

Hy4Heat (WP2) – Standards, Purity & Colourant

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Lot 1 – Hydrogen Standards

- Objectives

- Assess current gas standards and their suitability for adoption for hydrogen
- Develop a hydrogen gas standard (new or adoption of an existing standard)
- Develop and update the relevant IGEM standards for use with hydrogen
- Develop robust evidence through research and testing
- Obtain IGEM committee approval for the updated standards
- Communicate to the gas industry prior to commencing the trial

- Deliverables

- To enable installers to construct and commission the pipe work and appliances required
- Support an unoccupied trial and/or demonstration zone
- The procedures in place for a potential occupied trial
- To produce a package of standards that provide a level of safety equivalent to that of natural gas.

Lot 2 – Hydrogen Purity

- This project focuses on hydrogen production and trace impurities to pull together a draft Purity Specification
- Draft Purity specification guided by literature review undertaken on existing quality recommendations for hydrogen used for heating
- Key stakeholder (hydrogen producers, network operators, equipment designers, appliance manufacturers and technical consultants) views sought to support the evaluation of the purity specification.
- Hydrogen production and clean-up options have undergone a cost benefit study using selected target scenarios to determine purity levels
- Significant uncertainties have been identified
 - the costs of purification at the point of use for PEMFC applications,
 - the future demands for hydrogen from the grid used in PEMFC applications and combustion applications.
- No firm conclusions can be drawn on the most cost-effective hydrogen purity level delivered through the grid.

Draft Purity Standard

Content or characteristic	Value*	Rationale
Hydrogen fuel index (minimum mole fraction)	98 %	This value is a good compromise between hydrogen cost and effects on boiler.
Carbon monoxide	100 ppm (Safety Limit)	To meet health and safety limits, short and long term exposure (consideration being given to value nearer 10/20 ppm to permit the use of quick response PEM fuel cells)
Hydrogen sulphide content	≤ 3.5 ppm	These values are taken from GSMR1996 as any detrimental effects would be similar for hydrogen and natural gas.
Total sulphur content (including H ₂ S)	≤ 35 ppm	
Oxygen content	≤ 0.2 %	
Hydrocarbon dewpoint	-2 °C	Complies with GSMR1996 and EASEE-gas
Water dewpoint	-10 °C	
Sum of methane, carbon dioxide and total hydrocarbons	$\leq 1\%$	No detrimental effects to boiler, this limit is to reduce carbon content of the exhaust
Sum of argon, nitrogen and helium	$\leq 2\%$	To avoid inerting the hydrogen gas (in agreement with ISO/FDIS 14687)
Wobbe Number range **	42 – 46 MJ m ⁻³	Range and percentage variation based on natural gas range in GSMR1996
Other impurities	The gas shall not contain solid, liquid or gaseous material that might interfere with the integrity or operation of pipes or any gas appliance, within the meaning of regulation 2(1) of the Gas Safety (Installation and Use) Regulations 1998, that a consumer could reasonably be expected to operate	

Lot 2 – Hydrogen Colourant

- This project is considering the following hydrogen colourant options
 - Network addition / Appliance addition / No addition
- Implications of low visibility flames considered
- Appliance manufacturers consulted
- Risks to appliance performance considered
- Implications of odorant on flame colour investigated
- Work still to do
 - Leakage testing
 - Optimum colour solution
 - Concept and feasibility testing

Questions and Answers

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