Environmental Engineering and Management Journal *April 2022, Vol. 21, No. 4, 627-635*
http://www.eemj.icpm.tuiasi.ro/; http://www.eemj.eu

"Gheorghe Asachi" Technical University of Iasi, Romania

PREVENTING THE SPREAD OF COMBUSTIBLE PRODUCTS IN TUNNELS BY IMPLEMENTING A DIVISIBLE SYSTEM

Omar Lanchava[1]*, Nicolae Ilias[2], Sorin Mihai Radu[2], Giorgi Nozadze[3], Marad Jangidze[3]

[1]Georgian Technical University, 77 Kostava Street, Tbilisi, Georgia
[2]University of Petroşani, 20 Universităţii Street, Petroşani,Romania
[3]G. Tsulukidze Mining Institute, 7 Mindeli Street, Tbilisi, Georgia

Abstract

Controlling the events and processes caused by fires is one of the key issues of all projects dedicated to the fire safety of tunnels. These processes are characterized by the dynamics of the propagation of high temperature, smoke and toxic combustion products around the seat of fire and in tunnels. With longitudinal ventilation, two main parameters are to be considered: the critical velocity and the backlayering length. An important impact on both parameters is exerted by the proposed system of flexible crosspieces, which, by increasing the aerodynamic resistance of a tunnel, makes it possible to reduce the speed of propagation of harmful factors of fire through the tunnel. By considering the fire development scenarios in horizontal and sloping tunnels, the dynamics of propagation of fire damaging factors within a horizontal tunnel is described when the ventilation system does not operate, but the flexible system is used. The given case is compared to the case when the ventilation system does not operate and the flexible system is not used to prevent the propagation of harmful and hazardous combustion products. The results of numerical modeling show that by closing 50% of the cross-section of the tunnel with a flexible system, significant positive results may be gained in reducing the propagation of the combustion prod--ucts and saving lives. Thorough theoretical and experimental study of the mentioned transformable crosspieces, as well as the development of their various structures and operating principles is necessary to ensure the safety of traffic tunnels.

Key words: aerodynamic resistance, evacuation, saving life, transformable crosspieces

Received: November, 2020; Revised final: January, 2022; Accepted: January, 2022; Published in final edited form: April, 2022

* Author to whom all correspondence should be addressed: e-mail: o.lanchava@yahoo.com , lanchavaomari03@gtu.ge