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Abstract

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Efficiency of respirator filter media against diesel particulate matter

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Exposure to diesel particulate matter (DPM) is a major health issue, given the potential of diesel engine emissions to cause adverse health impacts including lung cancer, cardiovascular and irritant effects. Respiratory protection is commonly used to mitigate worker exposure.

Effectiveness of respiratory protection is evaluated in Australia in accordance with AS/NZS 1716¹. Filtering efficiency is determined by challenging filter media with aerosolised sodium chloride to determine penetration at designated flow rates. However the standard does not account for the differences in structure and chemical characteristics of DPM and sodium chloride. Additionally the standard does not incorporate worker breathing rates representative of moderate to heavy work, which are currently being considered by ISO in their review of performance requirements for respiratory protective devices.

Research undertaken at the University of Wollongong evaluated penetration of DPM through three commonly used respirator filters, at the flow rate designated in the standard, as well as a higher flow rate representative of medium to heavy work. Initial results indicate that when challenged with DPM, measured as elemental carbon, the filtering efficiency assumed by P2 certification in Australia was achieved for two of the respirator models, and for only one respirator model at the higher flow rate. These findings will inform the development of Australian and International standards on the selection and evaluation of respiratory protection for effective mitigation of DPM. Additionally, the importance of "Exploring the Boundaries" with evidence based research is demonstrated to ensure respiratory protection provided to workers adequately protects against this workplace carcinogen.

1. Standards Australia International Ltd AS/NZS 1716:2012 *Respiratory protective devices*.