

## Bonfire Test Confirms Safety of the SAG LH2 Tank System Even in Extreme Conditions



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**Fuel Cells Works**

December 12, 2024 at 11:17 AM EDT



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The liquid hydrogen tank system for [trucks](#) developed by SAG has reached a decisive milestone on the way to approval for road traffic: the successful completion of the so-called Bonfire test. This special fire safety test is a mandatory test to obtain type approval from the Federal Motor Transport Authority in order to ensure the safety of hydrogen tanks in road traffic.

In the Bonfire test, the tank is confronted with extreme conditions. The tank, which must be filled with liquid hydrogen ( $-253^{\circ}\text{C}$ ), is exposed to a fire with a temperature of up to  $1000^{\circ}\text{C}$ . This fire must act on the test specimen over the entire projected tank surface. In the course of the test, a situation (e.g. accident) is simulated in which the vehicle is exposed to an intense fire. The aim is to check whether the tank can withstand the high temperatures and whether inadmissible overpressure can be avoided. This is done by controlled, safer blowing off of hydrogen via the safety devices installed on the tank.

The SAG LH2 tank was subjected to this fire load for more than two hours, without the tank showing any structural damage and the internal pressure was only close to the level to activate the installed safety devices. Therefore, the vacuum insulation of the tank system was actively damaged ("broken") by the experts carrying out the test in order to check the function of the safety valves. It was impressively demonstrated that the developing excess pressure could be dissipated absolutely safely and in a controlled manner via the safety devices.

Thanks to the intensive cooperation with TÜV Rheinland in the preparation of the setting and in the execution of the test, it was possible to meet the requirements of the newly created, complex regulations. Based on Implementation Regulation (EU) Nr. 2021/535, the SAG LH2 tank system has been classified as safe in the event of an accident with fire.

Christian Eder, Project Manager Cryogenic Storage Systems at [SAG Group](#), commented on the positive test result: "No hydrogen leakage was detected during the underfiring period which lasted more than two hours. Subsequently, the safety valves discharged the stored hydrogen in a controlled manner. We are more than satisfied with the result and can take away important learnings for the further development of our tank system. The same applies to the test procedures, as we are currently taking on a pioneering role in carrying out these tests."

Conducting the Bonfire test was associated with considerable challenges. Since there are still no "mobile" LH2 refuelling facilities on the market, the LH2 filling was carried out together with SAG partners. The production of the prescribed test conditions was monitored by TÜV Rheinland and their correctness was also confirmed. Finally, the Bonfire test took place at a test site near Paderborn, Germany – the first of its kind to be carried out in connection with hydrogen liquid storage tank systems in accordance with the normative specifications, supervised by TÜV Rheinland and also metrologically verified.

With the successful passing of the Bonfire test, the SAG LH2 tank system has gone through the last outstanding test for the granting of type approval in accordance with European standards and is therefore ready for use in road traffic.

This success represents an important step in the development of safe hydrogen storage technologies for the mobility of the future.