



# SURFACE VEHICLE RECOMMENDED PRACTICE

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## Vibration Testing of Electric Vehicle Batteries

### RATIONALE

Revisions were made to this document to be consistent with information in the Cooperative Research Program SAE/NHTSA DOT HS 812 717 report. Vibration tables and figures were enhanced for accuracy. Test equipment and instrumentation sections were updated.

### FOREWORD

This document provides a test procedure for characterizing the effect of long-term, road-induced vibration and shock on the performance and service life of electric vehicle batteries. For mature, production-ready batteries, the intent of the procedure is to qualify the vibration durability of the battery. Either swept sine wave vibration or random vibration is typically used for the performance of such testing. Random vibration is the focus of this document.

The vibration tests defined in this procedure are based on rough-road measurements at locations likely to be appropriate for mounting of traction batteries in electric vehicles. The data were analyzed to determine an appropriate cumulative number of occurrences of shock pulses at various given G-levels over the life of the vehicle. The vibration envelopes shown in Figure 1 correspond to approximately 100000 miles of usage at the 90th percentile. The vibration spectra contained in this procedure have been designed to approximate this cumulative exposure envelope. For testing efficiency, a time-compressed vibration regime is specified to allow completion of the test procedure in a minimum of 13.6 hours and a maximum of 92.6 hours of testing, depending on the type of shaker table available and the choice of acceleration levels.

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### Cumulative Exposure to Vibration

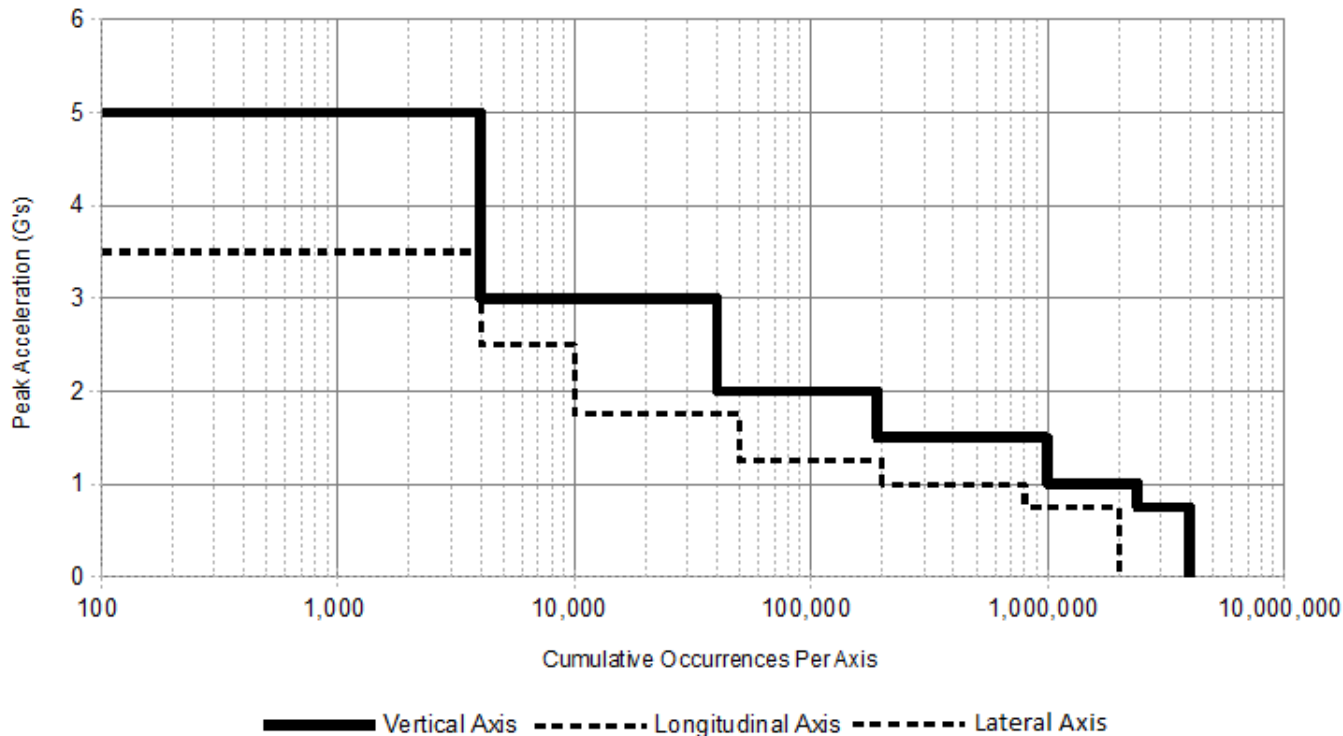


Figure 1 - Cumulative vibration envelopes

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