2. Introduction to ASET Analysis

2.1 Performance-Based Fire Safety Design

Performance-based fire safety design represents an engineering approach that evaluates building safety through quantitative analysis rather than prescriptive code compliance. The fundamental safety criterion is expressed as:

Fundamental Safety Criterion

$$ASET > RSET$$

ASET	Available Safe Egress Time - time until untenable conditions develop
RSET	Required Safe Egress Time - time needed for complete evacuation

2.2 ASET Definition and Significance

ASET represents the time interval from fire ignition to the onset of untenable conditions at a specified location. Untenable conditions are defined as environmental parameters that would prevent safe egress or cause incapacitation of building occupants. The ASET analysis employs multiple physiological criteria based on toxicological and thermal tolerance research.
This analysis uses Fire Dynamics Simulator (FDS), a computational fluid dynamics (CFD) model developed by the National Institute of Standards and Technology (NIST), to predict the fire environment evolution. FDS solves the Navier-Stokes equations for low-speed, thermally-driven flows with an emphasis on smoke and heat transport from fires.