

# Survey: Diesel Generator Set

## 1 Synopsis

This survey is issued as part of a Request for Information (RFI) by the United States Coast Guard (USCG) as a means of market research for gaining knowledge of capabilities pertaining to Diesel Generator Sets that may meet Polar Ice Breaker's specific design and operational requirements.

## 2 Purpose

The purpose of this survey is to perform market research to identify the capability of currently manufactured diesel generator sets that may meet Polar Ice Breaker's specific design and operational requirements as defined herein.

## 3 Requirements

The following design and operational requirements for Diesel Generator Sets are sought:

- 1) Suitable for Marine (shipboard) installation
- 2) Produce 450, 4160 or 6600VAC, 3 phase, three wire, delta wound, 60Hz, ungrounded
- 3) Continuous power rating of (a) between 2,000 eKW and 10,000 eKW for Auxiliary Generator Sets and (b) between 8,000 eKW and 25,000 eKW for Main Generator Sets.
- 4) Capable of meeting the following step load requirements:  
*Variation from rated voltage – transient*). Momentary voltage variations within the range of -15% to +20% of the rated voltage, and the capability to restore voltage to within  $\pm 3\%$  of the rated voltage in not more than 1.5 seconds when:
  - A load equal to the starting current of a motor or a group of motors, at least 60% of the rated current of the generator, and power factor of 0.4 lagging or less, is suddenly thrown on with the generator running at no load; and
  - A load equal to the above is suddenly thrown off.
- 5) Capable of operating in an interior ambient air temperature range from 40°F to 122°F and combustion intake air temperature range from -40°F to 95°F
- 6) Prime Mover operates on ultra-low sulfur Naval Distillate Fuel (F-76) and continuous power rating:  
(a) between 2,000 BkW and 10,000 BkW for diesel engines and  
(b) between 8,000 BkW and 25,000 BkW for diesel engines.
- 7) (a) An Auxiliary Generator capable of operating satisfactorily over an operating life of not less than 150,000 hours. The life predicated on 45,000 hours at 50 percent rated-load; 60,000 hours at 80 percent rated-load; and 45,000 hours at 90 percent rated-load. The generator capable of withstanding not less than 100,000 start/stops during its operating life.  
  
(b) A Main Generator capable of operating satisfactorily over an operating life of not less than 30,000 hours. The life predicated on 15,000 hours at 50 percent rated-load; 15,000 hours at 90 percent rated-load. A generator capable of withstand not less than 20,000 start/stops during its operating life.

## 4 Response Instructions

Please provide Product Guides/Data Sheets for each diesel generator set that meets the design and operational requirements listed above. Additionally, please complete the questions on Attachment (1). If the generator set does not meet an individual requirement stated above, please indicate the maximum capability for that requirement.

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### Attachment (1)

Questions:

For each Generator Set manufactured by the company please forward Product Guides/Data Sheets that provide the following data/answer the following questions:

1. Generator Set Manufacturer
2. Generator Set Model No.
3. Dimensions (LxWxH)
4. Weight (Dry and Wet)
5. Prime Mover Model No.
6. Prime Mover Manufacturer
7. RPM
8. No. of Cylinders
9. Cylinder Diameter
10. Stroke
11. Time Between Center Section Overhauls for each Generator Set based on the following tables:

**Table 1 Mission Profile for Auxiliary Diesel Engines**

Percent of Time	MCR
30%	50%
40%	80%
30%	90%

**Table 2 Mission Profile for Main Diesel Engines**

Percent of Time	MCR
50%	50%
50%	90%

12. Continuous and Prime Power Rating (ekW)
13. Emissions Certification Obtained or projected date certification will be obtained for the following (please indicate all that apply):
  - a. IMO Tier II
  - b. IMO Tier III
  - c. 40 CFR Part 1042 Tier 3
  - d. 40 CFR Part 1042 Tier 4 (as applicable)
14. Engine description
15. Start up requirements (Compressed Air Start capable?)
16. Support system descriptions (e.g. cooling water system)
17. Governor arrangements
18. Operating fluid requirements
19. Fuel Consumption and specified limits
20. Noise and vibration
21. Automation and control
22. Maintenance requirements including minimum and desirable clearances for removal of all parts for maintenance
23. Combustion Air consumption
24. Volume of exhaust gases at rated load specifying back pressure and temperatures for which the data apply
25. Brake Mean Effective Pressure (BMEP)

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26. Describe the method(s) used to comply with 40 CFR Part 1042, Tier 3 and 4 emissions standards. If compliance requires off-engine components, please provide space, weight, consumable type and quantity, and any other pertinent information on how the off-engine components must be integrated into the ship.
27. Are automatic voltage regulators typically included as part of the provided Generator sets? If so, please provide make(s), model(s) and datasheets for the generators listed above. If not, what are the requirements for interfacing with the generators listed above?
28. Are governors typically included as part of the provided Generator sets? If so, please provide make(s), model(s) and datasheets for the prime movers listed above. If not, what are the interface requirements for the prime movers listed above?
29. What type of controllers/control systems are typically provided with the above listed Generator sets?
30. For the Generator sets listed above and given the following transient conditions, what are the power quality transients at the generator terminals?
  - a. A step load of 0-50% of rated load.
    - i. Frequency dip (% maximum deviation)
    - ii. Frequency recovery time (to +/-3% of nominal)
    - iii. Voltage dip (% maximum deviation)
    - iv. Voltage recovery time (to +/-3% of nominal)
  - b. A step load of 50-100% of rated load.
    - i. Frequency dip (% maximum deviation)
    - ii. Frequency recovery time (to +/-3% of nominal)
    - iii. Voltage dip (% maximum deviation)
    - iv. Voltage recovery time (to +/-3% of nominal)
  - c. A load drop of 100-0% of rated load.
    - i. Frequency dip (% maximum deviation)
    - ii. Frequency recovery time (to +/-3% of nominal)
    - iii. Voltage dip (% maximum deviation)
    - iv. Voltage recovery time (to +/-3% of nominal)

For Generator Component:

31. Short Circuit Rating
32. Subtransient reactance
33. Output Voltage
34. 2 Hour Overload Rating