Toys' noise measurement - do we need an alternative approach?

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Background, While considering toys safety, the issue of generated noise often remains neglected. In the opposition to e.g. chemical or mechanical parameters, there are no specific guidelines for the safe limits of exposure to noisy toys for children in real-life conditions. The aim of presented research was to examine the effects of modifications of the standardized toy noise measurement procedures (both in relation to the measuring apparatus and the spatial geometry) on sound level and acoustic characteristics.

Material and Methods, based on the survey data obtained from over 180 respondents - parents or caregivers of up to 14 years old children, three the most frequently used types of toys in the most numerous age group (0-6 years) were selected: close-to-ear-toys, table-top / floor toys and hand-held toys. All of the measured toys were of self-playing type. The experiment was performed in an anechoic chamber. Sound pressure level measurements were carried with SVANTEK SVAN979 sound analyzer and binaural system HEAD acoustics SQuadriga II accordingly to two separate measurement scenarios: (1) measurement in accordance with ISO EN71 and (2) measurements in close-to-real conditions ("real-use"). To include the psychoacoustics effects, as well as positions of the child's head and body in relation to the sound source during normal play, Erler Zimmer manekin representing the size of 4-year old child corpus was used.

Results, mean values of A-weighted time-averaged levels LpA from at least 10 repetitions were derived for each toy and method which equals ("real-life"/EN71): 61,6 dB / 55,3 dB, 79,9 dB / 63,3 dB and 57,6 dB / 51,7 dB for hand-held, close-to-ear and table-top toys respectively. Similarly mean C-weighted peak sound pressure levels LCpeakwere derived and their values are ("real-life"/EN71): 76,8 dB / 94,8 dB, 90,7 dB / 105,2 dB and 73,2 dB / 78,9 dB for hand-held, close-to-ear and table-top toys respectively. Results did not exceed noise limits established by EN71 standard. Only one configuration - close-to-ear toy measured in "real-life" conditions - did not meet expected noise limits.

Conclusions, presented data suggest, that although the methodology specified by the EN71 standard is simplified and results carry discrepancies, attained toys' noise characteristics resemble those obtained in realistic settings, which include actual conditions of use (sound/source localisation) and psychoacoustic effects. However, it was found that there is a significant need to introduce additional markings of the toys referring to the sounds they generate In order to increase the usefulness of the marking (the degree of comprehensibility and informativeness), it should be supplemented with a recommended play time, based on the provisions of an already applicable standard. Such information would undoubtedly help caregivers consciously provide an accurate play environment, remaining relatively quiet, not only for the hearing protection, but also for better processing and comprehension of all encountered information, especially important in the early stages of life.