

Title	Research Report 146 – Analysis and Design of Profiled Blast Walls	
Publisher/Author	HSE	
Publication Date	2004	
Executive Summary	<p>Profiled barriers have been increasingly used as blastwalls in typical offshore topsides modules to provide a safety barrier for working personnel and critical equipments. Most of the blastwalls are designed using Single Degree of Freedom Method as recommended in the design guidance Technical Note 5. One of the uncertainties in blastwalls design remains in the accurate evaluation of the explosion loading. As such, they are normally designed against a nominal pressure of 0.5 bar which often results in the elastic response of the section. However, recent large scale explosion tests on the blastwalls have shown the possibility of as high as 4 bar overpressure with a shorter duration in a typical module. Under such conditions, elastic design of blastwalls, in which most blastwalls has been traditionally designed, is no longer economical and feasible.</p> <p>This report presents the study on the design and analysis of stainless steel profiled barriers subjected to blast loading generated from typical hydrocarbon explosions. The Technical Note 5 (TN5) issued by the Fire and Blast Information Group and a time domain finite element commercial software packages will be used for the above purposes. Particular attention is given to the plastic response of the blastwalls. Through this study, extensive discussions will be given to the adequacy of the simple design tool commonly used by the offshore industry for the analysis and design of blastwalls. In addition, appropriate guidance will also be presented on the use of the finite element numerical tool for the above purpose.</p> <p>In essence, the study considers 3 different profiled barrier sections, distinguished by the depth of the sections, classified as either plastic, compact or slender section in accordance to the TN5, and subjected to both static and dynamic loadings. These barriers are made up of either Grade SS2205 or SS316 stainless steel, both of which are commonly used in the industry. The design overpressures and duration are selected so as to represent realistic values that results in either an elastic and plastic response of the blast barrier.</p> <p>Therefore the study has attempted to cover a wide spectrum of design scenarios and hope that the document presented here can be served as an additional reference source for the design and analysis of stainless steel profiled barrier subjected to typical hydrocarbon explosion, which is clearly limited in the public domain.</p>	
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