Introduction

Lloyd's Certificate of Fire Approval SAS F160162/M1 contains a reference to two blast tests that were conducted on steel elements protected with Promat FENDOLITE® MII. These tests were performed by the independent test institute DNV GL Spadeadam, UK in December 2012. This Energy Industry Data Sheet aims to provide relevant details of these tests for a more detailed interpretation and evaluation within projects.

Test specimens

The test specimens were protected with Promat FENDOLITE® MII. Before application, PROMAT® PSK 101 was applied to the steel. Where mesh was used, it consisted of PROMAT® Helical CD Weld Pins and PROMAT® Plastic Coated Galvanised Mesh. The application was done in accordance with the Promat FENDOLITE® MII and Promat FENDOLITE® TG Energy Industries Application Manual.

Table 1: Structural test specimens

Steel element	Promat FENDOLITE® MII thickness	Mesh Installed
Universal column 254x254x73	18mm	No
Universal column 254x254x73	21mm	Yes
Universal column 254x254x73	34mm	Yes
Tube 219.1mm outer diameter x 8.18mm wall thickness	23mm	Yes
Universal column 254x254x73	34mm	No

Performed tests

The explosion chamber measures 4.5m x 4.5m in cross-section and is 9m long. The chamber has a vent opening in one of the 4.5m x 4.5m faces, with all other faces being confined. The area of the vent opening was reduced in order to produce a blast overpressure of around 3 barg.

The test specimens were positioned horizontally inside the vent opening, one above the other, and all welded in their positions.

For the explosion test, the chamber is filled with a mixture of gas and air. For this purpose, the vent opening was covered with polythene sheet. When the correct mixture is achieved, it is ignited. A first explosion test was done, however the blast pressure reached an average overpressure of only 2.08 barg, with a duration of 160 ms. As the specimens were generally undamaged, the test was then repeated, this time reaching an average overpressure of 3.24 barg, with a duration of 152 ms.

Results

After each test, the structural test specimens were checked and the following observations were made:

- After the first test (2.08 barg) there was little or no visual damage to the test specimens.
- After the first test (3.24 barg) the damage of the test specimens was as shown in table 2. Three of the specimens were then successfully subjected to jet fire tests.

Table 2: Observed damage after the second blast test

Steel element	Promat FENDOLITE® MII thickness	Mesh Installed	Observed damage after the second blast test (see also figure 1)	Exposed to jet fire after blast test
UC 254x254x73	18mm	No	One area of surface damage on the web, bare steel showing along the lower flange tip around the centre of the test specimen	-
UC 254x254x73	21mm	Yes	Little to none	66 minutes
UC 254x254x73	34mm	Yes	One area of missing top coating along lower flange	-
Tube 219.1mm x 8.18mm	23mm	Yes	Little to none	90 minutes
UC 254x254x73	34mm	No	Little to none	132 minutes



Figure 1: structural test specimens after the second blast test (same order as in tables 1 and 2)

The information given in this Application Procedure is based on practical experience, independent and other tests and represents, in Promat's opinion, the best technical advice available. Since the products are applied under circumstances beyond our control, Promat can accept no direct or consequential liability, whether in contract or in tort, for the interpretation of such recommendations and reserves the right to modify the recommendations as necessary. Should it be unclear as to the meaning of any of the instructions given above, or if further information is required, please consult Promat.