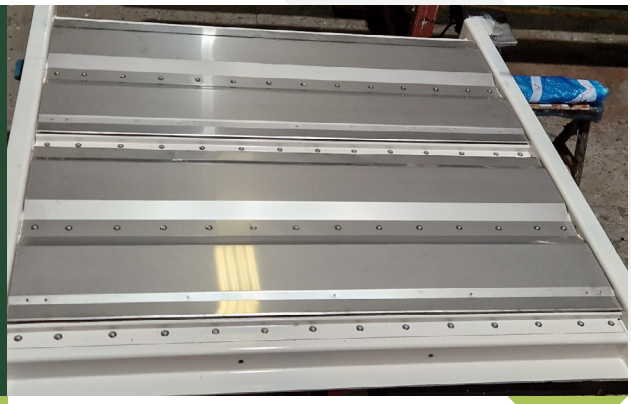
Rhino
HySafe

Our Work Developing Rapid Action Explosion Relief Vents



At Rhino Engineering Group, we've been working on addressing the critical need for reliable and rapid-acting explosion relief vents in the burgeoning hydrogen economy.

Through extensive research and development efforts, we have meticulously designed and patented a cutting-edge low-inertia rapid-relief venting system tailored explicitly for hydrogen applications. This innovative venting panel is engineered to swiftly and effectively mitigate the hazards associated with hydrogen deflagrations, reducing the risk of deflagration-to-detonation transitions (DDT). This has been specifically designed for applications in the hydrogen economy, battery energy storage systems and other related sectors where protection from deflagration hazards is critical.

Central to our approach is recognising the unique challenges posed by hydrogen's flammable characteristics. Unlike conventional gases, hydrogen presents a heightened risk of DDT under certain conditions, necessitating specialised mitigation strategies. By ensuring that our venting system remains highly responsive during the deflagration phase of combustion, we significantly enhance the safety of hydrogen storage, transportation and utilisation processes.

The Hydrogen Economy and the Need for Rapid-Action Explosion Relief Vents

Hydrogen has been used increasingly in energy, specifically in renewable and low-carbon power production and transport. To increase hydrogen infrastructure, it's vital to demonstrate to stakeholders, customers and the general public that measures have been taken to mitigate the risk of explosions and ensure they are adequately measured.

Strength to Protect

Empirically Tested

Innovative Design

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As a result, Rhino HySafe sought to develop a new venting panel that is highly suited to hydrogen applications and demonstrate its suitability through full-scale testing under a wide range of hydrogen deflagration conditions.

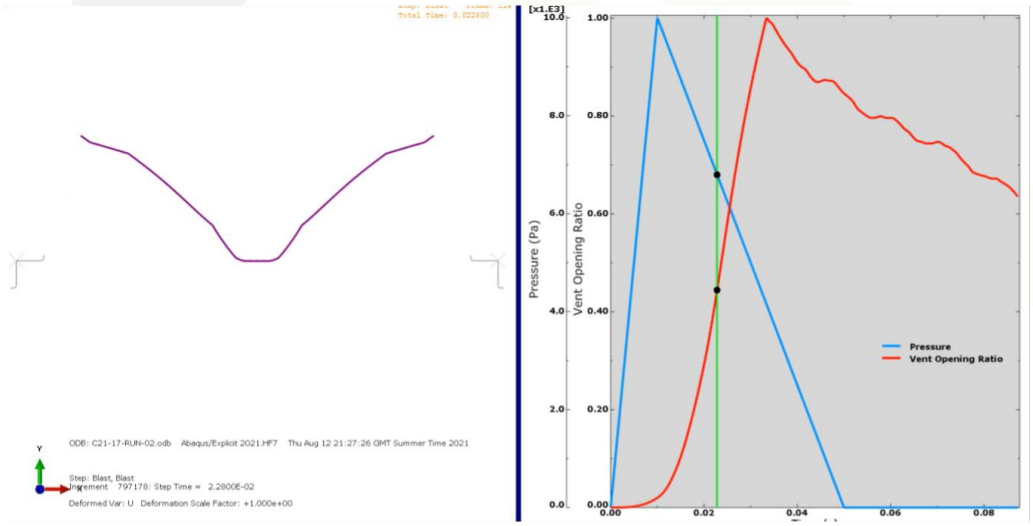
Our Work

The Rhino Engineering Group has extensive experience designing, fabricating, and installing many products. The new HySafe Vertex vent panel has been developed and tested to demonstrate its reliable and rapid activation and prevent debris and missile hazards.

Our design process began with outline analytical methods and simplified preliminary testing. These initial steps laid the groundwork for more detailed explicit dynamics finite element analysis (FEA), which was conducted before proceeding to full-scale hydrogen deflagration testing.

The full-scale experimental tests demonstrated satisfactory vent relief performance across a wide range of overpressure and impulse conditions. This rigorous validation led to the creation of a convenient pressure-impulse curve, which provides valuable guidance for specifiers and hazard modelling specialists in selecting the HySafe Vertex panel system.

Additionally, as hydrogen deflagrations are relatively challenging, the vent system we have developed is well suited to other deflagration hazards, such as other flammable gases, combustible dusts and combustible off-gases associated with lithium-ion battery thermal runaway.
Our commitment to innovation and safety underscores our dedication to advancing the hydrogen economy while prioritising the protection of lives, property and the environment. With Rhino HySafe at the forefront of hydrogen safety solutions, stakeholders can confidently embrace the transition to a more sustainable and energy-efficient future.



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