The exact knowledge of thermophysical properties of fluids with industrial importance is needed for a more accurate basic design of compressors, gas turbines, and gas pipelines. In contrast to the thermodynamic properties, the transport properties of n-butane and isobutane, particularly in the region near the critical point, are not sufficiently well-known. The current viscosity-surface correlations are characterized by uncertainties of ±(3-6)% in their ranges of validity. Viscosity measurements were performed using a vibrating-wire viscometer combined with a single-sinker densimeter. Isothermal series of measurements were carried out at temperatures from 298 K to 498 K and at pressures up to 95% of the saturation pressure of the respective isotherm, or up to 30 MPa. The uncertainty of the new experimental data is conservatively estimated to be ±(0.25-0.4)%, increasing with temperature. Consequently, they are considered to be primary data. New viscosity-surface correlations for n-butane and isobutane were generated using the structure-optimisation method by Setzmann and Wagner (1989). The bank of terms comprises expressions for different regions: the limit of zero density, the moderately dense fluid, the dense liquid phase, and the near-critical range. The results are compared to the primary data sets from the literature and from this work, which were used in the development of the correlations. In addition, they are checked against the earlier viscosity-surface correlations by Vogel et al. for n-butane (1999) and for isobutane (2000).