The European Commission’s science and knowledge service

Joint Research Centre
OUTLINE

Update European standardization for hydrogen fueling

Pre-normative research at JRC on hydrogen fueling

Other initiatives:

- MetroHyVe project
- Accidents / Incidents database
<table>
<thead>
<tr>
<th>Requirement</th>
<th>Standard/Specification</th>
<th>Pre-normative Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>to comply with ISO/TS 20100 (withdrawn by ISO)</td>
<td>Challenge: SAE 2601 cannot be referred to on an European legal document</td>
<td>• FCH JU: HyTransfer, metering protocol for HRS</td>
</tr>
<tr>
<td>Requirement 2: hydrogen purity to comply with</td>
<td>EN ISO 17268:2016</td>
<td>Rev. for 2019</td>
</tr>
<tr>
<td>the ISO 14687-2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Requirement 4: Connectors to comply with the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISO 17268.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Research on Hydrogen Refueling at the JRC

GasTeF: High Pressure Gas Testing Facility
EU reference laboratory for safety and performance assessment of high-pressure hydrogen (and natural gas) storage tanks

In 2018:
- Completed out of specification refuelings and consequences to CHSS.
- Study the effect of tank volume on the refuelling performance.

Test under cold -40 °C and hot 55 °C environmental conditions.

GasTeF only public European facility able to simulate wrong operative conditions at the hydrogen refueling station
Assessment of out-of-specification during refueling of on-board tanks

Wrong input on the SAE 2601 look up tables: $T_{Amb}$ of 50°C with -40°C input

(a) Single out-of-spec

(b) Combined out-of-spec

Technical failure: No cooling with a T40 table

Results of out-of-specification events can be different depending on the tank type
The lower the delivery gas temperature the higher is the effect of the tank volume. This could be explained by the bigger role played by heat transfer in these cases.

These results suggest that the refueling protocols should consider not only the capacity of the CHSS but the inlet volume of each of the tank of the system.
Pre-normative Research Hydrogen Metering

Metering Protocol for Hydrogen Refuelling Stations

- To develop an methodology for the certification and approval of HRS as regards their ability to measure the amount of hydrogen accurately.
- Certify HRS error rate below 1.5%.

- Asks for a simplified HRS testing protocol.
- Validation testing campaign in operating HRS and a buy-in campaign from main certification/approval bodies in EU MS deploying HRS.
- Duration of ca 1 year.
- This is intended to bridge the gap between current situation and future development of a proper certification.

See Presentation "Validation of Hydrogen Testing Device in Europe"
Pre-normative Research
Hydrogen Metering

**EMPIR European Metrology Programme for Innovation and Research:**
It is the main programme for European research on metrology. There is a focus on innovation activities to target the needs for industry and accelerate the uptake of research outputs.

**MetroHyVe:** Started in June 2017 till 2019. Funding is 2.3 MEUR
20 partners including European National Metrology Institutes (NMIs) and industrial gas producers

- **Flow metering** – To develop the necessary methodologies, standards and calibration facilities to allow HRSs to calibrate their hydrogen flow meters to suitable accuracy (1%) under the challenging refueling conditions. Provide recommendations to OIML136 (under revision);

- **Hydrogen quality assurance** – To develop gas analysis methods to allow measurement of all impurities specified in ISO 14687 and the delivery of primary reference gas mixtures to ensure that all of these measurements are traceable to National Standards;

- **Hydrogen quality control** – To develop online hydrogen purity analyzers capable of continuously monitoring low level impurities at the refueling station and ensuring suitable performance through robust testing and validation against primary reference gas mixtures;

- **Sampling** – To develop and disseminate best practice for sampling including suitable approaches for sampling at the station and use of correct gas vessels to ensure a representative sample of hydrogen can be delivered to the laboratory.
Collaborative and communicative web-based information platform: repository of data defining events related, directly or indirectly, to hydrogen safety

- to assist all stakeholders in better understanding hydrogen-related undesired events
- to keep the industry updated with recent hydrogen events
  - encourage and facilitate industry partners to share experience
- to serve as an important data source for risk assessment of hydrogen applications
- to provide safety lessons learned

The collection of data is characterized by a significant degree of details and information about recorded events:

- physical consequences
- application chain
- causes
- ...
New HIAD versions

HIAD FP7
2003-2006

H2 events

Registration & log-in

HELLEN
2016

Restricted only FCHJU

HIAD 2.0
2017

Free access

New H2 public available events

Project events

Thanks

Any questions?
You can find me at beatriz.acosta-iborra@ec.europa.eu