Absorbed-dose-based protocols recommend calibration of clinical linear accelerators using air-filled ionization chambers for which an absorbed-dose to water calibration factor has been established in a $^{60}$Co beam. The factor $k_Q$ in these protocols involves the ratio of the mean restricted collision mass stopping power water-to-air, which is energy dependent. For high-energy clinical photon beams, the stopping power ratio varies by up to 4%, whereas for electron beams the variation is larger. For certain insulating liquids, however, the stopping power ratio water-to-liquid shows little energy dependence. In this work the energy response of the MicroLIC, a novel liquid-filled ionization chamber being developed, was studied in 6 MV and 18 MV photon beams from a Clinac 21EX. This chamber has a nominal sensitive volume of 1.12 mm$^3$ and is filled with isooctane. Ion recombination corrections were evaluated using the measured ionization current in Boag’s theory for general recombination in gasses. Absorbed dose was measured using a calibrated Exradin A12 chamber. The MicroLIC was cross-calibrated at polarizing voltages of + and –1000 V to correct for polarity effects. Results were compared with previous measurements done using another liquid-filled chamber (LIC 9902-mix), with a liquid composition of 60% isooctane, 40% tetramethylsilane by weight. The ratio of the average calibration factor at 18 MV to 6 MV was 0.995±0.009 for the MicroLIC. This is in reasonable agreement with the ratio of the average calibration factors for the LIC 9902-mix (1.000±0.003). These values indicate that compared to gas-filled chambers, the MicroLIC has superior energy dependence characteristics.