Evaluation of Particulate Filtering Respirators Using Inward Leakage Testing in Korea

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Abstract

Korean certification regulation for particulate filtering respirators requires inward leakage testing according to European Standard, and the standard levels of compliance are similar to those of the European Standard. This study was conducted to evaluate particulate filtering respirators being commercially used in the Korean market using an inward leakage test and the validity of standard level in Korea. Three half masks and 10 filtering facepieces (two top class, four 1st class and four 2nd class), a total of 13 brand name respirators, and 10 test panels (subjects) who were classified with nine facial dimension grids in accordance with face length and lip length, were selected for test. Inward leakage testing was conducted at the laboratory of the 3M Innovation Center in which the experimental instruments and systems were established in compliance with European standards. The testing procedure was followed by an EN 140. As expected, inward leakages of half masks were less than those of filtering facepieces and the latter were significantly different among brands. Inward leakages of the 1st class filtering facepieces were found to be much more than those of the 2nd class, and the result may cause a wearer to get confused when selecting a mask. The main route leakage for filtering facepieces may not be the filter media but face seal leakage since minimal inward leakages of individual arithmetic means were much little. Therefore, it is necessary to develop well-fitting filtering facepieces for Koreans. Because inward leakages were significantly different among facial dimensions, a defined test panel for inward leakage testing according to country or race should be developed. Another finding implies that geometric mean of five exercises inward leakages may be better than arithmetic mean to establish a standard individual subject mean.