A reliability-based calibration of partial safety factors has been applied to assess the reliability levels of the ultimate limit state (ULS) flexural design suggested by the Italian guidelines CNR-DT 203/2006. 240 FRP-RC beams and 180 FRP-RC slabs have been designed to cover a wide design space considering an appropriate set of random design variables (crosssectional dimensions, concrete strengths and FRP reinforcement ratios) used to develop resistance models for FRP-RC members. Monte-Carlo simulations have been performed to determine the variability in material properties and fabrication processes; whereas experimental data reported in the literature have been used to quantify the variability related to the analysis method. A structural reliability analysis has been conducted based on the established resistance models and load models obtained from literature. The reliability index, □, calculated using FORM for all FRP-RC beams and slabs for five ratios of live load to dead load moments, has been assessed in different hypotheses, namely depending on □ f/□fb, ML/MD, f □ , and on ;(the uncertainty effects due to material properties (M), fabrication process (F) and analysis method (P