Abstract—Reducing the electrical contact resistance (ECR) and the coefficient of friction (CoF) are major technological requirements for sliding contacts. This report provides electrical-tribological characteristics of a Copper containing Diamond-like Carbon (Cu-DLC) nanocomposite coating deposited on a brass plate, investigated by using a ball/plate reciprocating tribometer. The counterpart was a brass ball. While the initial ECR was hundreds of milliohms, it gradually decreased with cycles and reached approximately 2 milliohms after 600 cycles. CoF started below 0.35 and decreased progressively, and stabilized around 0.25 after 600 cycles. The good electrical-tribological characteristics lasted up to approximately 7500 cycles and CoF increased rapidly after. Sliding surfaces at different cycles were analyzed by optical microscope, laser-scanning microscope, EDX, TEM and nanoindentation. The results of analyses revealed that a copper-rich tribofilm was built up on the ball, which grew with cycles. The Cu-DLC wore gradually and its substrate was exposed after less than 1000 cycles. Nevertheless, detrimental effects were not observed either on ECR or on CoF up to 7500 cycles. The unique structures and properties of the tribofilm and the worn Cu-DLC surface are discussed, attempting to account for their key roles on the good characteristics.