

# Purging of New and Existing Gas Distribution Hydrogen Pipelines



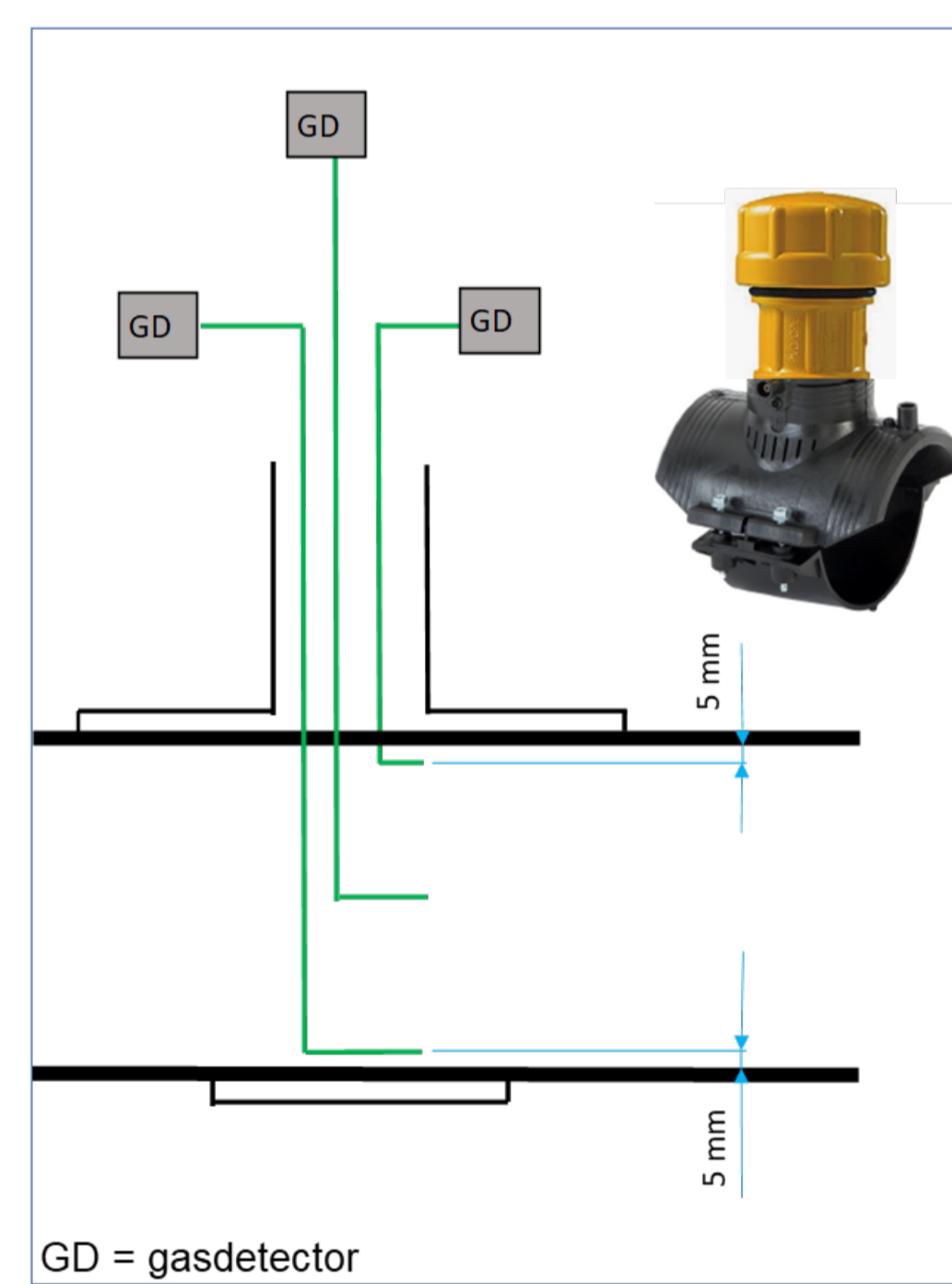
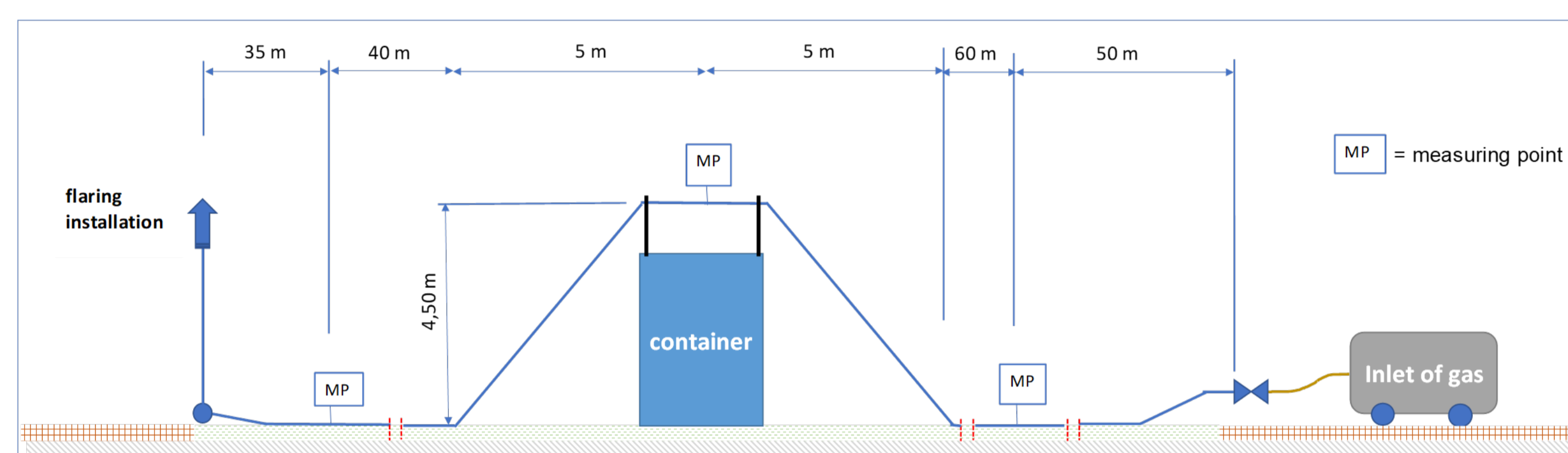
## Introduction

When safely commissioning and (temporarily) decommissioning hydrogen networks as they are currently being developed in pilot projects, it is important to have the requirements for purging the pipes. In general, it must be prevented that gas-air mixtures remain in the pipeline and this applies (to a greater extent) also for hydrogen-air mixtures. This poster is about the research that was done on this subject on behalf of Netbeheer Nederland and HyDelta (see QR-code on top).

## Objective

Which purge velocity should be used for commissioning and decommissioning hydrogen pipelines?

## Test set-up and detail of measuring point



## Method

### CFD calculations

- Decommissioning DN 200 hydrogen pipeline, purge velocity 0.8 m/s; purging with N<sub>2</sub>.

### Experiments

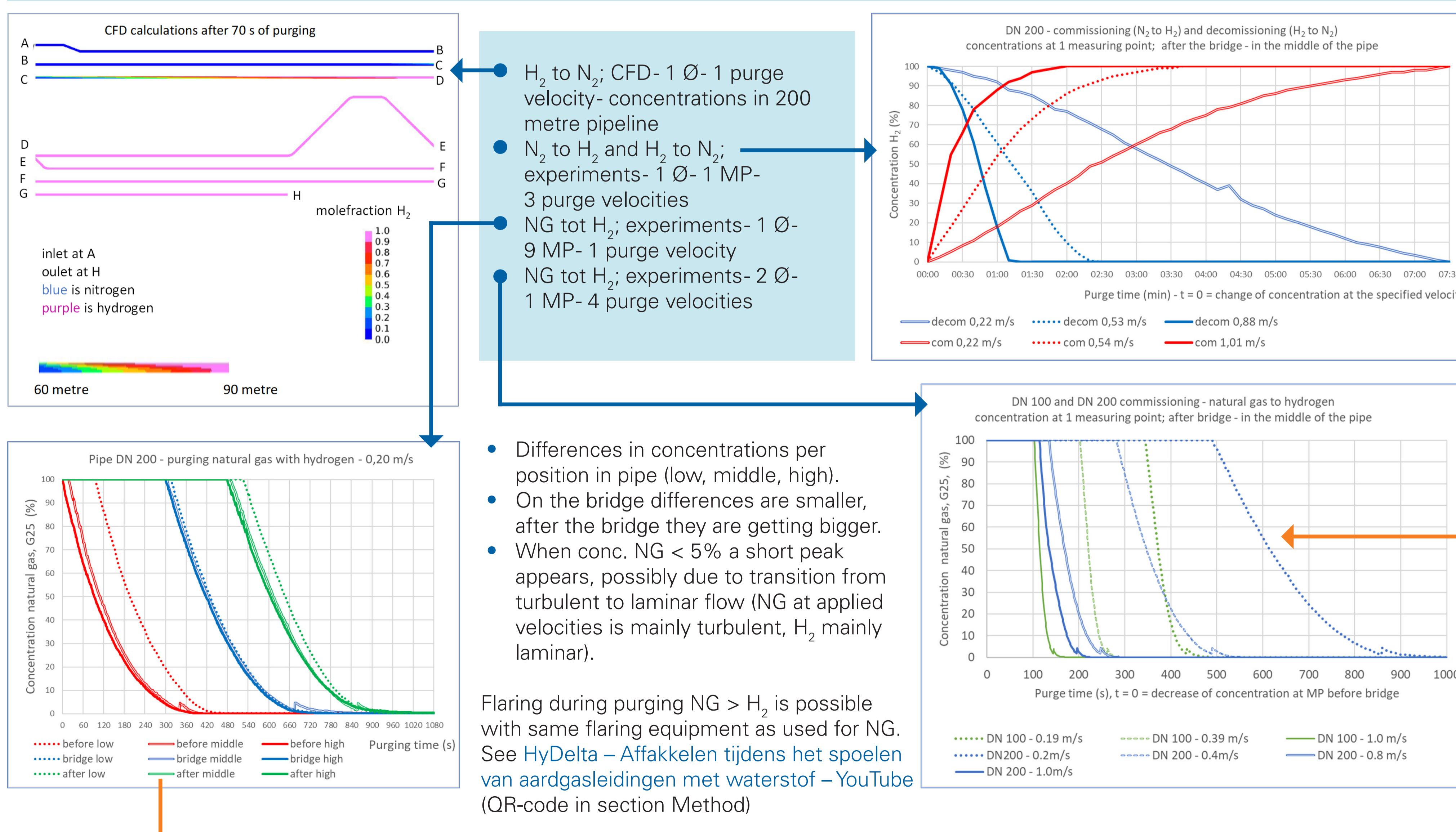
- Purge velocities varying between 0.2 and 1 m/s.
- Two PE-pipes of size DN 100 and DN 200 with a length of 200 meters.
- Simulation of commissioning new pipelines (filled with air); purging with N<sub>2</sub> followed by purging with H<sub>2</sub>.
- Simulation of commissioning existing pipelines (filled with natural gas); purging with H<sub>2</sub>.
- Simulation of decommissioning hydrogen pipelines; purging with N<sub>2</sub>.



## Conclusions

- Experiments are giving similar results as obtained with CFD calculations.
- Purging of natural gas directly with hydrogen including flaring is practicable.
- Minimum required purge velocity for pipes DN 32 to DN 200 is 0.4 m/s.
- Recommend purge velocity for hydrogen grids is similar to natural gas grids; both 1 m/s.

## Results



- Based on experiments a purge velocity of 0.2 m/s is sufficient for DN 100 and DN 200. While practical circumstances could be less favorable a safety-factor of two is applied.
- In order to shorten purge time and period of gas release/open flame 1.0 m/s is recommended.
- 1.0 m/s gives an acceptable size of open flame (NG to H<sub>2</sub>, up to DN 200).

## References

- A.J. Kooiman, C. Lock, C.J.A. Pulles, "Spoelen van waterstofleidingen", Netbeheer Nederland/Kiwa Technology, report GT-200289 – march 2021; link: [https://www.netbeheernederland.nl/\\_upload/Files/Waterstof\\_56\\_37ec4c47da.PDF](https://www.netbeheernederland.nl/_upload/Files/Waterstof_56_37ec4c47da.PDF)
- S.L.M. Lueb, C. Lock, "Purging of natural gas pipelines with H<sub>2</sub>", HyDelta/Kiwa Technology, D1C.1 – may 2021; link: <https://zenodo.org/record/5142228#.YoUBSHVBxPZ>

