INSTITUTE OF ENVIRONMENTAL SCIENCES AND TECHNOLOGY

Design, Test and Evaluation Division Recommended Practice 009.1

IEST-RP-DTE009.1

Vibration Shaker System Selection

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This Recommended Practice was prepared by and is under the jurisdiction of Working Group 009 of the Institute's Design, Test, and Evaluation Division.

Third printing, July 2017

ISBN 978-1-877862-58-3

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1 SCOPE AND LIMITATIONS

1.1 Scope

The purpose of this Recommended Practice (RP) is to define an orderly approach that addresses the major issues involved in selecting a shaker for dynamic testing. In some cases, this selection process is associated with deciding which shaker system to procure. In other cases, the user will already have shaker systems available (in-house or at commercial test laboratories) and must decide which one is best suited for the task at hand. The process is the same in either case.

Shakers are generally used for sine vibration, random vibration, and many types of shock tests.

It is the intent of this document to cover the following applications for shakers: simulation of operating conditions, design qualification tests, transportation simulation, and vibration for environmental stress screening (ESS).

All major types of shaker systems will be included in the discussions, namely: electrodynamic (E-D), servo-hydraulic (hydraulic), mechanical, and pneumatic impactor. In the context of this Recommended Practice, a shaker system includes the power supply (electronic, hydraulic, or pneumatic) as well as the cooling system required for the shaker system. Closed-loop control systems (required to run tests on E-D and hydraulic shakers) are addressed in a different RP.

1.2 Limitations

This document addresses technical matters and does not present any issues relating to specific commercial applications. This document also does not address any specific financial considerations, which certainly must be considered when selecting a vibration shaker system.

2 REFERENCES AND APPLICABLE DOCUMENTS

None.

3 TERMS AND DEFINITIONS

armature
That part of an electrodynamic shaker that moves with the payload.

The armature consists of a mounting table, a driver coil, and the structure that connects the mounting table to the driver coil.

axial resonance
The first mode of vibration of an armature that has the mounting table moving out-of-phase with the driver coil.

diaphragm mode
The first mode of vibration of an armature that has significant variations in vibration amplitude across the surface of the mounting table.

driver coil
The part of an armature that converts electrical energy to mechanical motion.

E-D
An abbreviation for electrodynamic (which see).

electrodynamic
A type of shaker that uses electrical energy to create dynamic motion. In physics, the technology used is called the voice coil principal.

exciter
Another word for shaker.

hydraulic
A shortened form of the phrase servo-hydraulic.