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SGS-8 Meeting: All action items are due no later than March 31, 2010.

3. Germany and Japan will provide sample language on pressure limits from existing regulations.

Japan proposes the following text.
Nominal working pressure(NWP) shall be 70MPa or less.
Maximum working pressure(125%NWP) shall be 87.5MPa or less.

Article 7, paragraph 10 of the current Japanese regulation (JARI-S001) reads as follows:
(2) Maximum filling pressure shall be 35 MPa or less.

13. Parties are asked to provide data to support higher number of cycles for Performance Durability tank testing (the taxi issue).
The results of a survey among taxi associations showed that the average mileage of taxis in Japan are as follows:
A taxi runs 80,000 km a year and is used for five years on average. The average mileage of a taxi in its life is about 400,000 km (while the average mileage of private cars is about 120,000 km.)
Based on the above findings, we defined the number of fillings as 11,000 times for commercial cars including taxis, because they run much longer distance than private cars.

Since the mileage of vehicles may vary from a country to another, we propose that vehicle types to which the number of fillings of 5,500 times is applicable be determined by each country.

Meanwhile, since Japan has not a large fleet of CNG cars and hence has not mileage data easily available, we expect that countries where these data are available will provide such data.

16. Japan will check permeation test results to confirm that the value is consistent with HySAFE value.

For details, see attached sheets. (CommentsonPermeation(JASIC).ppt)

[Proposal of a gtr draft]
We propose that the gtr draft satisfy either of the two conditions below. We propose the condition (ii) as an alternative.
(i) Current gtr draft
150 cc/min@55˚C
=150*(Vehicle Length+1)*(Vehicle Width+1)*(Vehicle Height+0.5)/30.4
(ii) The definition is given with the permeation amount per liter of the container and the value is
46cc/L/hr@55˚C in leakage/permeation test after gas cycle test.

[(ii) Reasons for the proposal]
* If we define permeation amount in relation to garage volume and vehicle size, we have to manage the combinations of container size and vehicle size. We want to spare this management work.
*The value of 46 cc/L/hr@55˚C takes into account a higher degree of deterioration compared to

5 cc/L/hr@15˚C for new containers. Therefore it takes into account the actual performance of currently used containers and is applicable to these containers.

25. Interested parties will submit written comments on the proposed text for fuel leakage limit (post crash).

Regarding the proposed provision requiring the post-crash hydrogen concentration in the passenger, luggage and cargo compartments to be no more than 4%, we would like the following information to be presented:

1. The details of the test conducted by NHTSA and how the test resulted in such proposal; and
2. Test procedures, test conditions, and pass/fail criteria to be used to realize such proposal.

A study conducted by Japan Automobile Research Institute (JARI) has demonstrated that if hydrogen being accumulated in an enclosed space such as the passenger, luggage or cargo compartment is ignited, a hazard that corresponds to the concentration of accumulated hydrogen would occur. However, for drafting the standards, it is necessary to study well if hydrogen that would cause such hazard can enter the passenger compartment. For hydrogen to enter the passenger compartment and have a concentration that is high enough to cause such hazard, there must be a scenario that meets the following three conditions:

1. A crash cuts piping.
2. The broken pipe cuts through the steel floor of the passenger compartment and enters the compartment.
3. In addition, the container's main shut off valve is not closed and is unable to stop the hydrogen supply.

To determine if this can really occur, analysis of the past crash tests on gasoline vehicles would provide important hints.
The results of the existing gasoline vehicle crash tests have shown no such situation where a crash cuts piping and the broken pipe cuts through the steel floor of the passenger compartment and enters the compartment. Further, for the hydrogen gas piping, which is more rigid than the gasoline piping, it is much less possible to be cut than for the gasoline piping. Moreover, the container's main shut off valve usually closes upon detecting a crash or closes when the power is turned off, as specified in B.3.6. For this reason, there are extremely few occasions where the leak continues after the crash test, and therefore it is also extremely rare for hydrogen to accumulate.

If, as a result of the study, it is shown that hydrogen that would cause hazards can enter the passenger compartment, we must discuss how to treat the hydrogen concentration that changes in terms of space and time.

The results of the above-mentioned JARI study, in which hydrogen was released into the passenger compartment from underneath its floor, and of a simulation study described below have clarified that distributions of the hydrogen concentration occur. From such standpoint, test procedures, test conditions, and pass/fail criteria that are appropriate for the actual crash testing must be developed based on the results of studies and investigations, including the following:
* For distributed hydrogen concentration, at which locations should they be measured by using how many hydrogen-concentration measuring instruments?
* How should the pass/fail status be determined for distributed hydrogen concentration?

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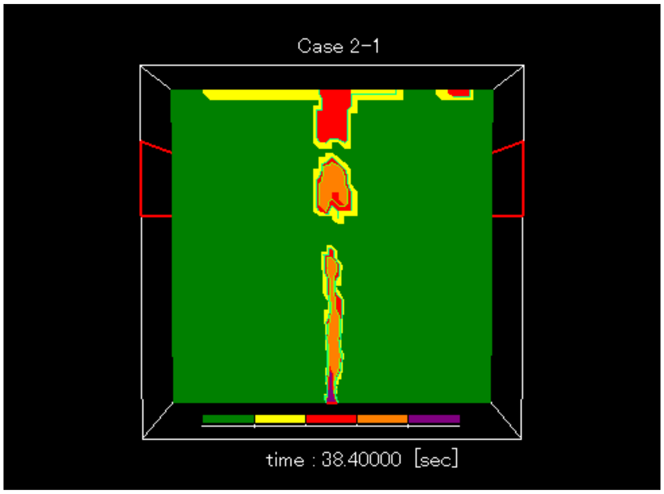
* How should the appropriate time required for measuring hydrogen concentration be set?

Source: FY 2001 Report by JARI



0-1%, 1- 4%, 4-8%, 18-75%, 75-100%

The test procedures, test conditions and criteria should be developed based on the clarification of these questions.

Addition (Japan's proposal)
Re: Rationale for crash test leakage limit (Draft SGS 8-13 rev.1, page 37)

Add the sentences to the proposed text in "***SS-8 GWS comment #9***":

Insert them as follows:
5.3.2 POST CRASH REQUIREMENTS
A.5.3.2.1 Rationale for crash test leakage limit and correspondence to requirements for gasoline vehicles.

The criterion for post-crash hydrogen leakage is based on allowing an equivalent release of combustion energy as permitted by FMVSS 301 for gasoline vehicles. Using 42.7 MJ/kg as the lower heating value for gasoline, an allowable energy loss of 72 590 kJ is permitted over the 60 minute interval after motion has ceased. (US DOT Transportation Energy Data Book: Liquid Fuel/LHV (MK/kg): conventional gasoline/43.438, reformulated or low-sulfur gasoline/42.348, CA reformulated gasoline/42.490, US conventional diesel/42.781, Low-sulfur diesel/42.602)

The allowable loss of hydrogen (on a mass basis) can be calculated using the lower heating value of hydrogen (119 863 kJ/kg) as follows:

$$m_H = \frac{72590\ \text{kJ}}{119863\ \text{kJ/kg}} = 0.606\text{kg}$$

Converting this mass of hydrogen to an expanded volume at standard temperature (15C) and pressure yields:

$$\frac{606\,\text{g}}{2\,(1.00794)\,\text{g/mol}}\ \text{x}\ 22.41\,\text{L/mol} \times \frac{288}{273} = 7107\,\text{L}$$

Finally, in this gtr, for the allowable gasoline leak rate, on which the calculation of the allowable hydrogen leak rate is based, “30 gr/min” in ECE R94 and 95 is used instead of “1 ounce/min” in FMVSS. In addition, to correct for the influence of environmental temperatures in the crash testing, the criterion (118NL/min) was set for the normal condition (temperature 0°C, barometric pressure 1013 hPa).

As confirmation of the hydrogen leak rate, JARI conducted ignition tests of hydrogen leaks ranging from 131 NL/min up to 1000 NL/min under a vehicle and inside the engine compartment. ・・・・・・