

# **GENERATOR 101**

# **DESIGN**

# **CONSIDERATIONS**

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# Brands We Service



***ELECTRO-MOTIVE.***



Mercedes-Benz



What does  
it need  
to do?

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# APPLICATION

## Service Duty

### *Standby*

**Varying loads for the duration of the outage**

### *Prime*

**Varying loads for unlimited hours**

### *Continuous*

**Steady load for unlimited hours**

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# STANDBY

For heavy-duty diesel generator sets used in the event of a utility power failure. The generator set may be operated at rated power for the duration of the utility outage. The generator set will operate with an average load factor of less than 85% of the rated power & will operate for less than 500 hours per year.

# PRIME

For heavy-duty diesel generator sets used as a power source. It is subject to normal varying load conditions, with an intermittent load capability of 10% (up to the standby power rating), for no more than 1 hour in every 12 hours operation. When averaged over a 24 hour period, the average load factor must not exceed 75% of the prime power limit. Under these conditions the generator may be operated for an *unlimited* number of hours per year.

# CONTINUOUS

For heavy-duty diesel generator sets used as a power source. It is subject to non varying load conditions, a 100% load factor, with no overload load capability. Under these conditions the generator may be operated for an *unlimited* number of hours per year.

# Loads

*Linear Loads*

*Motor Loads*

**Starting method?**

**Acceptable voltage dip?**

**Sequential or Simultaneous start?**

*UPS Loads*

*Miscellaneous Loads*

# Engine Type

## *Fuel System Types*

**Diesel**

**Natural Gas**

**LP / Propane**

# Diesel Fuel

## *Advantages*

- >125kW less cost than NG/LP**
- Independent of utility**
- Wider product range**
- Relatively safe**
- Indoor & outdoor storage**
- Reliable delivery network**

## *Disadvantages*

- Temperature sensitive**
- Limited storage life**
- Emissions**

# Natural Gas

## *Advantages*

- <150kW same cost as diesel**
- No on site storage**
- Clean burn for emissions**
- Infinite supply**
- Generally not temp sensitive**

## *Disadvantages*

- Dependent on utility**
- Very high cost on large units**
- Highly volatile**
- Installation costs**

# LP / Propane

## *Advantages*

- <150kW same cost as diesel**
- Independent of utility**
- Clean burn for emissions**
- Long term storage**

## *Disadvantages*

- Only available up to 125kW**
- Highly volatile storage**
- Separate fuel tank**

# Diesel Fuel Tanks

## *Sub Base Tanks*

**Easiest solution**

**UL142**

**Standard Double Wall**

**UL2085**

**Fire Rated Concrete**

## *Day Tanks*

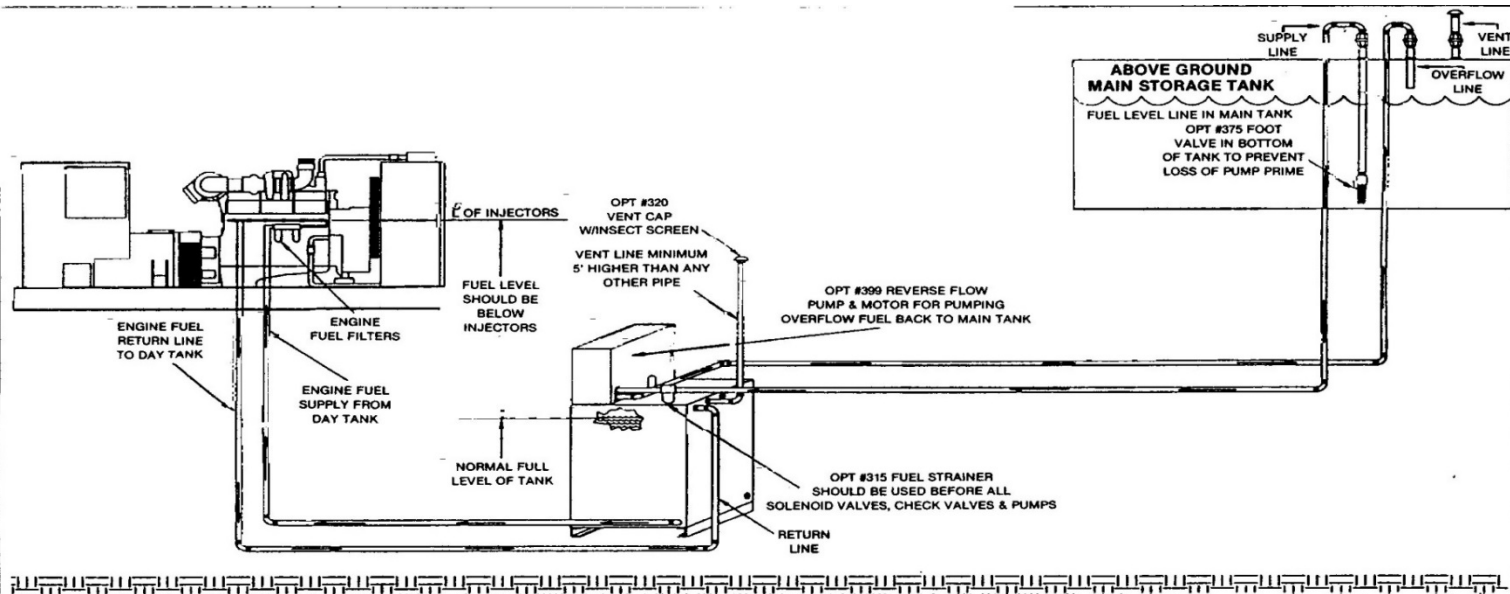
**Free standing, with or without pumps**





**INLAND**  
POWER GROUP





#### FUEL SUPPLY SYSTEM SPECIFICATIONS

- 1 - BLACK IRON, BRASS, OR COPPER PIPE SHOULD BE USED FOR ALL FUEL PIPING. PIPING FROM MAIN TANK TO DAY TANK SHOULD BE MIN. 1" NPT PIPE. FOLLOW ENGINE MANUFACTURER'S RECOMMENDATION FOR PIPE SIZE, LIFT & RUN FROM DAY TANK TO ENGINE GENERATOR. DAY TANK OVERFLOW LINE SHOULD NEVER BE PLUGGED. PIPE DAY TANK OVERFLOW BACK TO MAIN TANK WITH SAME SIZE OR LARGER PIPE THAN DAY TANK SUPPLY LINE.
- 2 - DAY TANK VENT PIPE SHOULD BE AT LEAST FIVE FEET HIGHER THAN OTHER PIPING IN SYSTEM. VENT SHOULD BE PLUMBED TO OUTSIDE OF BUILDING AND SHOULD BE PROTECTED FROM WATER, DEBRIS, AND INSECTS.
- 3 - WATER & SEDIMENT SHOULD BE DRAINED FROM THE TANK EVERY SIX MONTHS.
- 4 - RECOMMENDED OPTIONS -- #360 SOLENOID VALVE, #375 FOOT VALVE, #399 REVERSE FLOW FLOAT SWITCH & PIPING, #315 FUEL STRAINER, #320 VENT CAP, #463 REVERSE FLOW PUMP & MOTOR

FOR GENERAL REFERENCE ONLY.

# Emissions

*Tier 3*

*Tier 4*

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# Controls

## *Digital Panels*

- Fully programmable**
- LED display**
- Keypad control and access**
- Password protected**

## *Remote Annunciators*

## *Communications*

- RS232, RS485, MODBUS, Ethernet**
- Remote monitoring and control via software**

Where  
is it going?

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# Location

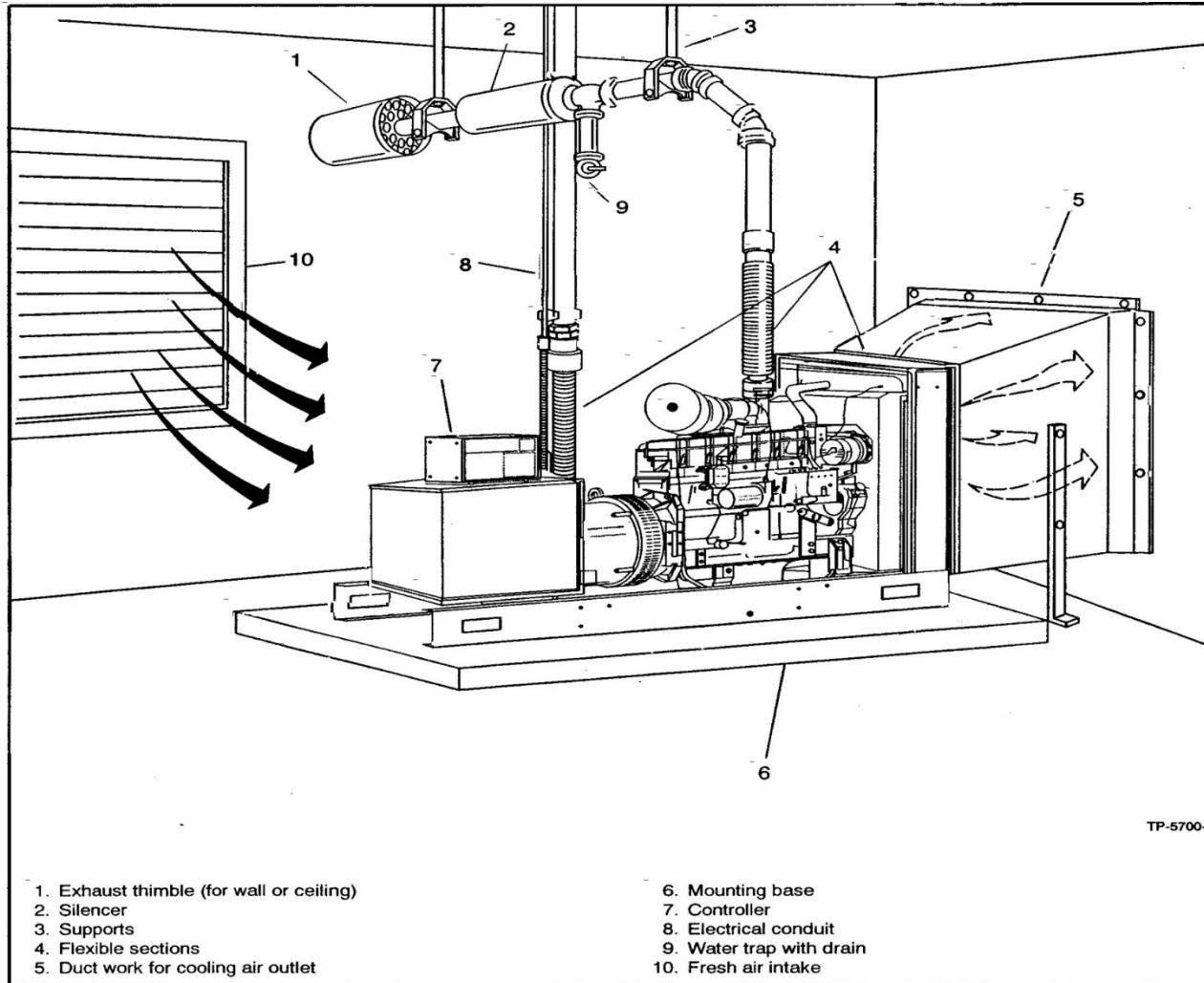
*Indoor*

**Cooling**

**Unit mounted radiator**

**Remote radiator**

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TP-5700-1



# Location

## *Indoor*

### **Exhaust Silencer**

### **dBA Reduction**

***Hospital / Super Critical***

***35-40dBA***

***Critical***

***25-35dBA***

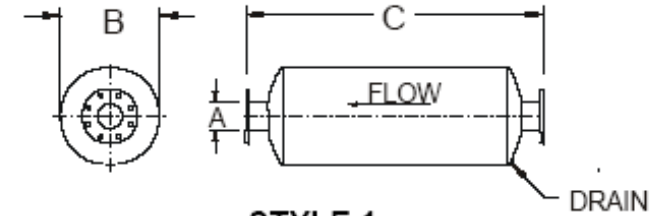
***Residential***

***20-25dBA***

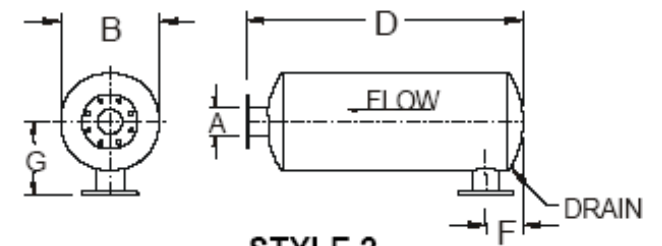
***Industrial***

***15-20dBA***

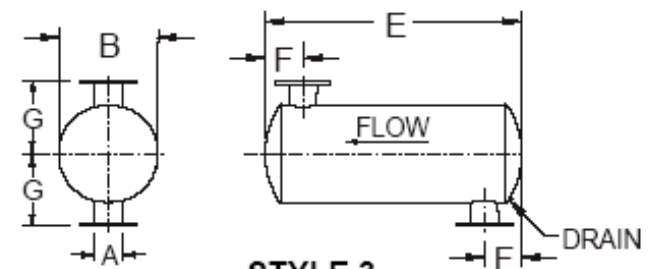
***Custom Applications***



**STYLE 1**



**STYLE 2**



**STYLE 3**

# Location

*Outdoor*

**Enclosures**

**Weather**

**Sound Attenuated**

**Skin Tight / Skid Mounted**

# Enclosures

## *Weather*

Basic, weather protective

Internal or external muffler

No added sound insulation or baffling

Minimal sound reduction on exhaust

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# Enclosures

## *Sound Attenuated*

**Weather protection PLUS sound reduction**

***What are the site requirements?***

**Typically has internal muffler**

**Options - *Lights, heaters, louvers, etc.***



# Sound Requirements

*Local Codes*

*Codes vs. Reality*

*Sound Measurement*

**Usually measured at 23 feet**

**Needs to be PACKAGE sound**

# Accessories

*Battery Chargers*

*Block Heaters*

*Circuit Breakers*

**Sized to current output of generator**

*Extended Warranties*

# Transfer Switch

## *Open Transition*

**"Break Before Make"**

## *Programmed Transition*

**aka Time Delay Neutral, Center Off**

## *Closed Transition*

**Momentary paralleling with utility on transfer to normal**

**"Make Before Break"**

## *Bypass Isolation*

**Remove ATS without interrupting utility**

# Genset Exercising

MTU Onsite Energy recommends monthly testing with at least 30% load, until the engine reaches normal operating temperatures and an annual test for a minimum of 2 hours at 100% load to confirm proper operation.

Operating the engine under load until it reaches normal operating temperature is critical in order to rid the engine and generator of any accumulated condensation, and to avoid the build up of fuel condensate in the exhaust system.

EXAMPLE of WET STACKING





# Tier 4 Indoor Installation Example

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