A Bayesian analysis is applied to determine the flow resistivity of a porous sample and the influence of the test chamber based on measured Sabine absorption coefficient data. The Sabine absorption coefficient measured in a reverberation chamber according to ISO 354 is influenced by the test chamber significantly, whereas the flow resistivity is a rather reproducible material property, from which the absorptive characteristics can be calculated through reliable models. Using Sabine absorption coefficients measured in 13 European reverberation chambers, the maximum a posteriori and the uncertainty of the flow resistivity and the test chamber’s influence are estimated. Inclusion of more than one chamber’s absorption data helps the flow resistivity converge towards a reliable value with a standard deviation below 17%.