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NOISE EMISSION FROM MOPEDS

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SUMMARY

This investigation concerning noise emission from mopeds has been made by IFM Akustikbyrån AB on behalf of the National Environment Protection Board.

The purpose of this investigation was to determine the actual noise emission data of today's brand-new mopeds. (The information was gathered by means of literature studies, contacts with manufacturers and general agencies.) The investigation shows clearly that most of these new mopeds may fulfil forthcoming limits of 70 dB(A), where a maximum speed of 30 km/h is specified.

A lot of questions have been cleared out, most of which have a big influence on noise emission:

- A normal standard deviation of ± 1.5 dB(A) in the noise emission ought to be valid for the same type of moped from any manufacturer
- The investigation results show that the sound level from a used moped with correct exhaust system has less noise emission than a brand-new moped. The sound level does not increase or decrease during the lifetime of the exhaust system
- Using a "pirate" exhaust muffler on mopeds may increase the noise emission in some cases with about 2 dB(A)
- By using the standardized measuring method it is possible to get an accuracy of more than ± 3 dB(A) depending on calibration, instrumentation and measuring accuracy.

Recommendations and adjustments of the proposed standard are also given in the report based on the results of this investigation.

DRAFT STANDARD. U N TRANS/SC1/WP29/92

I will shortly point out some details in the draft standard given by the Economic Commission for Europe. This draft includes both measuring methods and limiting sound levels for the approval and the marking of new mopeds.

The measuring method for approval is by-pass at a distance of 7.5 m in accordance with the ISO/R362 but with fully opened trottle all the time if the highest speed is less or equal to 30 km/h. In the draft there is a specification for the instrumentation, the test site, the meteorological conditions and the conditions of the moped. In order for the administration to get a reference value for control of mopeds in use, a stationary measuring method is described, according to ISO 5130 from 1982.

In the draft, annex 3, measuring instruments, is stated: "The sound level meter (or the equivalent measuring system) shall at least meet the requirements of a type 1 instrument according to IEC Publication 651 (1979)".

"The measurements shall be made using the frequency weighting "A", and the time weighting "F"".

Beneath the title "Measurement of noise on mopeds in motion" in the draft, is stated: "At least two measurements shall be made on each side of the moped. The maximum sound level recorded at each measurement shall constitute the result of the measurement. The measurements shall be considered valid if the difference between two consecutive measurements on the same side of the vehicle is no more than 2 dB(A)."

Beneath the title "Interpretation of results" is stated: "The figure recorded shall be that corresponding to the highest sound level. Should that figure exceed by not more than 1 dB(A) the maximum sound level authorized for the category of moped tested, a second series of two measurements shall be made. Three out of the four so obtained results must fall within the prescribed limits. To allow for lack of precision in the measurements, the figures read from the measuring instrument shall be reduced by 1 dB(A)."

COMMENTS ON ACCURACIES AT A STANDARDIZED MEASUREMENT

Test site, rider and vehicle variables

In the background document for the U S standard for motorcycles and mopeds is shown a standard deviation in the range of 3.5 to 4.4 dB for 15 motorcycles. 50-99 cc. at 5 different test sites and 15 motorcycles at 10 different test sites respectively. Variations in sound level data at combined co-operation of test site, rider and vehicles variables gave a standard deviation of 1.3 - 1.8 dB.

Measuring instruments

The combined accuracy for calibration and instrumentation could normally be in the range of ± 1 dB(A).

A more important factor for high accuracy is that almost every national or international measuring method for moving vehicles accepts direct reading of a precision sound level meter for example type 2203. Our experience shows at least an error of ± 1 dB(A) at direct readings in comparison with measurements made with instruments equipped with circuits for "max, fast, hold, dB(A)". Three acoustical engineers have made direct readings on 9 mopeds with 5 runs for each moped.

Repeatability

Results from our measurements made at two manufacturers show a standard deviation of ± 0.5-1.0 dB(A) for 6 repeated by-pass runs. In another Swedish investigation on motorcycles complete tests showed a repeatability of ± 0.3-0.5 dB(A) in the standard motion tests. 6 repeated standardized series of measurements with the same motorcycle showed a maximum difference of about 0.9 dB(A).

Production tolerance

Results from our measurements on four mopeds taken from the production showed a standard deviation of ± 1.1-1.2 dB(A).

Manufacturers of mopeds really agree that the deviation of the same model is considered to be 2 dB(A) at the most which in practice may result in a maximim difference of about 3 dB(A).

Influence of aging

There is no basic data available today indicating an increase or a decrease in noise emission of mopeds influenced by aging during the useful life-time of the exhaust system.

Exhaust systems

In the background documents for the U.S Standard concerning emission from motorcycles and mopeds, measurement results are reported on aftermarket exhaust systems. This standard also includes noise limits for the manufacturer of the aftermarket exhaust system. A summary of these results shows that 32 of the tested aftermarked exhaust systems increase the sound level within 3 dB(A) in comparison with original exhaust system and 50 increase the sound level in the range of 4 to 16 dB(A).

Our measuring results showed an increase of the sound level of about 1 to 2 dB(A) with only 2 different aftermarked silencers mounted on one type of moped. If the silencing device inside the silencer was taken out the sound level increased more than 10 dB(A).