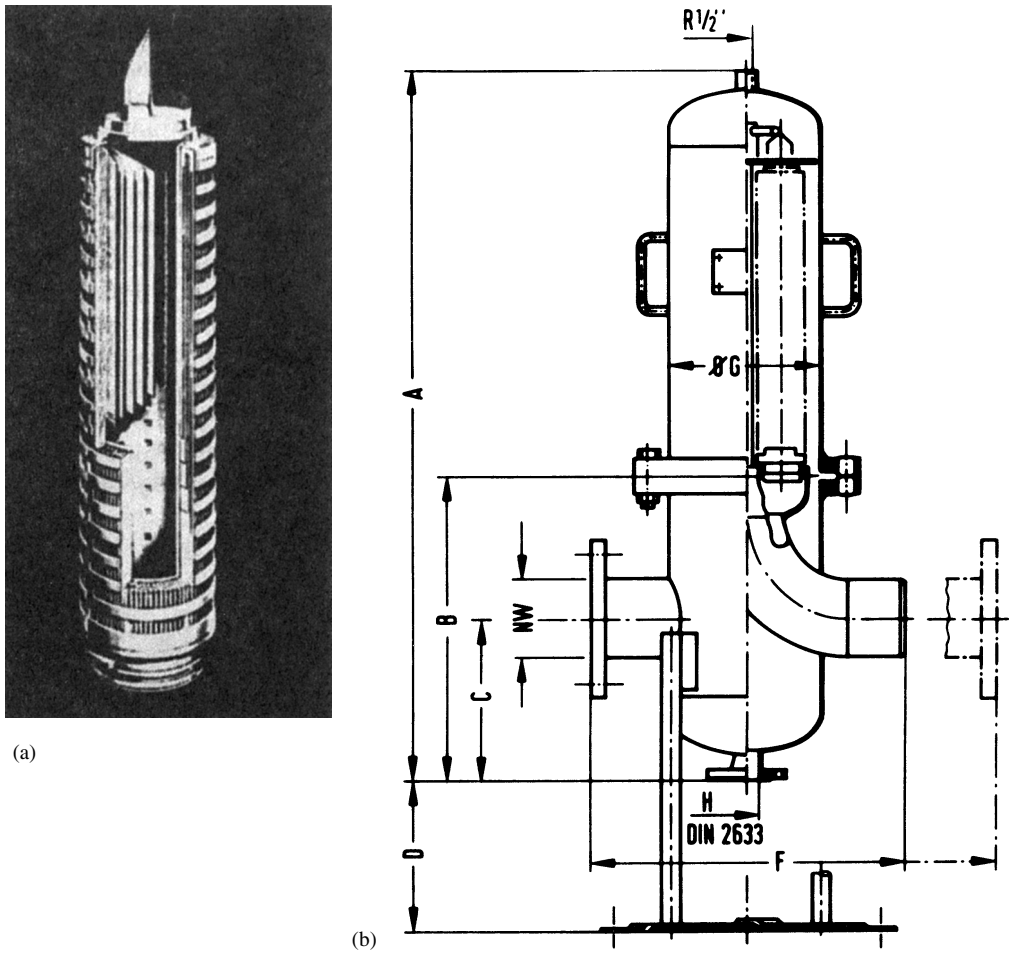

Figure 10.16. (a) A Pull-Emflon membrane cartridge for filter sterilization of air. (b) Housing for air sterilization filter. (With permission, from W. Crueger, "Sterile Techniques in Biotechnology," in R. K. Finn and P. Prave, eds., *Biotechnology Focus 2*, Hanser Publishers, New York, 1990, p. 413.)

Other tests for the integrity of the unit are pressure-drop-versus-flow-rate and bubble-point tests, which detect defects in the membrane and maximum pore size. "Grow-through" tests use a sterile nutrient solution on one side of the membrane and a similar nutrient solution inoculated with a test strain (e.g., *Pseudomonas diminuta*) on the nonsterile side. The greater the integrity of the filter, the longer it will take before growth on the nominally sterile side will occur. A filter should be evaluated with several different types of tests.

Because of the high costs associated with the loss of a batch due to contamination, the choice of air filter to give dependable protection for a fermentation while minimizing pressure drop is critical.