Abstract: Bacterial biofilms are able to resist a broad range of chemical challenges as well as mechanical stress. The mechanical properties of natively grown biofilms, however, remain largely unknown. This is mostly due to a lack of suitable experimental setups which are capable of quantifying the mechanical properties of those biofilms in their naturally grown state, i.e., without harvesting and transferring the biofilm material into a measuring device. Here, we present a customized device which allows measuring material parameters of bacterial biofilms in situ. Parameters that can be obtained from our stretching experiments include the tensile strength and rupture energy of native and chemically treated biofilms. Although the example measurements shown here have all been conducted with biofilms formed by the apathogenic soil bacterium B. subtilis B-1, the setup should be applicable to a broad range of bacterial biofilms or other viscoelastic materials.