PROPAGATION OF CONVENTIONAL BLAST WAVES IN TUNNELS

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For any design purposes related to tunnels or tunnel-systems exposed to the effects of the blast of nuclear or conventional explosions, a detailed knowledge of the blast loading characteristics is required.
A huge amount of data on the propagation of a nuclear blast wave in a tunnel and a tunnel-system is available. On the other hand a literature search showed that basic data concerning blast loading characteristics for conventional explosions - compulsory in view of the constantly enhanced precision of modern conventional weapons systems - are extremely scarce.
Although computations with highly sophisticated 3-D codes could be done, they are limited at the very most to some simplified configurations and moreover they are expensive. Therefore the experimental way using scale models seems to be more suitable for the investigation of any particular configurations as well as for getting basic data.
The main goal of the test series described in this paper was to work out blast loading characteristics inside a tunnel in the case of the detonation of conventional HE-charges in and/or close to the tunnel entrance.
Furthermore the influence of three different tunnel-entrance configurations on the blast propagation in the tunnel was investigated.
Finally two particular and more complex tunnel configurations were modeled and tested as well.
The model-scale chosen was 1:30. The HE-charges used for this test series varied between 3.7 g and 37.5 g TNT which correspond to 100 kg and 1000 kg TNT in full scale. Pressure time histories were measured simultaneously at ten different locations inside the tunnels.