It is well known that, due to viscoelastic effects in the suspension, the displacement of the loudspeaker increases with decreasing frequency below the resonance. Present creep models are either not precise enough or purely empirical and not derived from the basis of physics. In this investigation, the viscoelastic retardation spectrum, which provides a more fundamental description of the suspension viscoelasticity, is used to explain the accuracy of the empirical LOG creep model (Knudsen et al.). Then, two extensions to the LOG model are proposed which include the low and high frequency limit of the compliance, not accounted for in the original LOG model. The new creep models are verified by measurements on two 5.5 loudspeakers with different surrounds.