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Accession #: D196027043

Document #: SD-WM-ATR-105

Title/Desc:
DIESEL GENERATOR ACCEPTANCE TEST REPORT

Pages: 47
2. To: (Receiving Organization)  
Characterization Plant Engineering

3. From: (Originating Organization)  
Characterization Equipment Improvement

4. Related EDT No.:  
N/A

5. Proj./Prog./Dept./Div.:  
Core Sampling Aux. Equipment

6. Cog. Engr.:  
J.L. Smalley

7. Purchase Order No.:  
404886

8. Originator Remarks:  
ETN-94-0023-D
This Acceptance Test Report is transmitted for approval. The report documents compliance with specification WHC-S-0252 Rev.0.

11. Receiver Remarks:

12. Major Assm. Doc. No.:  
N/A

13. Permit/Permit Application No.:  
N/A

14. Required Response Date:  
5/12/95

15. DATA TRANSMITTED

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16. KEY

S. S. O. or N/A  (see WHC-CM-3-5, Sec.12.7)

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18. Signature of EDT Originator

19. Authorized Representative Date for Receiving Organization

20. Significant Manager Date

21. DOE APPROVAL (if required)

□ Approved
□ Approved w/comments
□ Disapproved w/comments

BD-7400-172-2 (04/94) GEF097
DIESEL GENERATOR ACCEPTANCE TEST REPORT

ALOIS J. KOSTELNIK
WESTINGHOUSE HANFORD COMPANY, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-87RL10930

EDT/ECN: 612070 UC: ZC7C
Org Code: 75230 Charge Code: N4H2B
B&R Code: E97W821Z074 Total Pages: 45

Key Words: ETN-94-0023-D, Core Sampling, Diesel Generator, Specification WHC-S-0252, Cummins, Onan, 150KW Generator, Purchase Order 404866, Core Sampling Ancillary Equipment

Abstract: This Acceptance Test Report documents compliance with the requirements of specification WHC-S-0252. The equipment was tested according to WHC-SD-WM-ATP-105 Rev.0.

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Approved for Public Release

A-6400-073 (10/95) GEF321
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SUMMARY

The test was performed at Cummins Northwest's facility in Renton, WA. All steps and exceptions were completed at the time of testing. The NEC Inspection discovered items that needed repair which were verified upon receipt inspection.

One item which was not written as an exception is the 88 decibel noise recording for the generator sets. The Gensets were parked on an asphalt drive, next to a shop area for access to fuel, tools and test equipment during the test. The control station for the generator was between the generator and the shop wall. If the noise meter was moved to either side of the control panel the noise level dropped indicating that the cinder block shop wall was reflecting the noise back at the Genset and influencing the noise measurement. After considering the test conditions and the fact that the Gensets will be used in the field, parked on sand, the 88 decibel noise level was judged as acceptable without retesting.

The attached Appendix A contains the Acceptance Test Results for Genset Model # 1500GFA, Serial # E940542240. Appendix B contains the Acceptance Test Results for Genset Model # 1500GFA, Serial # F940547197. Appendix C contains the Internal Memo from Electrical Power Systems Engineering which includes the NEC Inspection results for both Gensets. Appendix D includes the Receipt Inspection Report for both Gensets.
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## KEY

- **E, S, Q, D or N/A**: see WHC-CM-3-B, Sec.12.7.

## Signature of EDT Originator

- Signature: [Signature]
- Date: [Date]
## RELEASE AUTHORIZATION

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This document was reviewed following the procedures described in WHC-CM-3-4 and is:

**APPROVED FOR PUBLIC RELEASE**

* * * * * * * * * *

**WHC Information Release Administration Specialist:**  

[Signature]

9/23/94  
(Date)
Diesel Generator Trailer Acceptance Test Procedure

5. Key Words
ETN-94-00234
Core Sampling, Diesel Generator, Specification
WHC-S-0252, Trailer, Cummins, Onan, 150KW
Generator, Purchase Order 404886, Core Sampling
Auxiliary Equipment

6. Author
Name: Alois J Kostelnik
Signature:

7. Abstract
This Acceptance Test Procedure (ATP) will document compliance with the requirements of WHC-S-0252 Rev.1 and ECNs 609271, and 609272. The equipment being tested is a 150KW Diesel Generator mounted on a trailer with switchgear. The unit was purchased as a Design and Fabrication procurement activity. The ATP was written by the Seller and will be performed by the Seller with representatives of the Westinghouse Hanford Company witnessing the test at the Seller's location.

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9. Impact Level

10. RELEASE STAMP
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DATE SEP 23 1994
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1.0 Scope

This acceptance test procedure is to verify that the trailer mounted 150KW Cummins/Onan Diesel Generator Set meets the requirements of Westinghouse Hanford specification WHC-S-0252.

2.0 Test Performance

Cummins Northwest will complete the following test in the order deemed best by Cummins personnel. Westinghouse Hanford Company (WHC) personnel shall witness all testing and shall perform the inspection portion of the test. All steps will be completed and any exceptions shall be noted on the attached exception sheet along with the resolution. Cummins Northwest shall resolve all exceptions with the concurrence of WHC.

3.0 Inspection Plan

3.1 Record the model and serial numbers of the Generator Set and Trailer.

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3.2 Verify by record review that the generator is capable of the following:

- 3.2.1 3-phase, 4-wire, 277/480 VAC and single-phase 240/120 VAC.
- 3.2.2 Operating frequency is 60 Hertz ± 0.5%.
- 3.2.3 Standby Rating Range is 150KW @ 0.8 power factor.
- 3.2.4 Prime Rating Range is 135KW @ 0.8 power factor.
- 3.2.5 Voltage dip does not exceed 20% of rated voltage upon application of rated load at rated power factor.
- 3.2.6 Voltage regulation under load from no load to 100% load is within ± 2% of rated voltage, (±10 V).
- 3.2.7 Frequency regulation under varying loads, from no load to 100% load is within ± 3 Hz.
3.3 Verify the control panel contains the following:

- 3.3.1 Run-Off-Auto switch: (Run: manually start engine) (Off: stop engine) (Auto: start engine by closing of a remote contact) Run-Off-Auto

- 3.3.2 Accessible remote start-stop terminals.

3.4 Verify controls are provided to shutdown and lock out the engine under the following abnormal operating conditions:

- 3.4.1 Engine failure to start after a specified cranking time.
- 3.4.2 Engine over-speed.
- 3.4.3 Engine low lube oil pressure.
- 3.4.4 Engine high operating temperature.
- 3.4.5 Remote manual stop activated.

3.5 Verify the following instrumentation is provided as a minimum:

- 3.5.1 Engine lube oil pressure gauge.
- 3.5.2 Coolant temperature gauge.
- 3.5.3 Hour meter.
- 3.5.4 Battery volt meter.
- 3.5.5 Fuel gauge for day tank.
- 3.5.6 Cranking time meter (Internal timer, alarm light indicator)
- 3.5.7 Other instruments normally provided by the manufacturer for the proper operation and maintenance of their engine-generator set. (e.g., High Engine Temperature; Low Oil Pressure)

3.6 Verify battery-powered visual and audible alarms for the following condition as a minimum are provided. Verify alarm test switch, lamp test switch and alarm reset switch and contacts for each alarm for remote signaling are provided:

- 3.6.1 Over-crank shutdown.
- 3.6.2 High engine temperature shutdown.
- 3.6.3 Low engine lube oil pressure shutdown.
- 3.6.4 Over-speed of engine shutdown.
3.7 Verify the generator AC power output monitoring and controls include the following as a minimum:

3.7.1 AC voltmeter with a phase selector switch with an OFF position.

3.7.2 AC ammeter with a phase selector switch with an OFF position.

3.7.3 Frequency meter.

3.7.4 AC voltage adjust rheostat.

3.7.5 Generator output circuit breaker with manual reset.

3.8 Verify the following equipment has been installed:

3.8.1 The basic trailer is provided with an electrical equipment rack located on the side of the engine-generator set enclosure that does not increase the total width dimension of the unit. The equipment rack is located for easy access but allows accessibility to the engine-generator set for maintenance and operation. All receptacles are on the same side of the generator and labels are mechanically fastened to the equipment with screws.

3.8.2 The distribution and wiring system have been installed per NFPA 70, National Electrical Code. See Exhibit... (Continued)

3.8.3 There is a 25KVA transformer on the unit to provide single phase power of 240/120 volt. The transformer has fault protection on the primary side.

3.8.4 A 100KW load bank is on the unit. The load bank is divided into 3 sections, 2 (two) 25KW and 1 (one) 50KW sections, which may be manually switched on individually as required to maintain the generator near 70% of capacity. The load bank is wired for operation in parallel with the normal load.
3.8.5 The electrical equipment furnished by the engine-generator set Supplier, mounted on the equipment rack outside of the engine-generator set enclosure, and wired to the generator output terminals via a 3-phase, 4-wire bus is as follows: (Rated current capacity of components shall not be less than the rating requested.)

3.8.5.1 One (1), 3-pole, 3-wire, 150 amp rated, 80 amp trip, 600 VAC, lockable circuit breaker. A 100 amp receptacle is on the load side of the circuit breaker and is labeled as "SERVICE TRAILER 240 VAC 80 AMPS". The receptacle is an Appleton Cat. # ADR1034.

3.8.5.2 One (1), 3-pole, 3-wire, 150 amp rated, 50 amp trip, 600 VAC, time delay lockable circuit breaker. A 60 amp. receptacle is on load side of the circuit breaker and is labeled as "BREATHING AIR COMPRESSOR 480 VAC 50 AMPS". The receptacle is an Appleton Cat. # ADRG034.

3.8.5.3 One (1), 3-pole, 3-wire, 200 amp rated, 110 amp trip, 600 VAC, lockable circuit breaker. A 200 amp. receptacle to the load side of the circuit breaker and label receptacle as "UTILITY 480 VAC 110 AMPS". The receptacle is an Appleton Cat. # ADR20044.

3.8.5.4 One (1), 20 amp, 240 VAC, single receptacle, wired from a two pole, 20 amp breaker to be used for hookup of temporary power boxes. Labeled as "240 VAC 20 AMPS".

3.8.5.5 One (1), 20 amp, 120 VAC, duplex receptacle, wired from a single pole, 20 amp breaker with ground fault protection, to be used for hookup of temporary tools and lighting. Labeled as "120 VAC 20 AMPS".

3.8.5.6 One (1), 30 amp, 120 VAC, single receptacle, wired from a single pole, 30 amp breaker. Labeled as "PURGE GAS TRAILER 120 VAC 30 AMPS".

3.8.6 The unit has grounding rods and a 100 foot cable to allow grounding to a ground grid.
3.9 Verify the following engine-generator trailer requirements are satisfied:

3.9.1 The engine-generator set including all accessories are mounted on a heavy duty type trailer designed for use in construction, communications, and utility applications.

3.9.2 The trailer meets Department of Transportation (DOT) requirements for highway travel. (DOT Certification)

3.9.3 Vibration isolators are used between the engine-generator set and the trailer.

3.9.4 The trailer is equipped with running lights, brake lights, safety brake, stabilizer jack on each corner; a front wheel jack with wheel; and hitches.

3.9.5 The trailer has a 2 3/4 inch Lunette hitch with vertical adjustment.

3.9.6 The underside of the trailer is undercoated for rust protection.

3.9.7 The trailer has hydraulic surge type brakes.

3.9.8 The generator is within an enclosure and the enclosure is lined with sound deadening material.

3.9.9 The instruments and controls are vibration isolated to prevent gauge and control malfunction.
3.10 Verify the following engine requirements are satisfied:

3.10.1 Diesel fuel engine.

3.10.2 Engine shall be electric start from negative grounded battery supplied.

3.10.3 Battery shall be charged with alternator having automatic voltage regulation supplied with engine.

3.10.4 A fuel tank is on the unit that will supply fuel for the engine to operate at full load for at least 24 hours. (Capacity 25 gal, Consumption rate 9.7 gal/hr)

3.10.5 Two (2) stage dry type air cleaner with a restriction gauge.

3.10.6 Furnished with the capability for cold weather starting such as electric glow plugs. Engine hot start 1500 watt, 110 volt heater.

3.10.7 Record the freeze point of the engine antifreeze. (-40 °F)

3.10.8 Drip pan to catch fuel or oil leaks.

3.10.9 Painted inside and out. Exterior is White.

3.10.10 Verify there are no Suspect Fasteners as identified on the U.S. Custom's Fasteners Headmark List.

3.10.11 Verify all visible welds are acceptable per AWS D1.1.

4.0 Run Test

4.1 No Load Cold start: Verify that the engine starts and comes to 1800 ±9 rpm in the specified time. (MFR \( \frac{C}{i} \) sec.)

4.1.1 Switch Run-Off-Auto switch to Run.
(Time from close of contacts to 1800 rpm \( \frac{C}{i} \) sec.)

4.1.2 Verify the following instrumentation is functional and the value indicated is within the range specified by the manufacturer:

4.1.2.1 Engine lube oil pressure gauge.
(\( \frac{160}{10} \) psi, MFR \( \frac{C}{i} \) psi)

4.1.2.2 Coolant temperature gauge.
(\( \geq 100 ^{\circ} F \), MFR \( \geq 230 ^{\circ} F \))
4.1.2.3 Hour meter.
(1.4 hrs)

4.1.2.4 Battery volt meter.
(24 volts, MFR 24 - 36 volts)

4.1.2.5 Fuel gauge for day tank.
(Empty level)

4.1.2.6 Other instruments normally provided by the manufacturer for the proper operation and maintenance of their particular engine-generator set.

4.1.3 Record and with a sound meter the generator noise level at the electrical control panel and verify that it is less than 85 decibels.

4.2 Loaded Cold start with Remote/Auto start: Verify, with the 100 KW load bank on line, that the engine starts, comes to 1800 ± 9 rpm, and the load is automatically switched on-line in the specified time. (MFR _ - _ sec.)

4.2.1 Switch Run-Off-Auto switch to Auto.

4.2.2 Close contacts on a temporarily installed switch.
(Time from close of contacts to load on-line. _ sec.)

4.2.3 Switch Run-Off-Auto switch to Off. (Remove temporary switch.)

4.3 Verify controls shutdown and lock out the engine under the following simulated abnormal operating conditions. (Temporarily install contacts and jumpers as required to simulate conditions. Restart the generator between each alarm test.) Verify alarm test switch, lamp test switch and alarm reset switch are operational:

4.3.1 Engine failure to start after a specified cranking time, with alarm.

4.3.2 Engine over-speed, with alarm.

4.3.3 Engine low lube oil pressure, with alarm.

4.3.4 Engine high operating temperature, with alarm.

4.3.5 Remote manual stop activated. (Located on distribution panel) - Temporary Switch
4.4 Verify proper operation of the generator, power distribution components and load bank according to the manufacturer's supplied information. (For load bank test operate for 15 minutes at each step prior to recording information.)

4.4.1 Step 1 (25KW Resistive Load for 15 min.)

4.4.1.1 Amperage 130, 230, 330 amps

4.4.1.2 Voltage 1-2483, 2-3483, 1-3483

4.4.1.3 Frequency 62.1 Hz

4.4.1.4 Oil Pressure 80 psi

4.4.1.5 Water Temperature 125 °F

4.4.2 Step 2 (50KW Resistive Load for 15 min.)

4.4.2.1 Amperage 150, 250, 350 amps

4.4.2.2 Voltage 1-2483, 2-3483, 1-3483

4.4.2.3 Frequency 61.8 Hz

4.4.2.4 Oil Pressure 75 psi

4.4.2.5 Water Temperature 175 °F

4.4.3 Step 3 (100KW Resistive Load for 15 min.)

4.4.3.1 Amperage 170, 270, 370 amps

4.4.3.2 Voltage 1-2483, 2-3483, 1-3483

4.4.3.3 Frequency 61.1 Hz

4.4.3.4 Oil Pressure 65 psi

4.4.3.5 Water Temperature 175 °F

4.4.4 Verify voltage and clockwise phase rotation as noted for the following:

4.4.4.1 UTILITY 480 VAC 110 AMPS outlet

4.4.4.1.1 Phase rotation CW

4.4.4.1.2 Voltage 1-2483, 2-3483, 1-3483
4.4.4.2 SERVICE TRAILER 240 VAC 80 AMPS outlet

4.4.4.2.1 Voltage 1-2 240

4.4.4.3 BREATHING AIR COMPRESSOR 480 VAC 50 AMPS outlet

4.4.4.3.1 Phase rotation

4.4.4.3.2 Voltage 1-2480, 2-3480, 1-3480

4.4.4.4 240 VAC 20 Amp Single Receptacle

4.4.4.4.1 Voltage 240

4.4.4.5 120 VAC 20 Amp Duplex Receptacle

4.4.4.5.1 Voltage 120

4.4.4.6 PURGE GAS TRAILER 120 VAC 30 Amp Single Receptacle

4.4.4.6.1 Voltage 120

4.4.5 Switch Run-Off-Auto switch to Off.

4.5 No load hot start: Verify that the engine starts and comes to 1800 rpm in the specified time. (MFR 16 sec.)

4.5.1 Switch Run-Off-Auto switch to Run. Time sec.

4.5.2 Switch Run-Off-Auto switch to Off.

4.6 Loaded hot start: Verify, with the 100 KW load bank on line, that the engine starts, comes to 1800 ± 9 rpm, and the load is automatically switched on-line in the specified time. (MFR 16 sec.)

4.6.1 Switch Run-Off-Auto switch to Run.

(Time from close of contacts to load on-line. sec.)

4.6.2 Switch Run-Off-Auto switch Off.
TEST EXCEPTIONS

<table>
<thead>
<tr>
<th>Step #</th>
<th>Description of exception and resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.8.2</td>
<td>Grounding of Generator Frame should be bonded to the trailer frame @ provide chase through circuit breaker enclosure (Mounted on the rear of trailer) for Grounding Electrode connection to neutral/ground bus. GIK Verify upon receipt inspection. GIK</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step #</th>
<th>Description of exception and resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2.2</td>
<td>Frequency for full load factory set @ 60 Hz. Test data shows variance which is explained by lack of full load during test. Trend of frequency indicates equipment is capable. GIK</td>
</tr>
</tbody>
</table>

---

TEST COMPLETED BY:

<table>
<thead>
<tr>
<th>PRINT NAME</th>
<th>COMPANY</th>
<th>SIGNATURE</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albie J Reitelmik</td>
<td>WHC</td>
<td>ALBIE J REITELMIK</td>
<td>9-26-94</td>
</tr>
<tr>
<td>CUMMINS NORTHWEST INC</td>
<td></td>
<td>CHARLIE J RIVET</td>
<td>9-26-94</td>
</tr>
</tbody>
</table>

* Make additional copies as required.
**Suspect Fastener Headmark List**

**All Grade 5 and Grade 8 fasteners of foreign origin which do not bear any manufacturer's headmarks:**

<table>
<thead>
<tr>
<th>Grade 5</th>
<th>Grade 8</th>
</tr>
</thead>
</table>

**Grade 5 fasteners with the following manufacturers' headmarks:**

<table>
<thead>
<tr>
<th>Mark</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>J</td>
<td>Jinn Han (TW)</td>
</tr>
<tr>
<td>J5</td>
<td>Jinn Han (TW)</td>
</tr>
<tr>
<td>K3</td>
<td>Kaseka Kogyo (JP)</td>
</tr>
</tbody>
</table>

**Grade 8 fasteners with the following manufacturers' headmarks:**

<table>
<thead>
<tr>
<th>Mark</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Asahi Mfg (JP)</td>
</tr>
<tr>
<td>NF</td>
<td>Nippon Fasteners (JP)</td>
</tr>
<tr>
<td>H</td>
<td>Hinomoto Metal (JP)</td>
</tr>
<tr>
<td>M</td>
<td>Minamida Shiyobo (JP)</td>
</tr>
<tr>
<td>MS</td>
<td>Minato Kogyo (JP)</td>
</tr>
<tr>
<td>H, Triangle</td>
<td>Infasco (CA, TW, JP, TLD) (Greater than 1/2-inch diameter Grade 8 hollow triangle only)</td>
</tr>
<tr>
<td>E</td>
<td>Dole (JP)</td>
</tr>
<tr>
<td></td>
<td>UNY</td>
</tr>
</tbody>
</table>

**Key:** CA—Canada, JP—Japan, TW—Taiwan, TLD—Togakushi

Any bolt on this list should be treated as defective without further testing.
**Model:** 150DGFA 68913H  
**S/N:** E940542240

**Customer:** CUMMINS NORTHWEST INC  
**Order File Number:** U432913D  
**P.O.:** 1311R

**SERVICE RATING**  
- **Prime:** KW 135  
- **Standby:** KVA 169

**FUEL TYPE**  
- **Gasoline**  
- **Diesel**  
- **LP Vapor**  
- **LP Liquid**  
- **Nat Gas**  
- **Other**

**GOVERNOR TYPE**  
- **Mechanical**  
- **Electrical**  
- **Brand:** BOSCH

**COOLING SYSTEM**  
- **Mounted Radiator**  
- **Remote Radiator**  
- **Heat Exchanger**  
- **Other**

**ITEMS CHECKED/ADJUSTED**  
- **Governor**  
- **Remote Start**  
- **Voltage Regulator**  
- **Oil Pressure Pre-Alarm**  
- **Oil Pressure Shutdown**  
- **Meter Accuracy**  
- **Hi Cool Temp Pre-Alarm**  
- **Hi Cool Temp Shutdown**  
- **LET Alarm**  
- **Overspeed 2140 RPM**  
- **Overcrank Sec 17 Crank 17 Rest 87 Total**  
- **Other:** List: H389 H462 H480 KH22 K001 B184 F001

**TEST CONDITIONS**  
- **Test Spec.:** 98126  
- **Ambient Temp:** 77 Deg F  
- **Barometer:** 28.71 In Hg  
- **Voltage 277/480:** V  
- **Phase:** 3  
- **Frequency 60 Hz**

**UNIT RESULTS* No Load >**  
- **Batt Charge Syst:**  
  - 28 X Volts  
  - 1-2 481  
  - 2-3 481  
  - 1-3 481

- **Volt Reg Adj:** 444-510  
  - 1-N 278  
  - 2-N 278  
  - 3-N 278

- **Frequency 62.6 Hz**  
- **Coolant Temp 175**  
- **Lube Press 65**

**Full Load (4/4) >**  
- **Batt Charge Syst:**  
  - 28 X Volts  
  - 1-2 480  
  - 2-3 480  
  - 1-3 480

- **KW 135**  
  - Current 1 203  
  - 2 201  
  - 3 203

- **Frequency 60 Hz**  
- **Coolant Temp 180**  
- **Lube Press 60**

**Maximum Power 152**  
- **Freq 59.5 Hz**  
- **Voltage 480**  
- **ISO Correction Factor 1.0**  
- **Test Date 05/16/94**  
- **Running Time 1.2**

**Data Recorded & Certified By:**  
- **J OLINGER 2947**  
- **Quality Engineer:**  
- **Date:** 5/20/94

**X22A041-Front 1/90 * If unit is dual fuel, see additional sheet for second fuel results.  
19-78 Mail to: CUMMINS NORTHWEST  
777 E. N. GRAND AVE.  
BENTON, WA. 98230  
* See reverse side for extended running time data.  
22A054 10/91
ONAN CORPORATION GenSize 2 Version 4.00

<table>
<thead>
<tr>
<th>KW</th>
<th>KVA</th>
<th>PF</th>
<th>KW Occurs in Step</th>
<th>KVA Occurs in Step</th>
</tr>
</thead>
<tbody>
<tr>
<td>135</td>
<td>135</td>
<td>1.00</td>
<td>135</td>
<td>135</td>
</tr>
</tbody>
</table>

---MAX---SURGE---At Specified Voltage---

Recommended GenSet

Model: 150DGFA

GenSet Voltage: 208-240/416-480

Nominal KW Duty Specified Voltage Freq. Specified Recommended

---
| 150 | Standby | 277/480 WYE | 60 | 105 | 105 |

When operated at 500 Feet Altitude and 77 degrees Fahrenheit Ambient the operating performance is:

* GenSet selected with one GenSet. *

Maximum Voltage Freq. Excitation

---
<table>
<thead>
<tr>
<th>KW</th>
<th>Dip</th>
<th>Dip</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>19%</td>
<td>8%</td>
</tr>
</tbody>
</table>

Onan Corporation has developed this GenSize 2 computer program to help you, the engineer, with a generator set selection. The recommendations are based upon your input of the genset requirements and typical performance data published by NEMA and other agencies.

Due to changing load and site conditions beyond our control, we cannot be certain the selection of a genset based upon the recommendation of this computer program will meet the site requirements. Therefore, nothing in this program may be construed as a warranty. You must decide for yourself or consult with your local Cummins/Onan distributor that the generator set selected is sufficient for your intended purpose. Each Onan generator set is covered by an express written warranty which is in lieu of all other warranties, expressed or implied.

Please consult with your Cummins/Onan distributor representative in your area for further information.
and engine/alternator capacity.  135 KVA  187  Acceptable

2. Running load requirements and alternator capacity at site conditions.  135 KW  150  Acceptable

3. Max load surge KVA and Max set KVA capacity with minimum 90% sustained voltage.  135 KVA  563  Acceptable

4. Max load Surge KW and Max set Surge KW capacity at site conditions with minimum 90% sustained voltage.  135 KW  189  Acceptable

5. Transient Voltage Dip:
   Allowable Transient Voltage Dip:  19 %  35 %  Acceptable

6. Total non-linear plus linear load KW and Alternator KW capacity.  135 KW  150  Acceptable
ONAN CORPORATION   GenSize 2   Version 4.00

Project Name: (WESTINGHOUSE HANFORD)
Project Parameters:

Duty: Stationary Standby
Voltage: 277/480 WYE
Frequency: 60
Max. Temp. Rise: 105
Max. VDIP%: 35
Max. Altitude: 500
Altitude Scale: Feet
Max. Amb. Temp: 77
Temperature Scale: Fahrenheit
Cooling System: Radiator
Fuel Type: Diesel

Load Listing

Load Number: 1   Load Type: Resistive   Phase 3
Load Name: (135 KW PRIME)   Input KW: 135
Comment:

<table>
<thead>
<tr>
<th>SKW</th>
<th>SKVA</th>
<th>SKVAR</th>
<th>SPF</th>
<th>RKW</th>
<th>RKVA</th>
<th>RKVAR</th>
<th>RPF</th>
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<tbody>
<tr>
<td>135.0</td>
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<td>1.00</td>
<td>135.0</td>
<td>135.0</td>
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<td>1.00</td>
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</table>

Step Sequence/Load

Step Number: 1   Surge KW: 135   Surge SKVA: 135
Step Name: START 135 KW PRIME LOAD
Comment:

<table>
<thead>
<tr>
<th>Load #</th>
<th>Qty</th>
<th>SKW</th>
<th>SKVA</th>
<th>SKVAR</th>
<th>SPF</th>
<th>RKW</th>
<th>RKVA</th>
<th>RKVAR</th>
<th>RPF</th>
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<tbody>
<tr>
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<td>135.0</td>
<td>0</td>
<td>1.00</td>
<td>135.0</td>
<td>135.0</td>
<td>0</td>
<td>1.00</td>
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</table>

Step Total:
135.0 135.0 0 1.00 135.0 135.0 0 1.00

Cumulative:
135.0 135.0

Criteria Selection Results:
Model: 150DGFA

<table>
<thead>
<tr>
<th>1. Running load requirements</th>
<th>Required by Loads</th>
<th>Available from Model</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>135 KW</td>
<td>150</td>
<td>Acceptable</td>
</tr>
</tbody>
</table>
2. To: (Receiving Organization)  Core Sampling  
3. From: (Originating Organization)  Characterization Equipment  
4. Related EDI No.:  N/A  
5. Proj./Prog./Dept./Div.:  Core Sampling Aux. Equipment  
7. Purchase Order No.:  404886  
8. Originator Remarks:  ETN-94-0023-D  
   This Acceptance Test Procedure is transmitted for approval. The procedure was prepared by the Seller and will be performed at the Sellers location. It will show compliance with specification WHC-S-0252 Rev-0.1 (K+T).  
9. Equip./Component No.:  N/A  
10. System/Bldg./Facility:  200 General  
11. Receiver Remarks:  

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item Description</th>
<th>Approval Designator</th>
<th>Reason for Transmission</th>
<th>Originator Disposition</th>
<th>Receiver Disposition</th>
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<tbody>
<tr>
<td>1</td>
<td>WHC-SD-WM-ATP-105, Diesel Generator Trailer Acceptance Test Procedure</td>
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</table>

<table>
<thead>
<tr>
<th>Approval Designator (F)</th>
<th>Reason for Transmission (G)</th>
<th>Disposition (H) &amp; (I)</th>
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</thead>
</table>

17. SIGNATURE/DISTRIBUTION  

<table>
<thead>
<tr>
<th>Reason</th>
<th>Disp.</th>
<th>(J) Name</th>
<th>(K) Signature</th>
<th>(L) Date</th>
<th>(M) MSIN</th>
<th>(J) Name</th>
<th>(K) Signature</th>
<th>(L) Date</th>
<th>(M) MSIN</th>
<th>Reason</th>
<th>Disp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Cog. Mgr. R.J. Blanchard</td>
<td></td>
<td>9/14/94</td>
<td>1-17</td>
<td>Cog. Mgr. R.J. Blanchard</td>
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<td>1-17</td>
<td>18-07</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>QA J.J. Verdunton</td>
<td></td>
<td>9/14/94</td>
<td>1-17</td>
<td>QA J.J. Verdunton</td>
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<td>1-17</td>
<td>18-07</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
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<td>9/14/94</td>
<td>1-17</td>
<td>Safety NW</td>
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<td>9/14/94</td>
<td>1-17</td>
<td>18-07</td>
<td>3</td>
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<tr>
<td>1</td>
<td>1</td>
<td>Env. N/A</td>
<td></td>
<td>9/14/94</td>
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<td>9/14/94</td>
<td>1-17</td>
<td>18-07</td>
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<td>Core Sampling Cog. A.P. Housel</td>
<td></td>
<td>9/14/94</td>
<td>1-17</td>
<td>Core Sampling Cog. A.P. Housel</td>
<td></td>
<td>9/14/94</td>
<td>1-17</td>
<td>18-07</td>
<td>3</td>
</tr>
</tbody>
</table>

18.  

19.  

20.  

21. DOE APPROVAL (if required)  
   Ctrl. No.  
   - Approved  
   - Approved w/comments  
   - Disapproved w/comments  

BD-7400-172-2 (04/94) GEF097
## RELEASE AUTHORIZATION

<table>
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<tr>
<th>Document Number:</th>
<th>WHC-SD-WM-ATP-105, REV 0</th>
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<tbody>
<tr>
<td>Document Title:</td>
<td>Diesel Generator Trailer Acceptance Test Procedure</td>
</tr>
<tr>
<td>Release Date:</td>
<td>9/23/94</td>
</tr>
</tbody>
</table>

* * * * * * * * * *

This document was reviewed following the procedures described in WHC-CM-3-4 and is:

APPROVED FOR PUBLIC RELEASE

* * * * * * * * * *

WHC Information Release Administration Specialist:

[Signature]

9/23/94

A-6001-400 (07/94) WEF256
Diesel Generator Trailer Acceptance Test Procedure

ETN-94-0023-D
Core Sampling, Diesel Generator, Specification WHC-S-0252, Trailer, Cummins, Onan, 150KW
Generator, Purchase Order 404886, Core Sampling
Auxiliary Equipment

APPROVED FOR
PUBLIC RELEASE

This Acceptance Test Procedure (ATP) will document compliance with the requirements of WHC-S-0252 Rev.1 and ECNs 609271, and 609272. The equipment being tested is a 150KW Diesel Generator mounted on a trailer with switchgear. The unit was purchased as a Design and Fabrication procurement activity. The ATP was written by the Seller and will be performed by the Seller with representatives of the Westinghouse Hanford Company witnessing the test at the Seller's location.

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2.0 Test Performance ........................................... 3
3.0 Inspection Plan ............................................... 3
4.0 Run Test ....................................................... 8
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SUSPECT FASTENER HEADMARK LIST .................. 13
1.0 Scope

This acceptance test procedure is to verify that the trailer mounted 150KW Cummins/Open Diesel Generator Set meets the requirements of Westinghouse Hanford specification WHC-S-0252.

2.0 Test Performance

Cummins Northwest will complete the following test in the order deemed best by Cummins personnel. Westinghouse Hanford Company (WHC) personnel shall witness all testing and shall perform the inspection portion of the test. All steps will be completed and any exceptions shall be noted on the attached exception sheet along with the resolution. Cummins Northwest shall resolve all exceptions with the concurrence of WHC.

3.0 Inspection Plan

3.1 Record the model and serial numbers of the Generator Set and Trailer.

<table>
<thead>
<tr>
<th>GENERATOR SET</th>
<th>TRAILER</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 150 DC-FA 67134</td>
<td>V1N: 1D9US1923RS</td>
</tr>
<tr>
<td>E940647192</td>
<td>151333</td>
</tr>
</tbody>
</table>

3.2 Verify by record review that the generator is capable of the following:

- 3.2.1 3-phase, 4-wire, 277/480 VAC and single-phase 240/120 VAC.
- 3.2.2 Operating frequency is 60 Hertz ± 0.5%. See Exception.
- 3.2.3 Standby Rating Range is 150KW @ 0.8 power factor.
- 3.2.4 Prime Rating Range is 135KW @ 0.8 power factor.
- 3.2.5 Voltage dip does not exceed 20% of rated voltage upon application of rated load at rated power factor.
- 3.2.6 Voltage regulation under load from no load to 100% load is within ± 2% of rated voltage, (±10 V).
- 3.2.7 Frequency regulation under varying loads from no load to 100% load is within ± 3 Hz.
3.3 Verify the control panel contains the following:

- **3.3.1 Run-Off-Auto switch:** (Run: manually start engine) (Off: stop engine) (Auto: start engine by closing of a remote contact) Run *Stop Remote*

- **3.3.2 Accessible remote start-stop terminals.**

3.4 Verify controls are provided to shutdown and lock out the engine under the following abnormal operating conditions:

- **3.4.1 Engine failure to start after a specified cranking time.**
- **3.4.2 Engine over-speed.**
- **3.4.3 Engine low lube oil pressure.**
- **3.4.4 Engine high operating temperature.**
- **3.4.5 Remote manual stop activated.**

3.5 Verify the following instrumentation is provided as a minimum:

- **3.5.1 Engine lube oil pressure gauge.**
- **3.5.2 Coolant temperature gauge.**
- **3.5.3 Hour meter.**
- **3.5.4 Battery volt meter.**
- **3.5.5 Fuel gauge for day tank.**
- **3.5.6 Cranking time meter (Internal timer, alarm light indicator) B 4 I**
- **3.5.7 Other instruments normally provided by the manufacturer for the proper operation and maintenance of their engine-generator set.**

3.6 Verify battery-powered visual and audible alarms for the following condition as a minimum are provided. Verify alarm test switch, lamp test switch and alarm reset switch and contacts for each alarm for remote signaling are provided:

- **3.6.1 Over-crank shutdown.**
- **3.6.2 High engine temperature shutdown.**
- **3.6.3 Low engine lube oil pressure shutdown.**
- **3.6.4 Over-speed of engine shutdown.**
3.7 Verify the generator AC power output monitoring and controls include the following as a minimum:

3.7.1 AC voltmeter with a phase selector switch with an OFF position.

3.7.2 AC ammeter with a phase selector switch with an OFF position.

3.7.3 Frequency meter.

3.7.4 AC voltage adjust rheostat.

3.7.5 Generator output circuit breaker with manual reset.

3.8 Verify the following equipment has been installed:

3.8.1 The basic trailer is provided with an electrical equipment rack located on the side of the engine-generator set enclosure that does not increase the total width dimension of the unit. The equipment rack is located for easy access but allows accessibility to the engine-generator set for maintenance and operation. All receptacles are on the same side of the generator and labels are mechanically fastened to the equipment with screws.

3.8.2 The distribution and wiring system have been installed per NFPA 70, National Electrical Code.

3.8.3 There is a 25KVA transformer on the unit to provide single phase power of 240/120 volt. The transformer has fault protection on the primary side.

3.8.4 A 100KW load bank is on the unit. The load bank is divided into 3 sections, 2 (two) 25KW and 1 (one) 50KW sections, which may be manually switched on individually as required to maintain the generator near 70% of capacity. The load bank is wired for operation in parallel with the normal load.
3.8.5 The electrical equipment furnished by the engine-generator set Supplier, mounted on the equipment rack outside of the engine-generator set enclosure, and wired to the generator output terminals via a 3-phase, 4-wire bus is as follows:
(Rated current capacity of components shall not be less than the rating requested.)

3.8.5.1 One (1), 3-pole, 3-wire, 150 amp rated, 80 amp trip, 600 VAC, lockable circuit breaker. A 100 amp. receptacle is on the load side of the circuit breaker and is labeled as "SERVICE TRAILER 240 VAC 80 AMPS". The receptacle is an Appleton Cat. # ADR1034.

3.8.5.2 One (1), 3-pole, 3-wire, 150 amp rated, 50 amp trip, 600 VAC, time delay lockable circuit breaker. A 60 amp. receptacle is on load side of the circuit breaker and is labeled as "BREATHING AIR COMPRESSOR 480 VAC 50 AMPS". The receptacle is an Appleton Cat. # ADR6034.

3.8.5.3 One (1), 3-pole, 3-wire, 200 amp rated, 110 amp trip, 600 VAC, lockable circuit breaker. A 200 amp. receptacle to the load side of the circuit breaker and label receptacle as "UTILITY 480 VAC 110 AMPS". The receptacle is an Appleton Cat. # ADR20044.

3.8.5.4 One (1), 20 amp, 240 VAC, single receptacle, wired from a two pole, 20 amp breaker to be used for hookup of temporary power boxes. Labeled as "240 VAC 20 AMPS".

3.8.5.5 One (1), 20 amp, 120 VAC, duplex receptacle, wired from a single pole, 20 amp breaker with ground fault protection, to be used for hookup of temporary tools and lighting. Labeled as "120 VAC 20 AMPS".

3.8.5.6 One (1), 30 amp, 120 VAC, single receptacle, wired from a single pole, 30 amp breaker. Labeled as "PURGE GAS TRAILER 120 VAC 30 AMPS".

3.8.6 The unit has grounding rods and a 100 foot cable to allow grounding to a ground grid. To be verified at receipt inspection.
3.9 Verify the following engine-generator trailer requirements are satisfied:

3.9.1 The engine-generator set including all accessories are mounted on a heavy duty type trailer designed for use in construction, communications, and utility applications.

3.9.2 The trailer meets Department of Transportation (DOT) requirements for highway travel. (DOT Certification)

3.9.3 Vibration isolators are used between the engine-generator set and the trailer frame.

3.9.4 The trailer is equipped with running lights, brake lights, safety brake, stabilizer jack on each corner; a front wheel jack with wheel; and hitches.

3.9.5 The trailer has a 2 3/4 inch Lunette hitch with vertical adjustment.

3.9.6 The underside of the trailer is undercoated for rust protection.

3.9.7 The trailer has hydraulic surge type brakes.

3.9.8 The generator is within an enclosure and the enclosure is lined with sound deadening material.

3.9.9 The instruments and controls are vibration isolated to prevent gauge and control malfunction.
3.10 Verify the following engine requirements are satisfied:

3.10.1 Diesel fuel engine.

3.10.2 Engine shall be electric start from negative grounded battery supplied.

3.10.3 Battery shall be charged with alternator having automatic voltage regulation supplied with engine.

3.10.4 A fuel tank is on the unit that will supply fuel for the engine to operate at full load for at least 24 hours. (Capacity 250 gal., Consumption rate 2.7 gal/hr)

3.10.5 Two (2) stage dry type air cleaner with a restriction gauge.

3.10.6 Furnished with the capability for cold weather starting such as electric glow plugs. Engine hot start 1500 watt, 110 volt heater.

3.10.7 Record the freeze point of the engine antifreeze. (-40°F)

3.10.8 Drip pan to catch fuel or oil leaks.

3.10.9 Painted inside and out. Exterior is White.

3.10.10 Verify there are no Suspect Fasteners as identified on the U.S. Custom's Fasteners Headmark List.

3.10.11 Verify all visible welds are acceptable per AWS D1.1.

4.0 Run Test

4.1 No Load Cold start: Verify that the engine starts and comes to 1800 ±9 rpm in the specified time. (MFR \( c \) - 16 sec.)

4.1.1 Switch Run-Off-Auto switch to Run. (Time from close of contacts to 1800 rpm \( 2 \) sec.)

4.1.2 Verify the following instrumentation is functional and the value indicated is within the range specified by the manufacturer:

4.1.2.1 Engine lube oil pressure gauge. ([75 psi, MFR \( c \) - 15 psi])

4.1.2.2 Coolant temperature gauge. ([175 °F, MFR \( c \) - 155 °F])
4.1.2.3 Hour meter. (16 hrs)
4.1.2.4 Battery volt meter. (24 volts, MFR 24-36 volts)
4.1.2.5 Fuel gauge for day tank. (Empty level)
4.1.2.6 Other instruments normally provided by the manufacturer for the proper operation and maintenance of their particular engine-generator set.

4.1.3 Record and with a sound meter the generator noise level at the electrical control panel and verify that it is less than 85 decibels. 88 decibels. Lot of ripple noise attracts flies.

4.2 Loaded Cold start with Remote/Auto start: Verify, with the 100 kW load bank on line, that the engine starts, comes to 1800 ± 9 rpm, and the load is automatically switched on-line in the specified time. (MFR 6-10 sec.)

4.2.1 Switch Run-Off-Auto switch to Auto.

4.2.2 Close contacts on a temporarily installed switch. (Time from close of contacts to load on-line: 2 sec.)

4.2.3 Switch Run-Off-Auto switch to Off. (Remove temporary switch.)

4.3 Verify controls shutdown and lock out the engine under the following simulated abnormal operating conditions. (Temporarily install contacts and jumpers as required to simulate conditions. Restart the generator between each alarm test.) Verify alarm test switch, lamp test switch and alarm reset switch are operational:

4.3.1 Engine failure to start after a specified cranking time, with alarm. - 3 seconds on/off.

4.3.2 Engine over-speed, with alarm. 2100, not factory test.

4.3.3 Engine low lube oil pressure, with alarm. Lube Oil Pressure

4.3.4 Engine high operating temperature, with alarm. 104 high engine temp.

4.3.5 Remote manual stop activated. (Located on distribution panel). Temporary switch.
4.4 Verify proper operation of the generator, power distribution components and load bank according to the manufacturer's supplied information. (For load bank test operate for 15 minutes at each step prior to recording information.)

4.4.1 Step 1 (25KW Resistive Load for 15 min.)
- **Amperage**: 30, 30, 30 amps
- **Voltage**: 1-2 460, 2-3 460, 1-3 460
- **Frequency**: 60 Hz
- **Oil Pressure**: 27 psi
- **Water Temperature**: 170°F

4.4.2 Step 2 (50KW Resistive Load for 15 min.)
- **Amperage**: 60, 60, 60 amps
- **Voltage**: 1-2 460, 2-3 460, 1-3 460
- **Frequency**: 60 Hz
- **Oil Pressure**: 27 psi
- **Water Temperature**: 170°F

4.4.3 Step 3 (100KW Resistive Load for 15 min.)
- **Amperage**: 119, 119, 119 amps
- **Voltage**: 1-2 460, 2-3 460, 1-3 460
- **Frequency**: 60 Hz
- **Oil Pressure**: 27 psi
- **Water Temperature**: 170°F

4.4.4 Verify voltage and clockwise phase rotation as noted for the following:
- **Utility 480 VAC 110 Amps outlet**
  - **Phase rotation**: CCW
  - **Voltage**: 1-2 460, 2-3 460, 1-3 460
4.4.4.2 SERVICE TRAILER 240 VAC 80 AMPS outlet

4.4.4.2.1 Voltage 1-2-3

4.4.4.3 BREATHING AIR COMPRESSOR 480 VAC 50 AMPS outlet

4.4.4.3.1 Phase rotation

4.4.4.3.2 Voltage 1-2-3, 2-3, 1-3

4.4.4.4 240 VAC 20 Amp Single Receptacle

4.4.4.4.1 Voltage 230

4.4.4.5 120 VAC 20 Amp Duplex Receptacle

4.4.4.5.1 Voltage 120

4.4.4.6 PURGE GAS TRAILER 120 VAC 30 Amp Single Receptacle

4.4.4.6.1 Voltage 120

4.4.5 Switch Run-Off-Auto switch to Off.

4.5 No load hot start: Verify that the engine starts and comes to 1800 rpm in the specified time. (MFR 6-10 sec.)

4.5.1 Switch Run-Off-Auto switch to Run. Time 2 sec.

4.5.2 Switch Run-Off-Auto switch to Off.

4.6 Loaded hot start: Verify, with the 100 KW load bank on line, that the engine starts, comes to 1800 ±9 rpm, and the load is automatically switched on-line in the specified time. (MFR 6-10 sec.)

4.6.1 Switch Run-Off-Auto switch to Run.

(Time from close of contacts to load on-line. 2 sec.)

4.6.2 Switch Run-Off-Auto switch Off.
### TEST EXCEPTIONS

<table>
<thead>
<tr>
<th>Step #</th>
<th>Description of exception and resolution.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.8.2</td>
<td>Grounding: 1) Generator frame should be bonded to trailer frame. 2) Power choke through control relay mechanism. (Master or Reel of Trailer) For Ground. Electrically connecting to neutral/ground bus. CJK. Verify upon receipt inspection. CJK.</td>
</tr>
<tr>
<td>3.2.2</td>
<td>Frequency for full load factory set @ 60 Hz. Test data shows variance which is explained by lack of full load during test. Time of frequency indicates the equipment is capable. CJK.</td>
</tr>
</tbody>
</table>

**TEST COMPLETED BY:**

<table>
<thead>
<tr>
<th>PRINT NAME</th>
<th>COMPANY</th>
<th>SIGNATURE</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alex J. Kraskiak</td>
<td>WHC</td>
<td>CJK</td>
<td>9-26-94</td>
</tr>
<tr>
<td>Cummins Northwest Inc</td>
<td></td>
<td>Ch. Holtz.</td>
<td>9-26-94</td>
</tr>
</tbody>
</table>

* Make additional copies as required.
# SUSPECT FASTENER HEADMARK LIST

**Westinghouse Hanford Company**

*Help Stamp Out Suspects/Counterfeits*

## Suspect Fastener Headmark List

All Grade 5 and Grade 8 fasteners of foreign origin which do not bear any manufacturers' headmarks:

<table>
<thead>
<tr>
<th>Grade 5</th>
<th>Grade 8</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Grade 5 fasteners with the following Manufacturers' headmarks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mark</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>J</td>
</tr>
<tr>
<td>KS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grade 8 fasteners with the following Manufacturers' headmarks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mark</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>KS</td>
</tr>
<tr>
<td>NF</td>
</tr>
<tr>
<td>RT</td>
</tr>
<tr>
<td>H</td>
</tr>
<tr>
<td>FM</td>
</tr>
<tr>
<td>M</td>
</tr>
<tr>
<td>KY</td>
</tr>
<tr>
<td>MS</td>
</tr>
<tr>
<td>J</td>
</tr>
<tr>
<td>Hollow Triangle</td>
</tr>
<tr>
<td>E</td>
</tr>
<tr>
<td>UNY</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grade 8.2 fasteners with the following headmarks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mark</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>KS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grade A225 fasteners (Bennet Denver target only) with the following headmarks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
</tr>
<tr>
<td>Type 2</td>
</tr>
<tr>
<td>Type 3</td>
</tr>
</tbody>
</table>

Key: CA-Canada, J-Japan, TW-Taiwan, YU-Yugoslavia

Any bolt on this list should be treated as defective without further testing.
### Generator Set

#### Model Details
- **Model**: 150DGFA 68913H
- **S/N**: F940547197
- **Customer**: CUMMINS NORTHWEST INC
- **Order File Number**: U434358D/P.O. 11353R

#### Service Rating
- **Prime**: KW 135
- **Standby**: KVA 169

#### Fuel Type
- X Diesel

#### Governor Type
- X Mechanical

#### Cooling System
- X Mounted Radiator

#### Test Conditions
- **Test Spec.**: 98126
- **Ambient Temp**: 85 Deg F
- **Barometer**: 28.47 In Hg
- **Voltage**: 277/480 V
- **Frequency**: 60 Hz

#### Test Results

<table>
<thead>
<tr>
<th>Condition</th>
<th>Batt Charge Syst Voltage</th>
<th>1-2</th>
<th>1-3</th>
<th>2-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Load &gt;</td>
<td>Voltage</td>
<td>482</td>
<td>482</td>
<td>482</td>
</tr>
<tr>
<td></td>
<td>Volt Reg Adj 450-517</td>
<td>278</td>
<td>278</td>
<td>278</td>
</tr>
<tr>
<td></td>
<td>Frequency 62.7 Hz</td>
<td>176</td>
<td>66</td>
<td></td>
</tr>
<tr>
<td>Full Load (4 / 4) &gt;</td>
<td>Batt Charge Syst Voltage</td>
<td>480</td>
<td>480</td>
<td>480</td>
</tr>
<tr>
<td></td>
<td>1-2</td>
<td>1-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Additional Details
- **FUEL TYPE**: Diesel
- **GOVERNOR TYPE**: Mechanical
- **COOLING SYSTEM**: Mounted Radiator
- **TEST CONDITIONS**: Batt Charge Syst Voltage
- **UNIT RESULTS**: Batt Charge Syst Voltage 28.01 Volts, 1-2 482, 1-3 482, 2-3 482
- **FUEL TYPE**: Gasoline
- **GOVERNOR TYPE**: Mechanical
- **COOLING SYSTEM**: Mounted Radiator

---

*If unit is dual fuel, see additional sheet for second fuel results.*

---

**Quality Engineer**: D. McCready
**Date**: 7/31/94

---

*See reverse side for extended running time data.*
---R U N N I N G----- | ----M A X----S U R G E--At Specified Voltage---

KW   KVA   PF | KW Occurs in Step | KVA Occurs in Step
135   135   1.00 | 135             | 1

--------------------------------------------------------------------------------

Recommended GenSet
Model: 150DGFA

<table>
<thead>
<tr>
<th>Nominal KW</th>
<th>Duty</th>
<th>Specified Voltage</th>
<th>Freq.</th>
<th>Specified Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>Standby</td>
<td>277/480 WYE</td>
<td>60</td>
<td>105</td>
</tr>
</tbody>
</table>

--------------------------------------------------------------------------------

When operated at 500 Feet Altitude and 77 degrees Fahrenheit Ambient the operating performance is:

* GenSet selected with one GenSet. *

Maximum  Voltage  Freq.  Excitation
KW  Dip  Dip  
150  19%  8%  Shunt

Onan Corporation has developed this GenSize 2 computer program to help you, the engineer, with a generator set selection. The recommendations are based upon your input of the genset requirements and typical performance data published by NEMA and other agencies.

Due to changing load and site conditions beyond our control, we cannot be certain the selection of a genset based upon the recommendation of this computer program will meet the site requirements. Therefore, nothing in this program may be construed as a warranty. You must decide for yourself or consult with your local Cummins/Onan distributor that the generator set selected is sufficient for your intended purpose. Each Onan generator set is covered by an express written warranty which is in lieu of all other warranties, expressed or implied.

Please consult with your Cummins/Onan distributor representative in your area for further information.
and engine/alternator capacity. 135 KVA 187 Acceptable

2. Running load requirements and alternator capacity at site conditions. 135 KW 150 Acceptable

3. Max load surge KVA and Max set KVA capacity with minimum 90% sustained voltage. 135 KVA 187 Acceptable

4. Max load Surge KW and Max set Surge KW capacity at site conditions with minimum 90% sustained voltage. 135 KW 563 Acceptable

5. Transient Voltage Dip:
Allowable Transient Voltage Dip: 19 % 189 Acceptable

6. Total non-linear plus linear load KW and Alternator KW capacity. 135 KW 35 % Acceptable
Project Parameters:

- Duty: Stationary Standby
- Voltage: 277/480 WYE
- Frequency: 60
- Max. Temp. Rise: 105
- Max. VDIP%: 35
- Max. Altitude: 500
- Altitude Scale: Feet
- Max. Amb. Temp: 77
- Temperature Scale: Fahrenheit
- Cooling System: Radiator
- Fuel Type: Diesel

Load Listing

<table>
<thead>
<tr>
<th>Number</th>
<th>Load Type</th>
<th>Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Resistive</td>
<td>3</td>
</tr>
</tbody>
</table>

**Load Details:**

Input KW: 135

- KW: SKVA: SKVAR: SPF: RKW: RKVA: RKVAR: RPF:
  - 5.0: 135.0: 0: 1.00: 135.0: 135.0: 0: 1.00

Step Sequence/Load

<table>
<thead>
<tr>
<th>Number</th>
<th>Surge KW:</th>
<th>Surge SKVA:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>135</td>
<td>135</td>
</tr>
</tbody>
</table>

**Step Details:**

- Start: 135 KW PRIME LOAD

<table>
<thead>
<tr>
<th>Qty</th>
<th>SKW</th>
<th>SKVA</th>
<th>SKVAR</th>
<th>SPF</th>
<th>RKW</th>
<th>RKVA</th>
<th>RKVAR</th>
<th>RPF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>135.0</td>
<td>135.0</td>
<td>0</td>
<td>1.00</td>
<td>135.0</td>
<td>135.0</td>
<td>0</td>
<td>1.00</td>
</tr>
</tbody>
</table>

**Total:**

- 135.0: 135.0: 0: 1.00: 135.0: 135.0: 0: 1.00

**Active:**

- 135.0: 135.0: 135.0: 135.0: 0

Via Selection Results:

- 150DGFA

<table>
<thead>
<tr>
<th>Using load requirements</th>
<th>Required by Loads</th>
<th>Available from Model</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>135 KW</td>
<td>135</td>
<td>150</td>
<td>Acceptable</td>
</tr>
</tbody>
</table>
Two Diesel generator sets by Cummins Diesel, 800 Grady Way, Renton Washington, 200 Kva each. The generators are 480Y/277 volt units.

The generators are installed on trailers fabricated for the units. The trailers have an industrial control panel enclosure. The enclosure is a NEMA 4 outdoor rated enclosure. The control panel has a dead front through which the handles of all circuit breakers are accessible.

The circuit breakers are properly rated and installed. Wire sizes were examined and found to be correct.

Also on the trailer is a 25 Kva transformer to supply 120/240 volt single phase power. The neutral ground point is located in the industrial control panel. A 100 KW load bank is mounted on the front of the generator unit. The load bank can be switched to provide load in increments of 25 KW.

Items requiring further attention.

1. The only provision for connection of a grounding electrode is inside the generator enclosure. A mechanical set screw type lug is bolted to the generator frame, inside the louvered door on the right side of the unit. This location does not allow connection of the grounding electrode conductor and closing of the louvered doors.

2. The generator neutral is internally grounded to the generator frame, however the generator is mounted on rubber vibration isolation pads. The neutral ground point of the generator and the trailer mounted transformer must be the same point.

3. The procurement specifications require that two ground rods (size was not specified) and 100 feet of grounding electrode conductor be provided. The grounding electrode conductor and the ground rods were not provided with the two units observed.

4. The acceptance criteria called for rotation checks of the three phase power. All three phase circuit breakers and receptacles were checked and found to have consistent clockwise rotation. However, the rotation required by the actual three phase loads to be connected was not evaluated.
Recommendations.

1. The neutral and equipment grounds are connected to a terminal bar located inside the industrial control enclosure. It is recommended that a chase be provided through the enclosure, below the level of all enclosed components, to allow the appropriate grounding electrode conductor to be routed from the grounding electrode selected to the neutral grounding bar inside the enclosure. This chase will allow the grounding electrode conductor to connect the grounding bar to the grounding electrode without splice or tap.

2. The generator housing is bonded to the generator frame with a braided bonding strap. A similar bonding strap should be provided to bond the generator frame to the trailer frame.

3. Include two 5/8 X 10 ground rods and 100 feet of # 4 AWG copper wire for connection to a grounding electrode system. The required grounding electrode conductor for the ground rods is #6 AWG.

4. A bump test for rotation check of all three phase motor loads will have to be accomplished at the time of first connection to the generator unit.

Conclusion. There were no NEC violations or safety issues not mentioned above that would prevent this unit from safely performing it's intended function.

CM Monasmith, NEC Interptative Authority
Electrical Power Systems Engineering

rmg
# QUALITY ASSURANCE INSPECTION PLAN

**Item Title:** Diesel Generator  
**Drawing/Spec. No.:** WHC-S-0252  
**Item Description:** Diesel Generator  
**Supplier:** Cummins Northwest  
**Inspection No.:** 2799  
**P.O. Subcontract:** 404866  
**Inspected by:**  
**Date:** 10-7-94

## Inspection Characteristics

<table>
<thead>
<tr>
<th>Char. No.</th>
<th>Inspection Characteristics</th>
</tr>
</thead>
</table>
| SAMPLE SIZE DETERMINATION | Sample size (number of items to be inspected in a lot), shall be determined by using Table I and Table III-A of the latest edition of MIL-STD-105 as follows:  
- Select the Sample Size Code Letter from Table I, based on the lot size of material received and the General Inspection Level indicated by the GAIP (Level I, II, or III).  
- Select the sample size from Table III-A using the Sample Size Code Letter obtained from Table I and the AQL number specified by the GAIP.  
- The minimum sample size utilizing Level II, AQL 4.0, Table III-A shall be 8 or 100%, if the lot size is less than 8.  
**NOTE:** If any samples are found nonconforming, the entire lot shall be placed on HOLD pending engineering evaluation and NCR disposition. |

## Inspection Status

<table>
<thead>
<tr>
<th>Acc</th>
<th>Hld Tag</th>
<th>Rej</th>
<th>NCR</th>
<th>Cond Acc</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. **Verify the Diesel Generator Trailer was not damaged during shipment.**  
   - DATE: 10-7-94

2. **Verify a wire chase has been installed on the Electrical Distribution panel at the rear of the trailer which consists of a short section of Rigid Galvanized Steel conduit which is bent with the end turned down to keep rain from entering the cabinet.**  
   - DATE: 10-7-94

3. **Verify that a ground strap has been installed to electrically bond the generator frame to the trailer frame. (Probably located inside of the generator enclosure on the right side. One strap grounds the generator to the frame and the second strap grounds the frame to the trailer.)**  
   - DATE: 10-7-94

4. **Verify there is a minimum of 100 feet of #4 CU wire provided.**  
   - DATE: 10-7-94
<table>
<thead>
<tr>
<th>Char. No.</th>
<th>Inspection Characteristics</th>
<th>INSPECTION STATUS</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Verify there are no Suspect Fasteners on the Generator Trailer.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Verify Receipt of 8 copies of Vendor Data.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.</td>
<td>Assembly drawings showing general equipment layout, subassembly details, critical</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>interface dimensions and identification of all major components of the engine and the</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>generator. Layout and wiring diagrams of the receptacles on the engine-generator set shall</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>be shown.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.</td>
<td>Schematic electrical drawings of wiring systems, including operating and safety devices,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>control panels, instrumentation and alarms. Include make, model and part numbers of items.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C.</td>
<td>Operating and maintenance instructions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.</td>
<td>Pictorial parts list and part numbers.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E.</td>
<td>Recommended spare parts list.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F.</td>
<td>Recommended maintenance procedures.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.</td>
<td>Short-circuit current capability at the generator output terminals.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>