Water Pump Repair Kit		1 set	
M-4.3e	Lube Oil Pump Repair Kit		1 set	
M-4.3f	Fan Adaptor & Accessories including Bearings		2 sets	
M-4.3g	Rocker Gear Cover Gasket		12 pcs	
M-4.3h	Thermostat		1 set	
M-4.3i	Lube Oil Pump Switch		1 set	
M-4.3j	Hot Water Temp. Switch		1 set	
M-4.3k	Turbocharger Repair Kit		1 set	
M-4.3l	Exhaust Manifold Bellow		1 set	
M-4.3m	Magnetic Pick-up		1 pc	
M-4.3n	Other spare parts recommended by Manufacturer		1 Lot	
M-4.3n.1				
M-4.3n.2				
M-4.3n.3				
M-4.3n.4				
M-4.3n.5				

**NOTES:**

\* *The list is preliminary which is subject to changes to conform with the final design and model/brand of the proposed equipment (per manufacturer's standard). NOTE #3 of page VI-TDS (MW)-7.*

\*\* *Quantities may be increased depending on manufacturer's required replacement intervals.*

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NATIONAL POWER CORPORATION		VI-TDS(MW)-11

**M-4.4 SPARE PARTS PER TOTAL UNITS OF 100 KW DG SET SUPPLIED AND DELIVERED AT KALAYAAN DPP \***

ITEM	DESCRIPTION	PART NO.	MINIMUM QUANTITY**	SUPPLIER'S DATA
M-4.4a	Fuel Injector Assembly		2 pcs	
M-4.4b	Top Overhauling Kit		1 set	
M-4.4c	Actuator		1 set	
M-4.4d	Jacket Water Pump Repair Kit		1 set	
M-4.4e	Lube Oil Pump Repair Kit		1 set	
M-4.4f	Fan Adaptor & Accessories including Bearings		2 sets	
M-4.4g	Rocker Gear Cover Gasket		12 pcs	
M-4.4h	Thermostat		1 set	
M-4.4i	Lube Oil Pump Switch		1 set	
M-4.4j	Hot Water Temp. Switch		1 set	
M-4.4k	Turbocharger Repair Kit		1 set	
M-4.4l	Exhaust Manifold Bellow		1 set	
M-4.4m	Magnetic Pick-up		1 pc	
M-4.4n	Other spare parts recommended by Manufacturer		1 Lot	
M-4.4n.1				
M-4.4n.2				
M-4.4n.3				
M-4.4n.4				
M-4.4n.5				

**NOTES:**

\* *The list is preliminary which is subject to changes to conform with the final design and model/brand of the proposed equipment (per manufacturer's standard). NOTE #3 of page VI-TDS (MW)-7.*

\*\* *Quantities may be increased depending on manufacturer's required replacement intervals.*

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**M-5.0 STANDARD/SPECIAL TOOLS**

**M-5.1 STANDARD/SPECIAL TOOLS PER TOTAL UNITS OF DG SETS SUPPLIED AND DELIVERED AT KALAYAAN DPP (Minimum Requirements as Specified in the Technical Specifications and Manufacturer’s Standard/Recommended Tools)<sup>+</sup>**

ITEM	DESCRIPTION	NPC REQUIREMENT	SUPPLIER'S DATA
M-5.1a	Portable computer (Minimum of Intel I7 Processor, 16GB RAM, 500GB HDD, 2Ghz, 12"-13.3" screen size & with the latest pre-installed windows operating system compatible with manufacturer's/ Supplier's software) needed in programming the DG set control setting complete with licensed CD-ROM drive dongles of DG set control system and electronic/digital governing system including other digital components that require exclusive programs from the Manufacturer and/or Supplier with free update throughout the operating life of the DG set	1 set	
M-5.1a	Other tools recommended by the Manufacturer	1 lot	

**NOTES: +** Minimum requirements but the Supplier shall provide/include in the list all the necessary/standard tools required in the performance of normal maintenance and overhaul. The above list is preliminary which is subject to changes to conform with the final design and model/brand of the proposed equipment (per manufacturer's standard). Refer also to NOTE #3 of page VI-TDS (MW)-7.

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**PART II – TECHNICAL DATA SHEETS**

**MW – MECHANICAL WORKS**

**DOCUMENTS TO BE SUBMITTED DURING THE PROJECT IMPLEMENTATION BUT NOT LIMITED TO:**

**(Sections M-6.0, M-7.0, M-8.0, M-9.0, M-10.0 & M-11.0)**

**NOTES**

1. The Bidder shall complete this technical data sheet/documents and submit the filled-up forms during the project implementation (during contract stage). The Bidder shall use additional sheets as necessary for any other additional information following to the format shown herein or by reproducing the same.
2. The data required are technical features and characteristics of the Equipment to be provided by the bidder. Bidder's proposal shall at least be equal or superior to the requirements specified by NPC. The data provided shall be used as basis for evaluation of brochures, drawings and other documents to be submitted for review and approval during the project implementation.
3. All data and information shall be in English language.

<b>DOCUMENTS TO BE SUBMITTED DURING PROJECT IMPLEMENTATION BUT NOT LIMITED TO:</b>		
<b>SECTION</b>	<b>DESCRIPTION</b>	<b>PAGE</b>
M-6.0	ISO 9001 Certificate of the Manufacturer/Assembler/Integrator or equivalent for each of the Diesel Generating Set	
M-7.0	Standard Certification of the proposed offered model Diesel Generating Set from any of the following internationally recognized certifying body/organization: a) Canadian Standard Association (CSA) b) Underwriter's Laboratories (UL) c) Japanese Industrial Standards (JIS) d) European Commission (CE) e) Lloyd's Register (LR) f) Germanischer Lloyd (GL) g) Nippon Kaiji Kyokai (NKK) h) American Bureau of Shipping (ABS)	





**M-10.0 DIESEL ENGINE**

ITEM	DESCRIPTION	NPC REQUIREMENT	SUPPLIER'S DATA
<b>M-10.1</b>	<b>DIESEL ENGINE</b>		
M-10.1.1	Fuel Rate at Required Prime Rated Power & Reference Site Conditions DG Set		
	75 % Rated Load, li/kW-hr	By Supplier	<u>200kW:</u> <u>100kW:</u>
	50 % Rated Load, li/kW-hr	By Supplier	<u>200kW:</u> <u>100kW:</u>
	25 % Rated Load, li/kW-hr	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.1.2	Number of Strokes	4	
M-10.1.3	Rotating Direction (Viewed from Flywheel Side)	By Supplier	
M-10.1.4	Required Time from Starting Signal to Rated Speed, min.	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.1.5	Maximum Time from "Cold Condition" to Rated Speed w/ Load and w/o AC power available for motor-driven auxiliaries, min.	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.1.6	Heaviest part of DG set for maintenance, kg	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.1.7	Idling Speed Recommended, RPM	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.1.8	Duration of Idling (max.), min.	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.1.9	Minimum Load @ Normal Speed, kW	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.1.10	Maximum Load @ Normal Speed, kW	By Supplier	<u>200kW:</u> <u>100kW:</u>

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**M-10.0 DIESEL ENGINE (Cont'd.....)**

ITEM	DESCRIPTION	NPC REQUIREMENT	SUPPLIER'S DATA
M-10.1.11	Engine Heat Dissipation, kJ/hr	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.1.12	Engine Mechanical Efficiency, $\eta_m$	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.1.13	Numerical Values for Power Adjustment Parameters (Exponents) for high speed per Table 2 of ISO 3046,	By Supplier	<u>200kW:</u> a= m= n= s= <u>100kW:</u> a= m= n= s=
M-10.1.14	Expected Useful Life of Unit @ Prime Rated Power Load, Yrs.	10	
M-10.1.15	Factory Acceptance Test	Yes	
<b>M-10.2</b>	<b>LUBRICATING OIL SYSTEM</b>		
M-10.2.1	Total Lube Oil System Capacity, liters	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.2.2	Lube Oil Consumption of the Engine, g/kWhr	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.2.3	Lube Oil Pump Capacity, m <sup>3</sup> /hr	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.2.4	Lube Oil Filter Mesh, microns	By Supplier	
M-10.2.5	Lube Oil Filter Type & Capacity,	Spin-On Full Flow	<u>200kW:</u> <u>100kW:</u>
M-10.2.6	Lube Oil Priming Pump Capacity, if applicable, m <sup>3</sup> /hr	By Supplier	
<b>M-10.3</b>	<b>STARTING SYSTEM</b>		
M-10.3.1	Battery Capacity, AH	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.3.2	Starting Voltage, V	24 or 12	<u>200kW:</u> <u>100kW:</u>
M-10.3.3	Starting Motor Rating, HP	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.3.4	Full Load Cranking Current, A	By Supplier	
M-10.3.5	Battery Charging Type,	By Supplier	
M-10.3.6	Battery Charger Charging rate	By Supplier	
M-10.3.7	Time of Cranking, sec	30	

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**M-10.0 DIESEL ENGINE (Cont'd.....)**

ITEM	DESCRIPTION	NPC REQUIREMENT	SUPPLIER'S DATA
<b>M-10.4</b>	<b>EXHAUST SYSTEM</b>		
M-10.4.1	Exhaust Gas Flow, m <sup>3</sup> /hr	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.4.2	Exhaust Gas Temperature, °C	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.4.3	Maximum Allowable Back Pressure, mmH <sub>2</sub> O	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.4.4	Exhaust Pipe (nom. Diameter x length x weight), mm x mm x kg	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.4.5	Silencer (nom. Diameter x length x weight), mm x mm x kg	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.4.6	Exhaust Pipe Material, ASTM	A 106 or as required	
M-10.4.7	Silencer Material, ASTM	A 106 or as required	
<b>M-10.5</b>	<b>INTAKE AIR SYSTEM</b>		
M-10.5.1	Air Intake Valve (Free Air), m <sup>3</sup> /hr	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.5.2	Air Filter Type	By Supplier	
M-10.5.3	Turbocharger Type	By Supplier	
M-10.5.4	Turbocharger RPM	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.5.5	Charge Air Cooler Type	By Supplier	
<b>M-10.6</b>	<b>COOLING SYSTEM (Coolant for initial filling shall be provided by Supplier per Engine)</b>		
M-10.6.1	Total Cooling Water Capacity, Liters	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.6.2	Cooling Water Pump Capacity, m <sup>3</sup> /hr	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.6.3	Jacket Water Pump Capacity, m <sup>3</sup> /hr	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.6.4	Radiator Fan Air Flow, m <sup>3</sup> /hr	By Supplier	<u>200kW:</u> <u>100kW:</u>
M-10.6.5	Core Material	Aluminum	<u>200kW:</u> <u>100kW:</u>
M-10.6.6	Radiated Heat to Ambient, kW/hr	By Supplier	<u>200kW:</u> <u>100kW:</u>

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**M-10.0 DIESEL ENGINE (Cont'd.....)**

ITEM	DESCRIPTION	NPC REQUIREMENT	SUPPLIER'S DATA
M-10.6.7	Expansion Tank Capacity and Elevation, if applicable, liters and m.	By Supplier	
M-10.6.8	Radiator Dimensions (l x w x h), m x m x m	By Supplier	
M-10.6.9	Recommended cooling water properties such as ph, hardness, TDS, etc., ASTM		
	PH Value, ppm	By Supplier	
	Total Hardness	By Supplier	
	TDS, ppm	By Supplier	
	Chloride	By Supplier	
	Sulfate, ppm	By Supplier	
	Silica, mg/l	By Supplier	
	Iron, ppm	By Supplier	
	Conductivity, uS/cm	By Supplier	
<b>M-10.7</b>	<b>FUEL SYSTEM</b>		
M-10.7.1	Fuel Feed Pump Capacity, m <sup>3</sup> /hr	By Supplier	200kW: 100kW:
M-10.7.2	Discharge Head of Feed Pump, m	By Supplier	200kW: 100kW:
M-10.7.3	Fuel Filter Type and Mesh, microns	Spin-On Full Flow	
M-10.7.4	Injection Nozzle Type	By Supplier	
M-10.7.5	Fuel Day Tank Capacity, m <sup>3</sup>	1	
M-10.7.6	Fuel Day Tank Type (Elevated)	Rectangular or Approved Shape	
M-10.7.7	Fuel Tank Dimensions (W x L x H), m x m x m	Per Drawings	
M-10.7.8	Fuel Tank Plate Material, ASTM	A 36	
M-10.7.9	Fuel Tank Shell Thickness, mm	5	
M-10.7.10	Structural Steel Supports	Included	

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**M-10.0 DIESEL ENGINE (Cont'd.....)**

ITEM	DESCRIPTION	NPC REQUIREMENT	SUPPLIER'S DATA
M-10.8	<b>ENCLOSURE (Weatherproof)</b>		
M-10.8.1	Manufacturer	By Supplier	
M-10.8.2	Max. Sound Pressure Level @ 1-m distance, dBA	85	
M-10.8.3	Dimensions (L x W x H), m x m x m	By Supplier	
M-10.8.4	Enclosure Walls Thickness, mm	2 minimum	
M-10.8.5	Enclosure Roof Thickness, mm	2 minimum	
M-10.8.6	Enclosure Material, ASTM	A 36	
M-10.8.7	Hinges Material	Stainless Steel	
M-10.8.8	Insulation Materials	Oil-water resistant and fire retardant insulation and sound attenuating material	
M-10.8.9	Total Weight (DG set, Auxiliaries & Enclosure), kg	By Supplier	

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**M-10.0 DIESEL ENGINE (Cont'd.....)**

ITEM	DESCRIPTION	NPC REQUIREMENT	SUPPLIER'S DATA
<b>M-10.9</b>	<b>ENGINE METERING AND INDICATION</b>		
M-10.9.1	RPM Meter (RPM) *	Included	
M-10.9.2	Hours Run Counter (hours) *	Included	
M-10.9.3	Oil Pressure (kg/cm <sup>2</sup> )*	Included	
M-10.9.4	Oil Temperature (°C) *	Included	
M-10.9.5	Cooling Water Temp. (°C) *	Included	
M-10.9.6	Cylinders Exhaust Gas Temperature (°C)	Optional	
M-10.9.7	Battery Voltage (V)	Included	
M-10.9.8	Ready to Start	Included	
M-10.9.9	Remote Control Position Indication	Included	
<b>M-10.10</b>	<b>ENGINE PROTECTION AND ALARM</b>		
M-10.10.1	Engine Overspeed	Included	
M-10.10.2	Lube Oil Pressure Low	Included	
M-10.10.3	Lube Oil Temperature High	Included	
M-10.10.4	Cooling Water Temp. High	Included	
M-10.10.5	Cooling Water Temp. Low	Optional	
M-10.10.6	Fuel Day Tank Level High	Included	
M-10.10.7	Fuel Day Tank Level Low	Included	
M-10.10.8	Battery Voltage High	Included	
M-10.10.9	Battery Voltage Low	Included	
M-10.10.10	Failure to Crank	Included	
M-10.10.11	Overcrank	Included	
M-10.10.12	Annunciator Window with Common Audio alarm	Included	
<b>M-10.11</b>	<b>HUMAN MACHINE INTERFACE CONTROL</b>		
M-10.11.1	Manual Start/Stop *	Included	
M-10.11.2	Auto/Remote Start	Included	
M-10.11.3	Test Run Auto	Included	
M-10.11.4	Emergency Stop *	Included	
M-10.11.5	Alpha/Numeric Screen	Included	
M-10.11.6	Discrete Status Indicators	Included	
M-10.11.7	Fault Reset	Included	

**NOTE: \*** These monitoring/control points shall also be provided at DG set Enclosure-mounted panel with viewing window

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