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Quantifying the fire hazards and risks associated with the use of fire retardant conveyor belt in underground mines

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ABSTRACT

The purpose of this study was to determine whether the hazards associated with changes from the standard values of the variables applied during conveyor belt fire testing, namely heat input, air velocity and belt cover wear, as well as combinations of these variables, will result in higher risks as a result of easier ignition and greater flame propagation rates of flame retardant belting.

The approved South African Standard for fire retardant belting was used as the basis for the study. The dependent variables stated in the adopted Standard BS EN 12881-1 Method C, namely 'Temperature Rise above Ambient', 'Length Consumed by Mass' and 'Length Undamaged', were used to measure the influence of changes in conditions by varying independent variables, namely air velocity, gas consumed (energy supplied) and cover thickness. Sixteen fire tests were carried out with a section of textile-reinforced flame-retardant belt as typically used in South African mines, using the mid-scale fire tunnel at the South African Bureau of Standards.

The study found that changes in independent variables from the standard values could result in greater flame propagation rates of flame retardant belt when compared to the standard test done in accordance with the specification. A factorial experiment was used to conduct the study and an analysis of variance conducted to determine which factors and combinations of factors contributed to the higher risk.

The study ends with proposals of how to prevent and manage the additional risks identified of flame propagation of flame retardant conveyor belt. The purpose and objectives of the study were thereby achieved.