This is the report of a project carried out to determine the microbial-kill characteristics of saturated steam plus hydrogen peroxide (H2O2) using a specially-constructed test apparatus. Spores on stainless-steel planchets were inserted into a flowing gaseous atmosphere of steam plus H2O2 for a timed exposure to the lethal agent. The specially-designed test apparatus and its operating parameters are described. Geobacillus stearothermophilus (former name, Bacillus stearothermophilus) spore-death rates were evaluated in several spore-planchet handling modes. Enumeration microbial recovery methods were used. The data were analyzed using survivor-curve methods; D-values were calculated using the initial number of spores per planchet and the number of spores surviving the process. Extensive tests were carried out using Geobacillus stearothermophilus spores; limited tests were carried out using Bacillus smithii ATCC 51232 (former name, Bacillus coagulans), Bacillus macerans, and Bacillus subtilis, subtilis ATCC 35021 spores (former name, Bacillus subtilis, CCC 5230, Kerns 15U). For G. stearothermophilus spores subjected to steam plus H2O2 and recovered using the 2B procedure (planchets deposited in sterile, 100-mL bottles containing 50.0 mL of buffer immediately after they were subjected to the steam-H2O2 condition; 11 experiments), the mean D-value was 0.48 min at 2,500 ppm and 0.22 min at 7,500 ppm. The application of steam plus H2O2 to the sterilization of barrier isolator enclosures is discussed.