USA
ULTIMATE SERVICE ASSOCIATES

The ultimate solution for maintaining your nationwide generator network

Testing Standby Generator SetsResistive Versus Reactive

1.0 Introduction:

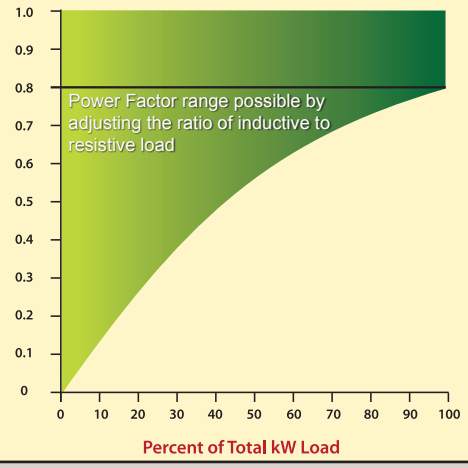
To ensure a backup generator system will perform as specified, it is necessary to carry out a fully witnessed test off-line at the time of initial installation, as part of the commissioning process. It is also important to perform load tests during periodic planned maintenance checks.

This information sheet discusses the use of portable load banks used for generator testing and the differences between resistive load bank testing and reactive load bank testing.

2.0 Provision of Test Equipment and Testing:

Distributors for the principal generator set manufacturers have the equipment and technicians throughout their dealer networks to perform the required testing. *(Continued over)*

TOTAL LOAD kW	TYPICAL LOAD STEP kW RESOLUTIONS	
200	240/480 VAC	5, 10, 10, 25, 50, 100 kW
250	240/480 VAC	5, 10, 10, 25, 50, 50, 100 kW
400	240/480 VAC	5, 10, 10, 25, 50, 100, 100, 100 kW
400	480 VAC	5, 10, 10, 25, 50, 100, 100, 100 kW
VOLTAGE RATING (3 PHASE, 60 Hz)		



Reactive Load Testing

MINIMAL OBTAINABLE POWER FACTOR FOR LOAD BANK WITH 0.8 PF AT TOTAL LOAD

To fulfill our commitment to be the leading network service provider in the Power Generation Industry, the USA, Inc. team maintains up-to-date technology and information standards on Power Industry changes, regulations and trends. As a service, our **Information Sheets** are circulated on a regular basis, to existing and potential Power Customers to maintain awareness of changes and developments in engineering standards, electrical codes, and technology impacting the Power Generation Industry.

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Testing should only be carried out by trained, experienced personnel and conducted as directed by applicable codes and by the manufacturer. This information sheet details some of the testing procedures specified by the National Fire Protection Agency code NFPA 110 for standby generator sets.

3.0 Resistive Load Testing:

This is the most common means of testing a generator set with its intended load. It will allow the owner to be sure the set produces 100% of its output at 1.0 power factor by connecting full kW loading. This load test measures whether the generator is producing at its full power rating, dissipating the required amount of engine exhaust gases and heat, and producing the required amount of thermal energy into the engine cooling system.

Resistive load testing verifies that the engine and generator system will produce and maintain full load without overheating and shutting down. It also evaluates other critical engine systems such as oil and fuel, assesses whether all components of the standby system will work together as designed and intended, and can identify any potential weaknesses under controlled conditions. Also it can be used to burn out any carbon deposits in the cylinders or exhaust system, thereby reducing any wet stacking problems due to frequent operation with light electrical loads.

Normally, it is sufficient to run a set with an artificial load for a maximum of eight hours. Some government and military specifications require 18- to 24- hour duration tests.

4.0 Reactive Load Bank Testing:

A reactive load equal to 75% of the resistive rating can be paralleled in combination with the primary resistive load bank to measure the full kVA nameplate rating at 0.8 power factor of the standby generator set. This also allows for proper calibration of load sharing and voltage regulating systems in parallel operation installations. Installations with critical large motor loads might warrant this testing. As this has a higher cost, it is normally only used for new installation start-up, as the generator kVA will not deteriorate or change once tested and proven initially.

5.0 Frequency of Load Bank Maintenance and Operational Testing:

NFPA 110 (2013 edition) details the testing requirements for Emergency Power Supply Systems (EPSS) and the recommended frequency of testing. Clause 8.3.1 states. “The EPSS shall be maintained to ensure to a reasonable degree that the system is capable of supplying service within the time specified for the type anf for the time duration specified for the class.”

6.0 National Fire Protection Agency (NFPA) 110 2013 Edition (Clause 8.4 Operational Inspecion and Testing)

Clause 8.4.2 Diesel generator sets in service shall be exercised at least once monthly, for a minimum of 30 minutues, using one of the following methods.

(1) loading that maintains the minimum exhaust gas temperatures as recommended by the manufacturer
(2) Under operation temperature conditions and at not less then 30 percent of the EPS standby nameplate kW rating

Clause 8.4.2.4 Spark-ignited generator sets in service shall be exercised at least once month with the available EPSS load for 30 minutes or until the water temperature and the oil pressure have stabilized.

Any Emergency Power Supply System (EPSS) must meet NFPA 110 regulations for one of the two levels.

Level 1: Clause 4.4.1. Level 1 systems shall be installed where failure of the EPSS to perform could result in loss of human life or serious injuries.

Level 2: Clause 4.4.2. Level 2 systems shall be installed where failure of the EPSS to perform is less critical to humna life and safety.

For more information about NFPA 110

NFPA Headquarters, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 0269-9101 • NFPA website: www.nfpa.com

7.0 Web Site Addresses for Reference on Load Testing:

The following are useful web sites for suppliers of load banks with details of the equipment available.

Avtron Loadbank Inc.	www.load-bank.com
ComRent International LLC	www.comrent.net
Simplex Inc.	www.simplexdirect.com

USA ULTIMATE SERVICE ASSOCIATES

Ultimate Service Associates, LLC.
5514 South Lewis Ave.
Tulsa, OK 74105

Ph: 918.836.8701
Fx: 918.835.2748

www.usa-svc.com

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