This study compared the initial and final failure loads and failure modes of indirect resin composite laminate veneers with and without fiber reinforcement. Forty intact lower canines received standard laminate preparations and were randomly assigned into four test groups (n=10). In Group 1, indirect resin composite veneers were repaired with two layers of preimpregnated bidirectional glass fiber weave and a restorative composite; in Group 2, with a layer of preimpregnated unidirectional glass fibers and a restorative composite; and in Group 3, with an experimental semi-IPN matrix composed of multidirectional short glass fibers. Indirect resin composite veneers without any fiber reinforcement were used as control (Group 4). All specimens were thermocycled and tested with a universal testing machine. On the final failure load, there were no statistically significant differences (p>0.05) among the test groups. Within each group, pairwise comparison of initial and final failure loads revealed statistically significant differences (p<0.05), except for Group 4 (p>0.05). On failure mode, unreinforced specimens showed instantaneous failure, whereas reinforced specimens mostly demonstrated elongated failure.