

Blast propagation through urban areas

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Terrorist attacks are usually committed in urban areas where the expanding blast encounters many obstacles during its propagation. The blast loading on buildings and people in the neighbourhood of an attacked building will be determined by the interaction of the blast wave with surrounding buildings, which may lead to relatively lower overpressures when blast shielding occurs or higher overpressures when blast focussing occurs.

Within the framework of a practical research, TNO has charted the influence of the urban area on the blast propagation. The problem has been approached by defining several explosion scenarios and configurations of streets, and calculating the blast loading at an assumed building at some distance. The environmental aspects were the subject of study and were changed in each scenario. The explosion charge and distance were kept constant. The calculations were done with both, semi-empirical tools and with a numerical code, i.e. the in-house developed BLAST 3D code.

The study resulted in a range of blast loads, which are relevant for a building at some distance (150 m) of an exploding charge of 1000 kg. The scenarios range from densely built-up districts with small streets and low to intermediate buildings to sparsely built-up areas with wide streets and high buildings. In addition, the vulnerability of some typical structural elements of normal urban buildings has also been charted. The two surveys together give a tool to estimate the damage that can be expected from an explosion in an urban area.