EFFECT OF ABSORBING MATERIAL SURFACE AREA ONITS SOUND ABSORPTION COEFFICIENT IN REVERBERATION ROOM

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Noise pollution has become another deleterious outcome of modern civilization, tobe added to the others pollution of our environment. Noise affect by several differentways, the most deleterious of which are hearing damage and annoyance. So there is aneed to reduce this noise pollution. Sound absorbing material is one of the mostimportant common used to reduce the noise pollution and to make noise control.The absorption quality of the material used as a sound absorber material dependson the determination method of sound absorption coefficient of this material, whethermeasured in standing wave tube (normal wave incidence) or in reverberation room(random incidence). Because the tested material used in standing wave tube has smallsize of diameter 10 cm for low frequencies or 2.9 cm for high frequencies, so that themajor parameters that affect the sound absorption coefficient of material are its density,construction and thickness.In reverberation room method, which gives actual measured absorption coefficientvalue, the tested material is affected by the surface area of the material beside the otherparameters.ISO 354 which is used to determine the absorption coefficient of material inreverberation room makes a condition to the standardized area of material to be measuredwhich must be between 10 m2 and 12 m2 for room of volume less than 200 m3.This thesis estimated equations of the area effect and corrections between the nonstandardized areas and the standardized area by using a least squares fitting method.This work was carried out by using experimental study to find out the absorptioncharacteristics of some absorbing materials (foam, polyurethane, polyisoprene rubber andcarpet) of different surface areas in the range between 2 m2 and 14 m2 at random soundincidences. The obtained results of different areas of each material were compared withthat obtained from the reference standard area according to ISO 354.The experimental data was treated statistically using the least squares fittingmethod where correction factor for the sound absorption coefficient from that of thereference standard area was presented. The effect of temperature and relative humidity ofthe field during measurements has been taken into consideration.The standard uncertainties for the measurements are very small; this means thatour thesis is carried out in high accuracy measurements.The absorption coefficient for polyurethane material increases as the thicknessincreases and give high absorption at low frequency and the real part of acousticimpedance for foam, polyurethane and polyisoprene rubber

materials increases as thebulk density increases.