

Andrew Whitehouse
Clean Air Power

Comments for LNG TF Teleconference
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It is planned to address the following issues:

1. UN Regulation No. 110 specifies a safety system for preventing the LNG container from being overfilled, but there are neither requirements for the safety and the function of this equipment nor performance tests. For this reason Germany is going to recommend requirements and performance tests similar to the ones for the liquid state of hydrogen (LH2) as described in Commission Regulation (EU) No 406/2010, part 3, 6.3.9.

AW comment:-

For item 1, what is the added benefit of testing? Existing tanks cover this issue well and testing would only add cost. Looking at the USA where there are many thousands of LNG tanks in service, this issue is handled differently. SAE J2343 and NFPA52 have similar requirements to the draft R110 document and do not require a test. SAE J2343 also defines the minimum ullage volume to prevent venting liquid. Is there any record of problems in the USA from not having any further testing?

If there is insistence on testing, we could follow ISO12991 :-

ISO 12991 extract,

4.7.7 Overfill protection

A system shall be provided for preventing the fuel tank from being overfilled. This system may work in conjunction with the refuelling station.

The filling process shall not cause any pressure relief valve to operate during the filling process. The filling process shall not lead to operating conditions that the boil-off management system is not designed for, and therefore cannot handle.

Under all circumstances and regardless of the fuel condition and the maximum operating pressure of the inner tank, the filling volume of LNG shall not exceed the maximum filling level of the inner tank specified by the fuel tank manufacturer.

5.4 Maximum filling level test

Two finished fuel tanks shall be subjected to a maximum filling level test in accordance with B.3 and meet the requirements therein.

The test is in annex A3 (not B3), which is similar to the LH2 document. It consists of 10 fills to maximum design level in succession, with >25% discharge between fills. Level must not exceed that declared in 4.7.7

The LH2 test also requires no operation of PRDs or flows greater than the boil off system can handle.

2. Definition 4.11. of the Regulation stipulates that: "Other parts downstream from the vaporizer shall be considered as CNG components". But there is no safety equipment that prevents the vaporizer from flooding by LNG which could lead to cold temperatures lower than -40°C downstream of the vaporizer and destruction of the CNG components that may not be designed for cold temperatures lower than -40°C. For this reason, Germany is going to recommend a safety system against flooding by LNG which shall be type approved.

AW comment :-

Worth considering. Has been covered to date by shut down if gas temperature downstream gets low, but might not protect a solenoid valve immediately downstream of the vaporiser. Reminder should be provided to prevent possibility of LNG trapping on shut down.

Separate issue – minor correction required.

While checking above issues, I noticed an anomaly in the R110 draft document, paragraphs 18.12 and 18.13.

18.12. The LNG system shall be designed to prevent any LNG trapping.

18.13. The LNG system in category M vehicles shall be equipped with a natural gas detector and/or gas tight housing. The LNG system in category N vehicles may be equipped with a natural gas detector if the fuel storage tank and associated piping is mounted on the exterior of the vehicle without the possibility of gas trapping (as in paragraph 18.12.). If the fuel storage tank is located inside the cargo area of a category N vehicle then a natural gas detector and/or gas tight housing is mandatory.

I think the trapping is different in these two cases.

18.12 is for liquid LNG trapping in a pipe.

The need for a gas detector in 18.13 category N vehicles is if the vehicle installation allows gas to accumulate in an enclosed area, like an engine enclosure, i.e. not as in 18.12, so 18.13 should read :

18.13. The LNG system in category N vehicles may be equipped with a natural gas detector if the fuel storage tank and associated piping is mounted on the exterior of the vehicle without the possibility of gas accumulation in an enclosed area or volume in the vehicle. If the fuel storage tank is located inside the cargo area of a category N vehicle then a natural gas detector and/or gas tight housing is mandatory.