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APPLICATION OF THE CRITICAL IMPULSE IN A CRITICAL TIME CRITERION FOR TESTING OF BLAST RESISTANT GLAZING

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Flying glass fragments from broken glazing resulted in serious injuries at accidental explosion events and terrorist attacks. Attention was directed to the testing of blast resistant glazing. Two different test procedures were used: High explosive tests in the free field and shock tube tests. Advantages and disadvantages were discussed. Important aspects of shock tube testing include (1) How does the shock tube test compare with concentrated HE explosion with regard to the damage potential. (2) What constitutes a valid criterion for the damage potential. Both test procedures show an instantaneous pressure jump to the same peak overpressure all along the surface of the test object, but the following pressure-time history is not identical. It is proposed to use the 'critical impulse in a critical time criterion' to describe the damage potential. For each glass target exists a critical impulse above which the target is damaged if such impulse is received within a critical time. A minimum overpressure is defined by the ratio of the critical impulse to the critical time. With this criterion the critical time is a most important parameter that depends on the failure mode. If a window pane was such overloaded that it fails in the shears mode all along the fixed edges, than the critical time is a fraction of a millisecond. If another pane fails in the bending mode, then the critical time may be in the range of milliseconds. According to this criterion the total positive duration of the pressure pulse is not an important parameter.