Title: Influence of Adaptor on the Calibration of Inductance Standards

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Abstract

Influence of the adaptors on the calibration of 100 μH inductance standard was studied as a function of torque, applied when tightening the standard inductor terminal with the adaptor. Two different homemade adaptors of BPO gold-plated brass (BPO-Au) and banana-copper (BN-Cu) were made for the connection between the LCR meter and the inductance standard. The measured inductance (L) of the standard inductor and the contact resistance (RC) between the adaptor and the standard inductor terminal showed exponential decreases against the torque increase from 25 cN·m to 150 cN·m. The measured L and the calculated equivalence series resistance (RS) were dependent on the adaptor type as well as on the RC. The results of the adaptor analysis imply that the BPO-Au adaptor with the lower RC is more suitable for the inductance calibration. The calculated inductance of 99.956 μH corrected by subtraction of the adaptor inductance and the contact resistance contributions from the measured value using the BPO-Au adaptor agreed well with the certificate (99.948 μH) of the PTB within the measurement uncertainty of 140 μH/H.