

# Application of Fire Safety Engineering to open and closed car parks of C.A.S.E. Project for L'Aquila

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**Abstract.** The Fire Safety Engineering (FSE) is a multi-discipline aimed to define the fire safety strategy for buildings under fire conditions, in which structural stability and control of fire spread are achieved by providing active and/or passive fire protection.

This Case Study concerns with the application of FSE (with reference to the structural behaviour in fire situation) to the car parks in the new buildings of the "C.A.S.E. Project for L'Aquila". The C.A.S.E. Project for L'Aquila was developed in L'Aquila (province of Abruzzo, Italy), after the seismic event of 06/04/2009, in response to the housing emergency. The car parks, placed at the ground floor of the buildings, are mainly built with steel columns that support the seismically isolated superstructure.

FSE requires the choice of a performance level, the definition of design fire scenarios, the choice of heat flows models and several numerical thermo-mechanical analyses.

The fire scenario is significantly affected, among other things, by the geometry and ventilation conditions of the compartment. As regards the evaluation of number of vehicles involved in the fire and the timing of fire initiation by a car to adjacent one, reference is made to the information provided by a significant research, performed in Europe for open and closed car parks.

The action of fire on structural member is considered by the one-zone model (for generalized fire) and Hasemi's method (for localized fire).

Two type of Structural analyses was carried out: a) Global structural analyses; b) Detailed 3D structural analyses.

The results of the application of the FSE approach will be reported and discussed.