

Bespoke Explosion Relief - Offshore Oil & Gas Upgrade and Refit



► Challenge

Last year we were approached by the global E&C company, Aiken to replace aging explosion relief panels as part of the refit and upgrade of the Stenna Don semi-submersible drilling rig. The Stenna Don was undergoing this refit and upgrade project in preparation for an upcoming contract, and those involved wanted to ensure that all blast mitigation and safety systems performed in accordance with the risk management strategy and FLACS analysis included within the vessels "case for safety" Safety Case.

From the full-scale explosion tests carried out as part of the panels research and development phase, Rhino HySafe would need to quickly determine that the VERTEX relief panels would open very early in the clients specified DAL (Design Accidental Load) explosion scenario. Our ability to integrate the

relief characteristics of the HySafe panels into the clients FLACS analysis, would not only verify performance but could also demonstrate a reduction in the peak pressures. If other structural works were being performed in the area, these potentially reduced pressures would have the benefit of reducing the complexity and hence cost of any associated structural works (strengthening, etc.).

In addition to decoding and understanding the complex nature of the structure and explosion scenarios, the team would also have to design and substantiate a bespoke support frame so that the new venting panels could be quickly installed by utilising the old panels fixing positions.



**Strength to
Protect**



**Empirically
Tested**



**Innovative
Design**

► Solution

Due to the tight project programme, the client sought a solution that didn't require a lengthy and costly FLACS review. An important objective from the outset of the project to develop the Rhino HySafe VERTEX panel was to produce a fully defined threshold in the overpressure-impulse space by which specifiers could have a full appreciation of panel activation conditions. To that end, a fully defined performance envelope for the VERTEX panels was available, in pressure-impulse space, so that the designers and specifiers had a complete view of the Vertex panel opening criteria. Given that this performance envelope has been validated by reference to static, pendulum impact testing and full-scale explosion testing, those involved were satisfied that panels would perform as required.

With approval to proceed, our in house structural and blast engineering team began designing and modelling the bespoke vent panels. The Vertex panels consist of relief plates made from grade 316 stainless (BS EN 10088 1.4401) in natural finish whilst, to withstand the harsh offshore environment, Rhino applied a full marine coating system to the S355J2 carbon steel structural elements of the cassettes.



► Results

The vent panels were designed and subsequently fabricated in line with the project schedule. All vent panels were fully assembled, and quality checked prior to crating and delivery to client in preparation for a rapid install.

Additionally, over the course of the pre-delivery, planning and engineering phase, Rhino fully conformed with all the strict quality and safety standards present in the offshore oil and gas industry, which culminated in all of HySafe's works being manufactured, and delivered in accordance with the agreed programme and to the satisfaction of all parties.

