

# **GE Transportation** Leader in Clean Island Power Solutions

June 2019

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# We are **GE** Transportation. **Powering the World.**

# **Fact Sheet**

# Stationary Power

V228 and V250 engines and gensets for stationary power generation



**GE** Transportation a Wabtec company



**OVERVIEW** 



**OVERVIEW** 

- **GE MDC engines and gensets** available with EPA Tier 4, IMO Tier III
- **GE MDC Engines** Driving the lowest life cycle costs and greatest fuel efficiency to customers
- **GE MDC Engines** Transferring powerful engine technology to the marine environment
- Bringing new possibilities to the most challenging conditions and environments











- Both V228 and V250 engines can be offered for 50 and 60 Hz applications.
- V228 stationary engine offers continuous power from 1961 to 2905 bkW and from 2353 to 3486 bkW for limited time running power. V228 engine is available in 12- and 16- cylinder models.
- V250 stationary engine offers continuous power from 2999 to 4442 bkW and from 3544 to 5250 bkW for emergency standby power. V250 engine is available in 12- and 16-cylinder models.
- Fuel optimized, world bank and EPA Tier 2 compliant emissions standards available.

- Narrow footprint allows ease of maintenance and packaging advantage.
- Advanced EC2+ Controller & Electronic Fuel Injection (EFI) optimizes the combustion to improve fuel efficiency.
- No deration on extreme weather conditions up to 50°C & 300m.
- Capable of operating in desert conditions with cyclonic or paper-type air filtration.
- Long oil change intervals that range from 2000 to 4000 operating hrs. depending on duty cycle.
- Impressive durability with no planned major overhauls for up to 40,000 hours.\*
- World-wide service network.



GE Transportation a Wabtec company **OVERVIEW** 



### GE Transportation (Engine) Genset Power Ratings based on ISO 8528-1: 2005

| Engine Model          |                            | Engine (bkW)              |                      |  |                                     | Engine (bhp)                 |                      |  |                                     |
|-----------------------|----------------------------|---------------------------|----------------------|--|-------------------------------------|------------------------------|----------------------|--|-------------------------------------|
| <b>Speed</b><br>(RPM) | Elec.<br>Frequency<br>(Hz) | Continuous<br>Power (bkW) | Prime Power<br>(bkW) | Limited Time<br>Running<br>Power (bkW) | Emergency<br>Standby<br>Power (bkW) | Continuous<br>Power<br>(bhp) | Prime Power<br>(bhp) | Limited Time<br>Running<br>Power (bhp) | Emergency<br>Standby Power<br>(bhp) |
| 16V250                |                            |                           |                      |  |                                     |                              |                      |  |                                     |
| 1000                  | 50                         | 4442                      | 4846                 | NA                                     | 5250                                | 5957                         | 6498                 | NA                                     | 7040                                |
| 900                   | 60                         | 3995                      | 4358                 |  | 4721                                | 5357                         | 5844                 |  | 6331                                |
| 12V250                |                            |                           |                      |  |                                     |                              |                      |  |                                     |
| 1000                  | 50                         | 3330                      | 3633                 | NA                                     | 3936                                | 4466                         | 4872                 | NA                                     | 5278                                |
| 900                   | 60                         | 2999                      | 3271                 |  | 3544                                | 4021                         | 4386                 |  | 4752                                |
| 16V228                |                            |                           |                      |  |                                     |                              |                      |  |                                     |
| 1000                  | 50                         | 2905                      | 3196                 | 3486                                   | N1/A                                | 3896                         | 4286                 | 4675                                   | N/A                                 |
| 900                   | 60                         | 2614                      | 2876                 | 3137                                   | N/A                                 | 3506                         | 3857                 | 4207                                   |                                     |
| 12V228                |                            |                           |                      |  |                                     |                              |                      |  |                                     |
| 1000                  | 50                         | 2179                      | 2397                 | 2614                                   | N/A                                 | 2922                         | 3214                 | 3506                                   | NI/A                                |
| 900                   | 60                         | 1961                      | 2157                 | 2353                                   |                                     | 2630                         | 2893                 | 3156                                   | N/A                                 |



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## **GET Commitment to Power**

- GEVO introduced 2005, based on EPA Tier 4 locomotive engine
- GE invested **\$400M** to develop a EPA T4 / EU Tier III Engine with No After Treatment

## Plant Owners

- Meet EPA Tier 4 / European Tier III
- High **Reliable** Engines
- Best in Class Fuel Efficiency
- Industry leading life cycle
  costs
- Up to 60,000 hours between overhauls (no top end overhaul)

## Plant Builders

**Best Solution** 

- **No space consuming** "SCR, DEF tanks, and associated support systems" (dosing cabinet, air lines, etc.)
- Emission Compliant / Plant
  Repower with minimal impact
  on vessel design
- Easy Start up lowers commissioning costs.

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GET's invested in a non-aftertreatment solution to lower emissions

# **GET's Investment in Emissions**

Core technology to achieve EPA Tier 4 / IMO Tier III emissions without SCR

### **GE** committed to Marine Solutions



### **Competition focused on Oil & Gas and Locomotive EGR**

Oil & Gas Locomotive CAT 3512 US EPA Tier 4 MTU 4000 US EPA Tier 4

• EMD 1010 US EPA Tier 4 CAT C175 EU IIIb

**Best Solution** 

Competitors are focused on leveraging EGR engines in O&G gensets and loco applications vs. Marine Solutions





#### GE MS T4 Engine Vs. HS with SCR



**Best Solution** 



High speed engine with SCR requires a lot of additional maintenance



**Best Solution** 



# **Best Solution**

#### EGR Design



## Fuel Consumption

- EGR has Impact on the Fuel consumption 🕇
- Common Rail Fuel system
- Increased Cylinder Pressure

Fuel consumption improved than T2 engine

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#### \_ Maintenance

- No Changes on Engine Maintenance sch.
- EGR Cleaning procedure is very simple



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These failure modes will not cause an automatic engine shutdown!

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## Fail Safe Design

#### Loss of Control

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- EGR (control valve open and backflow valve closed)
- The engine can run full power

#### Non- default Valve position

- Nominal EGR
- None to limited performance impact







RJE/CPUC, Micronesia PRIME POWER CHUUK Power Station 2 x GE12V228SDA



BOKUK/SONALGAZ, Algeria BLACKSTART / EMERGENCY Sonelgaz. Mega Deal (Biskra & Jijel CCPP) 8 x GE16V250SDA



RJE GLOBAL/SIRIUS RESOURCES (Now Independence Group), Western Australia CONTINUOUS POWER Independence Group's Nova nickel and copper mine 5 x GE12V250SDA





# References



#### TEXAS POWER ASSOCIATES/ AMERICAN SAMOA POWER AUTHORITY, American Samoa CONTINUOUS POWER

Satala Power Replacement Project 7 x GE16V250SDA



AMIMER SPA, Algeria PRIME & STANDBY POWER

Various Projects 33 x 12V228SDA, 26 x 16V228SDA, 9 x 16V250SDA, 24 x 8V228SDA



SPP, VARIOUS CUSTOMERS, Iraq BLACK START Various Projects GE16V250SDA & GE16V228SDA



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References

- Diesel Electric Power Plant (Example)
- Power Requirement ~12MWe
- Tender was open to HIGH SPEED and Medium SPEED
- Replacing HIGH SPEED (Tier 0)

- Fuel Efficient (Saving more than 12%)
- Reduced Overhauls and out of Service
- Annual Savings ~ \$1 Million





# References



- Majority of the weight coming from Urea Tank
- Vessel Design should accommodate additional 97t at least o
- Weight distribution / Management



**Based on MS Gensets** 

• Urea Solution demand double Space at least



• GE solution save \$100K at least without adding Urea Logistic / Management

Based on Diesel = 0.60 US\$/l, AdBlue = 0.70 US\$/l Note: Consumption for Urea Tank Heating Not Included





**2400** – Quantity of engines that can be built in one year **70** 

**440,000** – Square Foot of State of Art Manufacturing

**22,000** – Minimum Total of Installed base of engines

150,000,000 - Total hours of in service operations

**50** – Total years of experience with Medium Speed

**8,500** – Total Number of Electronic Engines in service

**16,150,000** Hours of Tier 4 Engine Platform experience

**700,000** – GE Investment in R&D USD (IMO Tier 3 / EPA Tier 4)

**72** – Average Cub/ Ft Space Savings with 8L250 T4 vs others

**88.5** – Average Tons Savings with GET 8L250 T4 vs others

**9.33** - Average Fuel and Urea Savings versus Competitors

**60,000** – Max recommended hrs between overhauls

**100,000** – Average USD Engine Savings per year per MW.

**1500** – Approx. number Tier 4 type Engines in Operation.



Summaru



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