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HYDROGEN: THE FUTURE OF ENERGY

AVK UK, FUSION GROUP AND PEAK PIPE SYSTEMS ARE READY FOR THE HYDROGEN REVOLUTION

In December 2020, the UK Government announced a plan to reduce greenhouse gas emissions by at least 68% compared to 1990 levels by 2030. This builds on the legally binding commitment, signed into law in June 2019, to reach a target of net zero emissions by 2050. A switch to hydrogen could play a major role in helping the UK achieve these targets: the hydrogen revolution.

AVK UK and Fusion Group are already playing their part in ensuring that any future hydrogen gas distribution network is both safe and effective. The Donkin brand, part of the AVK Group, has been designing and manufacturing gas products and solutions in the UK for over 170 years and when asked to supply products for the demonstration gas network being constructed by DNV at their Spadeadam Research and Development Centre in Cumbria, AVK, Fusion and Peak Pipe Systems embraced the opportunity to be involved in the future of energy, drawing on both their experience and capabilities.

The network forms part of the H21 project led by Northern Gas Networks with the collaboration of all other distribution network operators (DNO), National Grid and the HSE Science Division. The project will continue through 2021 and possibly beyond.

The H21 network at DNV Spadeadam is being used to establish whether normal gas network operations can function safely on a network transporting 100% hydrogen gas.

Fundamental to the success of the project is that the valves and fittings used on natural gas networks, and the methods used to install them, are safe and effective in a hydrogen network world.

Jon Briafield Market Sector Manager - Gas, has been leading on the project for AVK UK: "The hydrogen is stored at 70 bar in a 48" steel reservoir. The pressure is initially reduced down to 7 bar (intermediate pressure) and subsequently to 2 bar (medium pressure) and finally to 75mbar and below (low pressure).

The network itself is around 1km of PE pipes ranging in diameters. It incorporates a large number of Donkin valves for such a small area, the DNV and NGN teams undertaking the installation work have done a great job under challenging conditions. AVK UK supplied 19 different variants and sizes of the Donkin gate valve (Series 555), over 30 valves in total and a number of additional Donkin ball valves (Series 460 and Series 455).



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Most of the low-pressure valves are installed in a large underground concrete chamber. Each valve has purge and vent point risers, coming up through a metal grid across the top of the chamber to facilitate purging and venting operations without the need to enter the chamber."

The electrofusion fittings and fabrications on the network have been supplied by Fusion Group Ltd, an AVK UK Group company. In total, Fusion supplied over 110 different products including Multiseal tapping tees, branch saddles and stub flanges. Sizes ranged from 630mm down to 32mm.

Fusion Group also supplied the PE pipe. The pipe was manufactured by Peak Pipe Systems, which is located next to Fusion Group in Chesterfield, on its three extrusion lines. All the products were approved to current gas standards specifically, designed and manufactured in the UK for the project.

Sharon Foster is Peak Pipe Systems' Commercial Director:

"We made the first delivery of pipe to DNV Spadeadam in September 2020. Peak pipe systems provided at least 9 different pipe sizes ranging from 180mm and 125mm 7 bar orange pipe, to SDR17.6 pipe in sizes from 355mm all the way down to 63mm."

The UK gas mains replacement programme of old metal gas distribution pipes with PE – it is estimated that 90% of the network will be PE by 2032 - has, almost by accident, put the UK in a strong position with regards to introducing hydrogen into the legacy gas distribution network.

There are, of course, a huge number of legacy AVK Donkin valves and fittings on the existing network. Jon Briafield and colleagues have been in detailed discussions with Northern Gas Networks, Cadent and HSE to build the safety

case for the introduction of hydrogen into public gas networks in the North East and North West as part of the next phases of H21 and the HyDeploy project:

"The H21 project team will be sharing the research project outputs gathered at DNV Spadeadam through the knowledge dissemination process with AVK UK, Fusion Group and Peak Pipe Systems and this will provide us with valuable insights into the compatibility of our current product portfolios with any future hydrogen gas networks."

H21 is just one of many hydrogen-related projects being supported by AVK across the UK. For example, it is also contributing to the Cadent/NGN HyDeploy project which is looking at the safe blending of hydrogen with natural gas into the existing gas network in North West and North East England. It is also active on the SGN H100 project to build and operate a pilot public hydrogen network by 2022/23.

The hydrogen revolution is nationally important. Despite the huge growth of renewable energy sources such as wind, solar and hydro, 85% of homes and 40% of the UK's electricity generation currently relies on gas. Being able to use the existing gas network for hydrogen distribution with only minimal modifications would be hugely beneficial. One of the most effective ways of producing hydrogen is electrolysis which uses electricity to split water into hydrogen and oxygen. The surplus electricity generated by renewable sources could be supplied at low cost to power electrolyzers. This effectively transforms something that can't be stored, electricity, into something that can, hydrogen.

The possible move to a blend of hydrogen and natural gas, and eventually to a 100% hydrogen gas network has a precedent. During the 1960s and 1970s the UK transitioned from town gas to natural gas. Ironically, town gas typically contained around 50% hydrogen!



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