Title	Pulse pressure testing of 1/4 scale blast Wall panels with connections
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Executive summary	An extensive programme of experimental work has been carried out on ¼ scale stainless steel Blast wall panels with connections subjected to pulse pressure loading to determine their various Modes of failure and blast resistance beyond the design limit. The panel design was based on The deep trough trapezoidal profile with welded angle connections top and bottom and free Sides. A series of laboratory tests were carried out at the university of Liverpool impact Research centre on a panel of a ¼ scale stainless steel blast wall and on various Panel/connection systems. The loading applied to the test panel was a triangular pulse pressure Representative of a gas explosion overpressure. This project was sponsored by EPSRC, Mobil North sea ltd and hse (offshore division) with technical support from mech-tool Engineering ltd who designed and manufactured the test panels. The aim of this work was to Investigate the influence of the connection detail on the overall performance of the Panel/connection system under pulse pressure loading and to develop appropriate analytical and Numerical models of the panel/connection system for correlation with the test results. The work has shown that the connection detail can significantly influence the response of the Panel to extreme pressure loading. Large permanent plastic deformations were produced in the Panel/connection system without rupture. Independent connection tests were used to Characterise the support conditions for analytical modelling. Different methods were used to Estimate the response and hence the capacity of the test panel and the panel/connection system. Laboratory tests The performance of several test panels was investigated using a pulse pressure test facility. Three types of panel/connection system were studied, namely a short, medium and long welded Angle connection to compare the influence of the angle length. In general, the flexibility of the Angle connection and thus the test panel/connection system increases as the angle length Increases and larger displacements are produced in the panel for a given test pressure. It is Important to optimise the design of the blast wall to absorb as much energy in bending and Stretching and at the same time limit displacements that could affect other equipment and Processes. Numerical modelling The data generated in the laboratory tests were used to develop finite element numerical models Of the test panel/connection system. Once satisfactory correlation between the tests and the Model is achieved (the ability to predict failure modes and permanent displacements), the Numerical model can be used to predict the response of full size blast walls. Analytical modelling A simplified analytical model of the panel/connection system was developed to enable the Model to be used as a versatile design tool. Design of in-place blast walls should consider a More appropriate assessment of the wall's resistance taking into account connection flexibility And stretching modes of deformation as well as bending modes. Note: The intention is to make available further technical details and comparisons of the experimental And numerical/analytical data. The means of access will be announced in HSE's offshore Research focus.
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