Development of the J2825 On-Highway Motorcycle Sound Test Procedure

In response to a growing need for a practical and technically valid method for measuring exhaust sound pressure levels (SPL) of on-highway motorcycles, the SAE Motorcycle Technical Steering Committee has developed Surface Vehicle Recommended Practice J2825, "Measurement of Exhaust Sound Pressure Levels of Stationary On-Highway Motorcycles," which includes a stationary sound test procedure and recommendations (CR1) for vehicle sound level limit values. Key goals of the development process included: minimal equipment requirements (CR2), ease of implementation by non-technical personnel, and consistency with the federal EPA requirements; in particular, vehicles compliant with the EPA requirements should not fail when assessed using J2825 exactly as it is published (CR3).

Development of the recommended practice and the technical support information involved a comprehensive field study of 25 motorcycles and 76 different exhaust systems, ranging from relatively quiet OEM systems to un baffled, aftermarket exhaust systems. For the various motorcycle/exhaust system configurations, SPL (Sound Pressure Level / dBA) measurements were made using the EPA pass-by procedure and several different stationary measurement methods.

Correlations between the results obtained by these different methods were studied for the entire subject group (combinations of motorcycle and exhaust system) as well as for sub-groups based on motorcycle engine configuration.

Of the stationary measurement methods explored; the most reliable results were obtained when the SPL was measured 20 inches from the tailpipe outlet.

On the basis of engine configuration, stationary test results were correlated with results measured using the wide-open throttle, EPA pass-by procedure. (CR4)

For four-cylinder motorcycles, the best correlation was obtained at 5000 rpm; for all other engine types the best correlation was obtained at 2000 rpm. Satisfactory results were also obtained using idle SPL measurement. (CR5)

The detailed procedure SAE J2825 and supporting data has been published.

http://saepcmech.saejournals.org/content/4/2/1142.abstract (This is a brief review of the published supporting data)

http://saepcmech.saejournals.org/content/4/2/1142.full.pdf+html (This is the full supporting data technical paper.)

http://standards.sae.org/j2825_200905/ (This is the actual test procedure.)
Notes

As one of the authors of the sound testing procedure and having performed independent studies of vehicle sound measurements I have included these comments.

(CR1) The sound level recommendations in the recommended practice have been implemented to insure that truly legal motorcycles do not fail the roadside sound test. Any deviation from these values or the procedure has the potential of falsely failing an EPA legal vehicle. Any changing of any of the processes or values in that are specified in the Recommended Practice invalidates utilizing the support data as a reference. PLEASE utilize the procedure as it is published. The technical community will update the practice.

(CR2) The equipment segment in the standard must be adhered to. **Sub standard measuring equipment in a high pulse environment will give inaccurate measurements.**

(CR3) When used as directed in the standard, confirmed false failures are virtually eliminated.

(CR4) The EPA pass-by method for motorcycles has been a successful test method for measuring total vehicle sound and matching motorcycle sound levels with other transportation vehicles. J2825 allows for a stationary exhaust sound level reading to be taken, and when done as directed will repeatedly capture excessively loud vehicles.

(CR5) When using the idle mode exclusively some vehicles could have an equipment or accessory component rattle. The complete test method should utilize the elevated test rpm to eliminate this possibility.

Special recognition is given to the American Motorcyclist Association for promoting responsible motorcycling.