



MTU ONSITE ENERGY PERFORMANCE ASSURANCE CERTIFICATION

A Tognum Group Company

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PROTOTYPE TEST PROCEDURES & METHODS

MTU Onsite Energy has been producing superior engine generator sets for over five decades. We understand the importance of reliable cost-effective products, and have developed industry-leading test procedures to ensure we exceed this criteria. Our testing program confirms that our customers will receive products of the highest quality. The Performance Assurance Certification provided by MTU Onsite Energy certifies that every engine generator set undergoes rigorous prototype testing including the following:

PROTOTYPE TEST PROCEDURES

Rated Load (NFPA 110)

MTU Onsite Energy certifies that all engine generator set models will produce the name-plated load in all conditions within the design tolerance of the gen set.

Extended Run Testing

MTU Onsite Energy certifies that all engine generator set prototypes have been subjected to major run time testing.

Transient Response Analysis (ISO 8528-5)

MTU Onsite Energy certifies that all new gen-set models have undergone transient response analysis per ISO 8528-5.

Torsional Analysis

MTU Onsite Energy certifies that all engine generator set models have undergone torsional stress analysis.

Engine Cooling System

MTU Onsite Energy certifies that all gen-set models will cool sufficiently within the ambient design conditions per each model.

Anticipatory Alarms & Shutdowns

MTU Onsite Energy certifies that the pre-alarms and alarms function appropriately to protect the engine generator set from any foreseen unnecessary failures.

Vibrational Analysis (ISO 8528-9)

MTU Onsite Energy certifies that all new engine gen set models have undergone vibration analysis to ensure that each engine generator coupling is balanced and that there is no destructive resonant vibration.

PROTOTYPE TEST METHODS

MTU Onsite Energy performs prototype testing by following the methods and guidelines established by MIL-STD-705c. MTU Onsite Energy is proud to perform these stringent procedures because they showcase engine generator set superiority in providing precise power for all types of critical applications including hospitals, data centers, UPS systems and government and military installations.

TEST STANDARDS

MTU Onsite Energy engine generator sets are compliant with many different codes and standards. MTU Onsite Energy's philosophy and performance are regularly reviewed to ensure continuity with these codes and standards: UL2200, CSA, EPA, NFPA 99—Health Care Facilities, NFPA 70—National Electrical Code, NFPA 110—Standard for Emergency and Standby Power Systems, Department of Labor and Industry, ISO 8528-5—Generating Sets, and ISO 8528-9 Measurement and Evaluation of Mechanical Vibrations. In addition: ISO 8528-10—Measurement of airborne noise by the enveloping surface method, IEEE 115—Test Procedures for Synchronous Machines, NEMA MG 1—Motors and Generators, MIL-STD-705-c

MIL-STD-705C METHODS	
Method	Description
301.1c	Insulation Resistance Test*
302.1b	High Potential Test*
401.1b	Winding Resistance Test
503.1c	Start and Stop Test
505.2b	Over Speed Protective Device Test
507.1d	Phase Sequence Test (Rotation)
508.1d	Phase Balance Test (Voltage)
510.1d	Rheostat Range Test (as applicable)
511.1d	Regulator Range Test
511.2c	Frequency Adjustment Range Test (as applicable)
513.2a	Indicating Instrument Test (Electrical)
515.1b	Low Oil Pressure Protective Device Test
515.2b	Over Temperature Protective Device Test
516.1a	Controls, Direction of Rotation
640.1d	Maximum Power Test

* Performed by Alternator OEM

FACTORY ACCEPTANCE TESTING

MTU Onsite Energy's factory testing is performed with the same extreme diligence and attention to detail that is given to the prototype testing process. Every engine generator set receives a complete factory acceptance test that certifies and ensures that the set will function in accordance to every specific application. Test metering will have an accuracy of 1.3% or better. This metering is calibrated a minimum of once per year, and is directly traceable to the Bureau of Standards.

Factory Acceptance Testing Procedures:

- // Insulation Resistance Inspection (301.1c)*
- // High Potential Test (302.1b)*
- // Alternator Over Speed (1 min.)*
- // Engine Inspection
- // Generator Inspection
- // Resistances Inspection (401.1b)
 - Exciter Field Stator
 - Alternator Armatures
- // Mounting & Coupling Inspection
- // Engine Fuel Oil System Inspection
- // Engine Lube Oil System Inspection
- // Engine Cooling System Inspection
- // DC Charging System Inspection
- // Circuit Breaker Inspection
- // Anticipatory Alarms and Shutdowns Inspection (505.2b, 515.1b, 515.2b)
- // Optional Equipment Inspection (513.2a)
- // Load Test Inspection
 - Regulator Range Test (511.1d)
 - No Load Inspection
 - MAX Load @ 1.0 P.F. (640.1d)
 - MAX Load @ 0.8 P.F.
 - Block Loads @ 0-25%, 0-50%, 0-75%, 0-100%
- // Phase Balance and Sequence Inspection (507.1d, 508.1d, 516.1a)

*Performed by Alternator OEM

Extended Run Factory Acceptance Testing:

In some cases, extended run testing may be requested. Unless specified otherwise, extended run testing will be performed in the following manner.

- // 1.0 Power Factor
- // Full name plate rated load.
- // Standard readings taken every 15 minutes.

WITNESSED FACTORY ACCEPTANCE TESTING

Standard witnessed factory tests must be scheduled and approved at least four weeks prior to the engine generator set's scheduled shipping date. Any requests for witnessed factory testing after this four week period must be approved by the Regional Sales Manager and are subject to additional fees.

WITNESSED EXTENDED RUN FACTORY ACCEPTANCE TESTING

Witnessed extended run tests must be scheduled and approved at least six weeks prior to the engine generator set's scheduled ship date. Any requests for witnessed extended run testing after this six week period must be approved by the Regional Sales Manager and are subject to additional fees.

STANDARD READINGS RECORDED DURING LOAD TEST INSPECTION

Run Time	Frequency
AC Voltage	Exciter Field Voltage
AC Amperage	Exciter Field Current
kVA	Lube Oil Pressure
kWe	Engine Coolant Temp.
Power Factor	Ambient Temp.

ADDITIONAL FACTORY ACCEPTANCE TESTING

Additional testing is available upon request. The following is a list of supplementary tests which can be performed on MTU Onsite Energy engine generator sets. Non-standard testing is subject to additional charges.

MIL-STD-705C METHODS	
Method	Description
503.2c	Start and Stop Test (remote control)
505.2b	Over Speed Protective Device Test
602.1b	Voltage Modulation
608.1b	Frequency and Voltage Regulation, Stability and Transient Response Test
610.1b	Voltage and Frequency Droop
614.1b	Voltage and Frequency Regulation Test
619.2c	Voltage Dip and Rise For Rated Load Test
670.1b	Fuel Consumption Test (consult engineering)



National Fire Protection Association
The authority on fire, electrical, and building safety



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