In this study, bearing strengths of bolted joints with different clearances were compared. Woven-glass-epoxy prepreg composites were tested under two different bolt-bearing conditions. The geometry of the samples for bolted joints was suitably varied in order to find the limit for width-to-diameter (W/d) and edge distance-to-diameter ratios (E/d), which are necessary to avoid unsafe failure modes. Damage progression was examined using scanning electron microscope (SEM) on specimens with mixed (bearing+net tension) mode for different percentages of their ultimate failure load. It was observed that the clearance between the bolt and hole has an important influence on the failure load of mechanically fastened joints.