Comment from Andrew Schulte

This comment is regarding FMVSS 141, Minimum Sound Requirements for Hybrid and Electric Vehicles. The first comment I have is the requirement for 30 seconds of ambient noise measurement. These files are meant to have no distinct contamination from any sound source including birds and crickets, car doors, engines, etc. If ambient and test files with noise contamination are not saved by the test technician, then 10 seconds of ambient noise recording should be enough to characterize the environment. Requiring 30-seconds of ambient noise without contamination is very much more difficult than recording 10 seconds without contamination. Additionally, stationary and pass-by test files are around 10sec long, and the SAE J2889_1 calls for a 10-second sample. My recommendation is to change the FMVSS 141 ambient noise recording length to 10 seconds.

Additionally, a range of variation in the ambient sound recording, however long it may be, should be calculated and used to determine any SPL corrections. See table 2 on page 11 of SAE J2889_1_201511. FMVSS 141 (TP-141-01, p.32) uses the 1/3 octave levels at the point in time of the minimum overall ambient SPL, and this is not the correct way to do it. Using the levels at the quietest point of an ambient recording tells us nothing about how loud or how much variation there is in the ambient recording. This can have significant ramifications for the down-the-line calculations and whether or not a test will pass or fail.

A more general comment: the current test procedure is not objective enough in determining acceptable background noise for deciding if a test can or cannot be performed. A test technician can make sure to not use any files containing birds or airplanes, but what kind of background noise sound pressure levels are acceptable? A close-by highway that has a large amount of volume at the time of testing can cause high SPLs without really having distinct sounds that are detectable in the file. If there truly cannot be any distinct sounds, that means no birds at all and no crickets at all, however temperatures have to be ~41F or higher, so that narrows testing down to a couple months out of the entire year. This is not practical for any test lab or OEM that needs to certify their vehicle.

Background noise leads into the relative volume change requirement. The compliance tool sets values to 0 or -999 if they are too close to the ambient SPL for that 1/3 octave band. This has a significant impact on the averaged values. Example: 3150 Hz, 1/3 octave band ambient-corrected values are 0, 0, 32.3, 0. Those 0s do not go un-used. They cause an average SPL at 3150 Hz of 8.1 dB(A). Those 0s that represent un-usable values should not be factored-in to the 1/3 octave band value average. I believe this is the cause for many test outcomes to show a passing result in every category, and then fail the test because the relative volume portion was failed. Un-used values that are set to 0, should be left out of the average.

Wrapping up, there is quite a lot of potential for measurement uncertainty/variation the way things are written, and this will likely lead to test failures that aren't necessary, and I'm willing to bet every test failure that NHTSA finds will be opposed by OEM test data showing a passing result. My opinion is the FMVSS 141 procedure should either follow all of the SAE J2889_1 or none of it.

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