

More and more countries are now permitting a classification of structural elements with respect to fire exposure to be formulated analytically as an alternative to the internationally prevalent method of classification, based on results of standard fire resistance tests. In some countries, the authorities have also taken the next step to approve a general practical application of a direct analytical design procedure, based on the natural compartment fire concept.

The process of an analytical structural fire design comprises three main components the determination of the fire exposure, the thermal analysis and the mechanical behaviour analysis.

The components require access to well defined input information on:

- a) material properties for describing the characteristics of the fire load and the compartment fire;
- (b) material properties for determining the transient temperature state of the fire exposed structure and;
- (c) material properties for determining the related mechanical behaviour and loadbearing capacity.

With a summary presentation of the development and characteristics of the analytical structural fire design as a background, the paper is focusing on the mechanical material properties at elevated temperatures. A systematic scheme of classification of available tests is referred to and the importance is stressed of using such functionally well defined tests which give material properties, stringently connected to material behaviour models being independent of the type of loadbearing structure.