## Flame Propagation Velocity of Selected Gas Mixtures Depending on the Temperature

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Abstract : The purpose of this paper is demonstration the test results of research influence of temperature on the velocity of flame propagation using gas and air mixtures for selected gas mixtures. The research was conducted on the test apparatus in the form of duct 2 m long. The test apparatus was funded from the project: "Development of methods to neutralize threats of explosion for determined tanks contained technical gases, including alternative sources of supply in the fire environment, taking into account needs of rescuers" number: DOB-BIO6/02/50/2014. The Project is funded by The National Centre for Research and Development. This paper presents the results of measurement of rate of pressure rise and rate in flame propagation, using test apparatus for mixtures air and methane or air and propane. This paper presents the results performed using the test apparatus in the form of duct measuring the rate of flame and overpressure wave. Studies were performed using three gas mixtures with different concentrations: Methane (3% to 8% vol), Propane (3% to 6% vol). As regard to the above concentrations, tests were carried out at temperatures 20 and 30°C. The gas mixture was supplied to the inside of the duct by the partial pressure molecules. Data acquisition was made using 5 dynamic pressure transducers and 5 ionization probes, arranged along of the duct. Temperature conditions changes were performed using heater which was mounted on the duct's bottom. During the tests, following parameters were recorded: maximum explosion pressure, maximum pressure recorded by sensors and voltage recorded by ionization probes. Performed tests, for flammable gas and air mixtures, indicate that temperature changes have an influence on overpressure velocity. It should be noted, that temperature changes do not have a major impact on the flame front velocity. In the case of propane and air mixtures (temperature 30°C) was observed DDT (Deflagration to Detonation) phenomena. The velocity increased from 2 to 20 m/s. This kind of explosion could turn into a detonation, but the duct length is too short (2 m).

Keywords : flame propagation, flame propagation velocity, explosion, propane, methane

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