EGSA 107T — 1999

GENERATOR SET TEST METHODS

Note: Due to the sheer size of this standard, it is not practical to make the full documentation available via download online. Instead, please contact EGSA directly to purchase a copy of the standard in PDF format on CD-ROM.

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1. SCOPE

1.1 Coverage. This handbook covers many possible methods for measuring and determining characteristics of all electric generators and generator sets. It is assumed that anyone citing these test methods in a specification will select only those tests that are appropriate to the particular application, and contract. The description of the test instruments together with instruction for their use are included as applicable under each method. It should be noted that, some of the older types of instruments may no longer be manufactured. Where a replacement instrument must be used the accuracy of that instrument must be as good or better than the instrument cited.

2. REFERENCED DOCUMENTS

2.1 Issues of documents. The following specifications and standards of the issue in effect on date of invitation for bids or request for proposal, unless a different issue is specified in the contract documents, form a part of this standard to the extent specified herein.

STANDARDS

EGSA	Performance Standards
EGSA 100B	-Engine Cranking Batteries Used With Generator Sets.
EGSA 100C	-Battery Chargers for Engine Starting Batteries (Constant Potential Static Type).
EGSA 100D	-Generator Overcurrent Protection 600 Volts and Below.
EGSA 100E	-Governors on Engine Generator Sets.
EGSA 100F	-Engine Protection Systems.
EGSA 100G	-Generator Set Instrumentation, Control, and Auxiliary Equipment.
EGSA 100M	-Multiple Engine Generator Set Control Systems.
EGSA 100P	-Peak Shaving Controls.
EGSA 100R	-Voltage Regulators Used on Electric Generators
EGSA 100S	-Transfer Switches Used with Engine Generator Sets.
EGSA 101P	-Engine Driven Generator Sets
EGSA 101S	-Guideline Specification for Engine Driven Generator Sets.
EGSA 101G	-Glossary of Standard Industry Terminology and Definitions.
EGSA 109C	-Code Listing: Safety Codes Required States and Major Cities.

(Copies of these standards may be obtained from:
Electrical Generating Systems Assoc. 1650 S. Dixie Highway,5th Floor, Boca Raton, FL 33432
Phone: (561) 750-5575; Fax: (561) 750-5316.
EGSA standards may also be accessed on the internet: **www.egsa.org**)

MILITARY

MIL-STD-1332 - Definitions of Tactical, Prime, Precise, and Utility Terminologies for Classification of the Mobile Electric Power Engine Generator Set Family.

MIL-STD-1474 - Noise Limits for Army Materiel.

(Copies of specifications and standards required by contractors in connection with specific requirement functions should be obtained from the procuring activity or as directed by the contracting officer. Copies for other purposes may be obtained from Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.)

2.2 Other publications. The following publications of the issue in effect on date of invitation for bids or request for proposal, unless a different issue is specified in the requirement documents, form a part of this handbook to the extent specified herein.

AMERICAN NATIONAL STANDARDS INSTITUTE

ANSI C2	- National Electrical Safety Code.
ANSI C50.10 thru C50.41 Series	- Rotating Electrical Machinery.
ANSI/ASHRAE 41.6	- Standard Method for Measurement of Moist Air Properties.
ANSI/IEEE 100	- Standard Dictionary of Electrical and Electronics Terms.
ANSI/NEMA MG1	- Motors and Generators.
ANSI/NEMA MG2	- Safety Standard for Construction and Guide for Selection, Installation and Use of Electric Motors and Generators.
ANSI/NFPA 70	- National Electrical Code.

(included as general references)

(Copies may be obtained from the American National Standards Institute, 1430 Broadway, New York, NY 10018). (Microfilm or copies are also maintained at many libraries.)

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR CONDITIONING ENGINEERS (ASHRAE).

ASHRAE Handbook 1981 Fundamentals, Chapter 5, Psychrometrics, and Chapter 6, Psychrometric Tables.

ASHRAE Brochure on Psychrometry

(Copies may be obtained from ASHRAE, Inc., 1791 Tullie Circle NE, Atlanta, GA 30329.)
(Microfilm or copies are also maintained at many libraries.)

2.3 Textbooks. The following textbooks are listed for information purposes and are not to be considered as a part of this handbook:

On- Site Power Generation: A Referance Book, 3d Ed.
Electrical Generating Systems Association.

Electrical Engineers' Handbook, Pender and Del Mar, Vol. 1, 4th Ed.,
Wiley Brothers.

IEEE Standard Dictionary of Electrical and Electronics Terms,
IEEE 100 Wilby - Interscience.

Standard Handbook for Electrical Engineers, Fink and Beaty, 11th Ed., McGraw-Hill Book Co.

Chamber's Dictionary of Science and Technology (1978), Hippocrene Books.

(Copies may be obtained from bookstores, or from the publishers listed; copies are also maintained at many libraries.)

3. DEFINITIONS

3.1 Extent and sources of definitions.

a. EGSA 101G Glossary of Standard Industry Terminology and Definitions

b. ANSI/IEEE 100 Standard Dictionary of Electrical and Electronics Terms.

c. Other reference documents of section 2 herein.

4. GENERAL REQUIREMENTS

4.1 Physical standards, conventions and calibration traceability. Primary and secondary standards, conventions, and values for calculations, computations, conversions, and calibration of instruments, shall be those recognized by the International Electrotechnical Commission (IEC), International Organization for Standardization (ISO) and the United States National Bureau of Standards (NBS). The IEC and ISO are both located in Geneva, Switzerland. In the U.S.A., information regarding all these standards and conventions may be obtained from NBS, Washington D.C., 20234.

4.2 Recycled, virgin and reclaimed materials. Reclaimed, recycled and recovered materials may be used, where appropriate. This document does not contain any requirements that items be manufactured from virgin materials, so long as the intended use of any item is not thereby jeopardized.

5. Numerical Index Of Test Methods

Method No. Test Method

1 ----------Measurement of Potential
2 ----------Measurement of Current
3 ----------Measurement of Power
4 ----------Measurement of Frequency
5 ----------Measurement of Resistance
6 ----------Measurements of Transients and Waveforms
7 ----------Measurement of Power Factor
8 ----------Measurement of Time
9 ----------Measurement of Speed
10 ----------Measurement of Temperature
11 ----------Measurement of Weight and Force
12 ----------Measurement of Pressure
13 ----------Temperature Control (Hot Rooms, Cold Rooms, Altitude Chambers)
14 ----------Measurement of Sound Level
15 ----------Determination of Phase Rotation
16 ----------Determination of Phase Relationship
17 ----------Electrical Instruments: Care, Inspection, Use, and Required Accuracy
18 ----------General Instructions for Connecting Testing Instruments
19 ----------Engine Pressure Measurements
20 ----------Pressure and Temperature Corrections to Engine Data
21 ----------Temperature Corrections to Resistance Measurements
22 ----------Battery Servicing and Conditioning Prior to "Cold Starting"
23 ----------Thermal Instrumentation
24 ----------Data Sheets and Record Entries
25----------Insulation resistance test.
26----------High potential test.
27----------Winding resistance test.
28 ----------Open circuit saturation curve test.
29 ----------Synchronous impedance curve test (shortcircuit saturation curve).
30 ----------Zero power factor saturation curve test.
31 ----------Rated load current saturation curve test.
32 ----------Rotating exciter saturation curve test (constant resistive load).
33 ----------Summation of losses test.
34 ----------Generator power input test.
35 ----------Brush potential curve test.
36 ----------Short circuit ratio test.
37 ----------Direct axis synchronous reactance test.
38----------Negative sequence reactance and impedance test.
39 ----------Zero-sequence reactance test.
40 ----------Quadrature axis synchronous reactance test.

5. Numerical Index Of Test Methods- (continued)

Method No. Test Method

41 ----------Direct axis transient reactance test.
42 ----------Direct axis subtransient reactance test.
43 ----------Direct axis transient shortcircuit time constant test.
44 ----------Direct axis subtransient short circuit time constant test.
45 ----------Direct axis transient open circuit time constant test.
46 ----------Shortcircuit time constant of armature winding test.
47 ----------Start and stop test.
48 ----------Start and stop test (remote control).
49 ----------Start and stop test (remote cubicle).
50 ----------Torsiographing tests.
51 ----------Overspeed test (set).
52 ----------Overspeed protective device test.
53 ----------Overspeed test (generator only).
54 ----------Underspeed protective device test.
55 ----------Phase sequence test (rotation).
56 ----------Phase balance test (voltage).
57 ----------Circulating current test.
58 ----------Rheostat range test.
59 ----------Regulator range test.
60 ----------Frequency adjustment range test.
61 ----------Circuit interrupter test (short circuit).
62 ----------Circuit interrupter test (overload current).
63 ----------Circuit interrupter test (overvoltage and undervoltage)
64 ----------Indicating instrument test (electrical).
65 ----------Indicating instrument test (production sets) (electrical).
66 ----------Low oil pressure protective device test.
67 ----------Overtemperature protective device test.
68 ----------Low fuel protective device test.
69 ----------Controls, direction of rotation.
70 ---------- ---Reverse power protective device test.
71 ---------- ----Reverse battery polarity test.
72 ----------Paralleling aid device test.
73 ----------Voltage waveform test (oscillographic).
74 ----------Voltage waveform test (harmonic analysis).
75 ----------Voltage waveform test (deviation factor).
76 ----------Voltage modulation test.
77 ----------Frequency & voltage regulation, stability & transient response test (short term).
78 ----------Frequency & voltage stability test (long term).
79 ----------Voltage and frequency droop test.
80 ----------Parallel Operating Test

5. Numerical Index of Test Methods- (continued)

Method No. Test Method

81 ----------Inherent voltage droop test.
82 ----------Voltage and frequency regulation test (for generator sets).
83 ----------Inherent voltage regulation test.
84 ----------Voltage dip for low power factor loads tests.
85 ----------Voltage unbalance with unbalanced load test (line - neutral - load).
86 ----------Voltage unbalance with unbalanced load test (line to line).
87 ----------Voltage unbalance test (three wire, single phase).
88 ----------Unbalanced load heating test.
89 ----------Parallel operation test.
90 ----------Maximum power test (for gasoline and diesel generator sets).
91 ----------Maximum power test (determination of requirements for production sets).
92 ----------Maximum power test for gasoline and diesel generator sets (production sets).
93 ----------Ripple voltage test.
94 ----------Judging of commutation test (ac sets).
95 ----------Judging of commutation test (dc sets).
96 ----------Shaft current test.
97 ----------DC control test.
98 ----------Inclined operation test.
99 ----------Sound level test.
100 ----------Fuel consumption test.
101 ----------Temperature rise test (generator only) .
102 ----------Temperature rise test (alternate loading method).
103 ----------Endurance Test
104 ----------Reliability test.
105 ----------Starting and operating test (extreme cold, battery start).
106 ----------Starting and operating test (moderate cold, battery start).
107 ----------Starting and operating test (extreme cold, manual crank).
108 ----------Starting and operating test (moderate cold, manual crank).
109 ----------Standby operation test (extreme cold).
110 ----------High temperature test.
111 ----------Humidity test.
112 ----------Fungus resistance test.
113 ----------Rain test.
114 ----------Sand and dust test.
115 ----------Salt fog test.
116 ----------Immersion test.
117 ----------Solar radiation test.
118 ----------Altitude operation test.
119 ----------Storage test (extreme cold, -80 (F).
120 ----------Storage test (extreme hot, +160 (F).

5. Numerical Index of Test Methods- (continued)

Method No. Test Method

121 ----------Vibration Test.
122 ----------Drop test (free fall).
123 ----------Drop test (ends).
124 ----------Road transportability test.
125 ----------Railroad impact test.
126 ----------Forklift handling test.
127 ----------Fuel lift test.
128 ----------Winterization test.
129 ----------Rectifier test.
130 ----------Load bank test.