

Meeting Minutes
LNG Task Force Teleconference
17 October 2013
16.00-18.00 Central Europe Time

I. Introductions by the Chairman, Mr. Paul Dijkhof (KIWA)

1. Mr. Dijkhof read the list of attendees from those who have RSVP'd positively to the meeting.

II. Comments from Germany at the GRSG (Document GRSG-105-31 from 105th GRSG, 8–11 October 2013)

2. Andrew Whitehouse (Clean Air Power) explained the comments he provided in document LNG TF 12-XX. The U.S., which has significant experience with LNG trucks does not have requirements as explained and identified by the German document.
3. Mr. Dijkhof indicated that the comments from Germany probably are due to different fill pressures used in Germany and that higher fill pressures may result in boil off.

General Discussion

4. ISO 12991 provides for overfill protection but this is a requirement for the fuelling station and not the vehicle. But the challenge in R.110 is for the vehicle. The question is whether the protection is provided by the fuelling station, on-board the vehicle, or by the operator filling the tank.
5. There are different ways of fuelling and different situations of filling; by one connection; by a vapor return; by vapor collection/cooling. Therefore ISO says that the system shall provide a procedure to prevent overfill. Due to these different fuelling systems it is difficult to create language to prevent overfill on the vehicle.
6. Mr. Chrz (Chart) referred to standard ISO 12614, part 18 which relates to the LNG terminal sensor, behind the heat exchanger. In case of a temperature lower than -40 it signals an electronic control unit on the outlet of the vaporizer that shuts the system off. This comment relates to the second part of the German comment, about the vaporizer not working correctly.
7. Mr. Elliger (TUEV) indicated that, as with hydrogen, the regulation is not specific as to how the downstream temperature is protected. But it is clear that the sensors operate on temperature.
8. The temperature downstream of the vaporizer of the LNG tank and also the temperature downstream the first stage of the pressure regulator (where also vaporization takes place) could be lower than -40°C.

There is further general discussion of specific language that can be used in the regulation.

9. Mr. Dijkhof displayed paragraph 18; to add a new provision that the downstream fuel avoids temperatures below -40°C, but that it is up to the manufacturer how this condition is met.
10. Mr. Chrz added that it should be the 'temperature downstream of the vaporizer.'
11. Mr. Whitehouse indicated that reference should be made to Class 5 components not being in contact with temperatures lower than -40°C.
12. Brenda Smith suggested that a fail-safe system must be present to prevent components downstream of the vaporizer and it must be protected from fuel falling below -40°C. But also components not in class 5 should be protected from contact with fuel below -40°C.

13. Brenda Smith suggested that the issue is not so much preventing failure of the vaporizer, rather using a safety system that prevents components from exposure to cryogenic temperatures downstream, regardless of the cause,
 14. Various language was discussed in the existing R.110 regulation, section 8.14 about safety systems designed to protect components from exposure to temperatures for which they are not designed. This covers CNG systems with high flow pressure regulators as well as components (Class 5) that are not designed for temperatures below -40.
 15. Language for section 8.14.1 is formulated as: *The system shall be provided to prevent a liquid or gas at cryogenic temperature from entering the system components located downstream of the vaporizer or heat exchanger if they have not been approved for cryogenic temperature (Class 5).*
 16. The question is raised if a new paragraph 18.14.2 should be added to specify that the 'system' must be tested, therefore referenced in 8.14-18.22, or in Annex 3 or in another location in the regulation. There is general discussion about whether the manufacturer should demonstrate the functioning of the system or a new test demonstrating the functioning of the system is required by the regulator to meet some level of type approval. But R.110 is for vehicle components and if a *system* type approval is required then the focus would be on R.115. There is further discussion whether a test method should be included in Part I (components) or Part II (systems) of the Annex.
 17. Mr. Dijkhof indicated that the time is running short for the meeting and that the participants should think about and prepare a suggested solution to this issue and that the meeting move on to other agenda items in order to keep on time.
 18. Mr. Dijkhof brought the discussion back to the overfilling issue (the first of the comments in the German GRSG document). He referred back to ISO 12991, Section 4.7.7, Overfill protection. The participants should think about a solution – on the vehicle or at the fuelling station – and consideration must be given whether to create a prescriptive or performance solution. We do not want to tell manufacturers how to accomplish their job but to require a solution to overfilling. The minutes of the meeting and appropriate documents will be circulated shortly so the participants can consider proposed solutions.
 19. Another consideration in the German document regarding 'wrong references' (Annex 3B, Section 3.4.1) was raised. Mr. Dijkhof suggested to circulate that Corrigendum provided at the GRSG that corrects some mistakes in the proposed R.110 LNG amendments to see if the 'wrong references' are addressed appropriately. Mr. Dijkhof further suggested that the participants provide any other comments or suggestions, using Revision 4 (or maybe 5), that further corrections be submitted so they can be addressed for the April 2014 GRSG.
 20. Consideration also needs to be given to Mr. Whitehouse's comments about gas trapping in sections 18.12 and 18.13. The word 'trapping' that is referenced in 18.13 should, rather, be related to 'accumulation' in an enclosed space (or area) on the vehicle rather than trapping in a pipe.
 21. Brenda Smith suggested that the leakage should not only be considered in an enclosed area but could be accumulated in another 'unenclosed' space (such as with poor ventilation), Mr. Whitehouse suggested that we use only the word 'accumulation' and not specify an enclosed or unenclosed space. So the current suggestion is acceptable. Considering the discussion on the ADR vehicles we might need to include a requirement for a gas detector in an enclosed space.
- III. Ground Clearance of a Vehicle LNG Tank (Scania)**
22. Scania proposed that the LNG tank be excluded from the ground clearance requirement because they generally are manufactured from stainless steel like diesel tanks, which have been approved by ECE R.34. Also, since the LNG tank consists of an inner tank

and outer tank the redundant structure for external leakage is, therefore, decreased. Comparing stainless tank LNG tank compared to a composite tank, where lower level fiber wrap is damaged, the danger potential for an LNG tank is much lower than for a CNG tank, thus should be excluded from the ground clearance requirements. Also, diesel tanks have the lowest ground clearance (130-140mm) up to the tank.

23. Mr. Ursan noted that the North American code considers when the vehicle has a flat tire (or two flat tires). The standards specify that the tank does not come in contact with the ground, in order to prevent damage to the tank. This has been the rationale for specifying ground clearance.
24. Question from Scania: If the tank would be damaged to leakage if the tank came into contact with the ground in the case of a flat tire.
25. Mr. Dijkhof also asked how to handle the use of LNG on a low floor bus.
26. Mr. Seisler suggested that no specified millimeter requirements be provided but that regulatory language should merely specify that under no circumstances (flat tires/speed bumps, low floor buses, etc.) should the LNG tank comes in contact with the ground. This has to be ensured by the vehicle manufacturers (or retrofit installers).
27. Mr. Dijkhof suggested that Scania provides new language to accommodate this suggestion.

IV. ADR (Dangerous Goods Vehicles) regarding leakage of fuel going to the ground.

28. Mr. Dijkhof explained that he and Mr. Seisler will be putting together a series of presentations in one hour to the ADR WP15 (potentially November 6th) about LNG safety. He requests that all the participants send information, performance tests, bonfire tests or other related information (and specifically compared to diesel trucks) so we can use this information during the ADR discussion.
29. Westport has agreed to share its test results (video) and would want to publish it on YouTube. They would wish to require confidentiality prior to that. Mr. Seisler indicated that it is not possible at the United Nations to deal with confidentiality of documents (including videos).

V. Other topics

30. Question is raised about gas detection in section 4M (?), whether it is a pressure sensor device or methane detection system. Mr. Dijkhof indicated that gas detection is meant to detect gas inside the vehicle.

VI. Next steps and closing:

31. Comments from today will be sent, as well as the minutes of the meeting. Mr. Dijkhof suggested that in Week 44 we propose a new teleconference to discuss new proposals for the three points discussed. We can prepare a new formal document for GRSG three months in advance (2nd week in January). Mr. Dijkhof will suggest three dates also at 16.00-18.00 that is acceptable for everyone.

AGENDA

Paul Dijkhof (Kiwa) (Chairman)
Jeff Seisler (NGV Global /Clean Fuels Consulting)
Mihai Ursan (Westport Power)
Bobby Lidder (Portal Gas Services-Hardstaff)
Peter Murray (Chart)

John Crawford (Westport)
Andrew Whitehouse Clean Air Power
Jean-Louis Chazalette (Volvo)
Francesco Cagnolati (Landi Renzo)
Brenda Smith (Gas Advisers)
Johan Hag (Scania)
Kjel Henryson (Scania)
Jose Luiz Perez Souto (IVECO)
Vaclav Chrz
Bobby Lidder Hardstaff group UK
Tom Elliger TUEV Sued