H2(NG) AND GAS APPLIANCES

- ACTUAL STATUS OF TC109-WG1 AHG HYDROGEN

26-03-2021

BOSCH

November 2019: Proposal to raise an ad hoc group Hydrogen under TC109-WG1 was accepted with the following 3 job tickets:

1. Investigate what our current appliances (from e.g. 2005 onwards) can handle regarding H2. E.g. up to 5% or 10% (possible to get EU-funding for this ?).
   - What has to be changed in terms of tests and corresponding limit gasses ?
   - Review EN15502.

2. A new gas category could be introduced for (gas adaptive) appliances up to 20% (e.g. 2N+ or 2H+/2E+). This gas category could be become obligatory from e.g. 2035.
   - What has to be changed in terms of tests and corresponding limit gasses ?
   - Review EN15502.

3. For 100%H2 there is the 4th gas family, as this will be in separate grids.
   - What has to be changed in terms of tests and corresponding limit gasses ?
   - Review EN15502.

=> Focus on job ticket 2 and 3 as job ticket 1 is taken care of by the ThyGa-project.

Composition TC109-WG1 ad hoc group Hydrogen

- Convenor/secretary: Michel Oldenhof
- Participants:
  - NL: Bosch TTNL, BDR Thermea, Kiwa
  - UK: HHIC, Bosch TTGB
  - DE: BDH, Vaillant, DVGW, TÜV, Viessmann* (* from 01-09-2020)
  - FR: Engie, Cetiat
  - IT: Ariston, Baxi, Anima, Immergas
  - PT: Catim
- Meetings
  - 25-02-2020: Delft/Skype
  - 09-06-2020: Skype
  - 01-09-2020: Skype
  - 12-11-2020: Skype
  - 11-02-2021: Teams
  - Next meeting: 11-05-2021: Teams
- Note: Next to the job tickets also presentations are given of Hydrogen-related projects within Europe (like Thyga, HYDeploy, Hy4Heat, H2-20 etc.).

Achievements after 5 meetings

- Job ticket 2 (20% H2) is nearly finished:
  - Draft amendment EN15502-2-1 for H2NG appliances has been written.
    - Final review in May 2021, then handing over to TC109-WG1 for NWIP.
  - Proposal for marking and limit gases for H2NG done, to be completed in May 2021 (as annex to the amendment EN15502-2-1 until adaptation in EN437).
- Job ticket 3(100% H2) to be started in May 2021.
  - Depending on the required changes, this will be written as an amendment to the EN15502-2-1 or as a separate part: EN15502-2-4.

Draft amendment EN15502-2-1 for H2NG appliances:

Main adaptations:

- Marking of H2NG appliance with a ”Y” following by a number to indicate the %H2 in the gas:
  - E.g. 2EY20 for 80% CH4 and 20% H2.
- Amendment written for max. 20% H2 volume in the distribution gas, which means a range of 0-20% H2 is covered.
- Nominal heat input = heat input with reference gas (0% H2).
  - Max ± 5%/ 500W heat input tolerance allowed.
- Reduced heat input = heat input with hydrogen blend (20% H2)
  - No max. heat input tolerance.
- Risk analysis to be extended for materials in contact with hydrogen.
- Delayed ignition (to be done with NG&H2NG).
- Combustion measurements/calc. based on O2 instead of CO2.
- Light back to be done with higher %H2 test gas (see next page).
- (Mal)-adjustment of the boiler taking into account adjustment at both 0% and 20% H2.

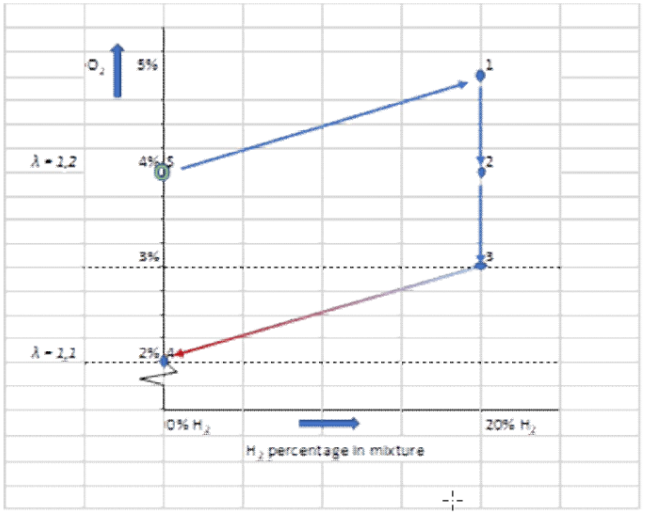

Figure 100: Illustration to show (mal)-adjustment of the boiler in combination with up to 20% Hydrogen volume in the distribution gas.

Limit gases for H2NG appliances for fully pre-mix appliances:

-2 proposals:

- "classic" proposal in line with current EN437, but for light back gas for 2EY20/2HY20 the test gas G22 is chosen (35% H2).

Gas category without H2 (EN437)		Gas category with Hydrogen blend (new, future adaptation in EN437)					
Gas category	Reference gas	Gas category	Reference gas	Declared heat input for 20% in the distribution gas	Incomplete combustion gas	Light Back gas	Flame lift limit gas
2_E	G20	2_{EY20}	G20	$G20_{Y20}$	G21	G22	G231
2_H	G20	2_{HY20}	G20	$G20_{Y20}$	G21	G22	G23

- Alternative for 20% H2 in the distribution gas a lambda variation of +/- 10% can be chosen (in line with the PAS4444 for 100% H2). A similar approach can be done for higher % H2 in the gas.

Gas category without H2 (EN437)		Gas category with Hydrogen blend (new, future adaptation in EN437)					
Gas category	Reference gas	Gas category	Reference gas	Declared heat input for 20% in the distribution gas	Incomplete combustion gas	Light Back gas	Flame lift limit gas
2_E	G20	2_{EY20}	G20	$G20_{Y20}$	0,9* λ	0,9* λ	1,1* λ
2_H	G20	2_{HY20}	G20	$G20_{Y20}$	0,9* λ	0,9* λ	1,1* λ