

**SGS 04 - 10**

**Safety Regulation  
for Fuel Cell Vehicles in Japan  
-Hydrogen Safety-**

**Japan Automobile Standards Internationalization Center  
(JASIC)**

**24-26 September, 2008**

**UN/ECE/WP29/AC3 GRSP HFCV-SGS 4<sup>th</sup> meeting**

# Concepts of Japanese technical standards regarding hydrogen gas leaks

1. Have no leaks
2. Sense and shut off hydrogen gas when leakage occurs
3. Have no accumulation and no entry of gas into the passenger compartment in the event of a leak

# Construction of Requirements

## ■ Approval of Device

Even if any other hydrogen safety system are used, the minimum number of devices shall be approved, in such a case that hydrogen leakage with their own failures can't be stopped.

## ■ Equipment and Structural Requirement

A minimum requirement about the equipment and structure to secure the safety of the vehicle and the hydrogen system shall be prescribed.

## ■ Functional Requirement

A minimum requirement about the function to secure the safety of the vehicle and the hydrogen system shall be prescribed.

## ■ Performance Requirement

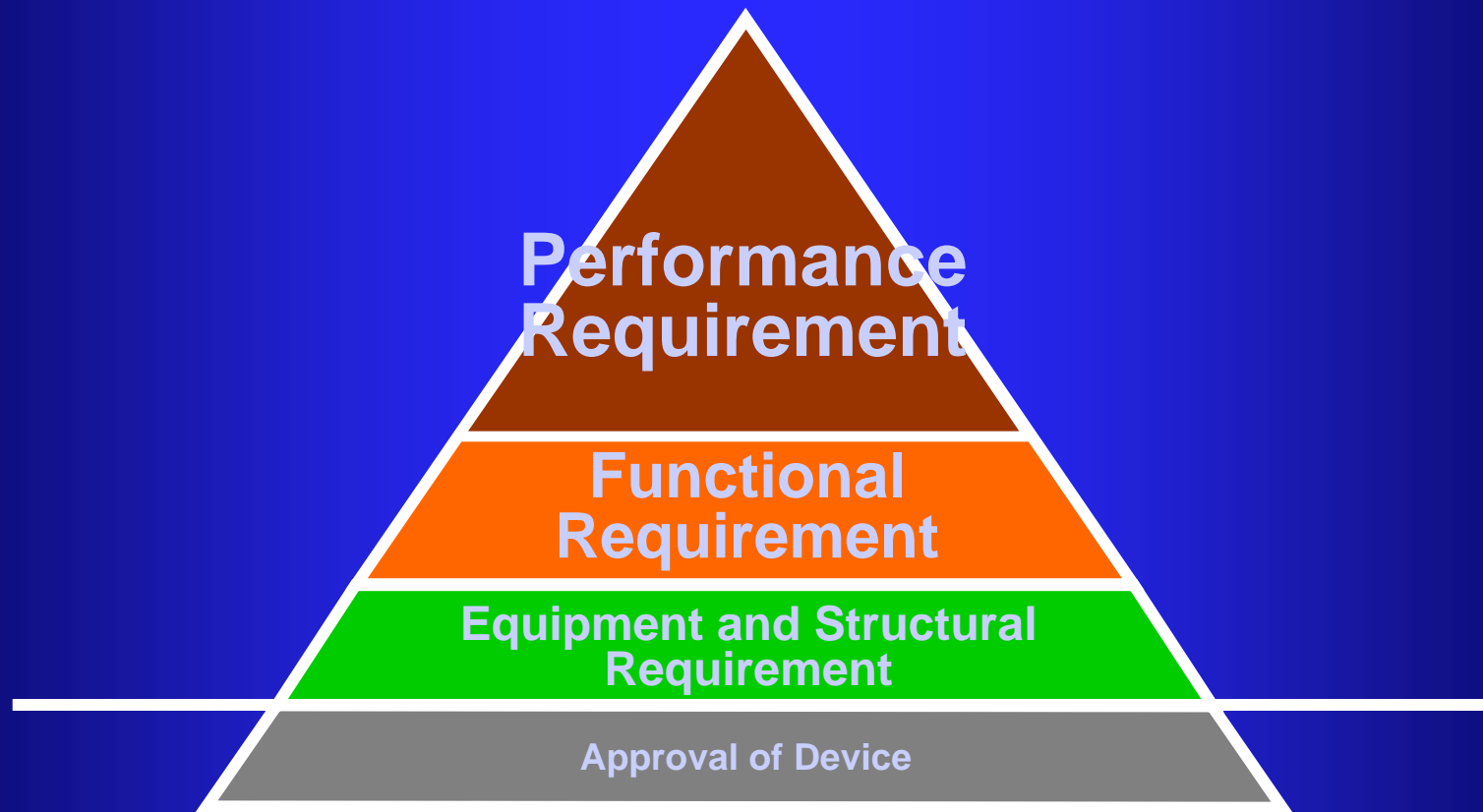
A minimum requirement about the performance to secure the safety of the vehicle and the hydrogen system shall be prescribed.

# Construction of Requirements

1. Have no leaks

2. Sense and shut off hydrogen gas when leakage occurs

3. Have no accumulation and no entry of gas into the passenger compartment in the event of a leak

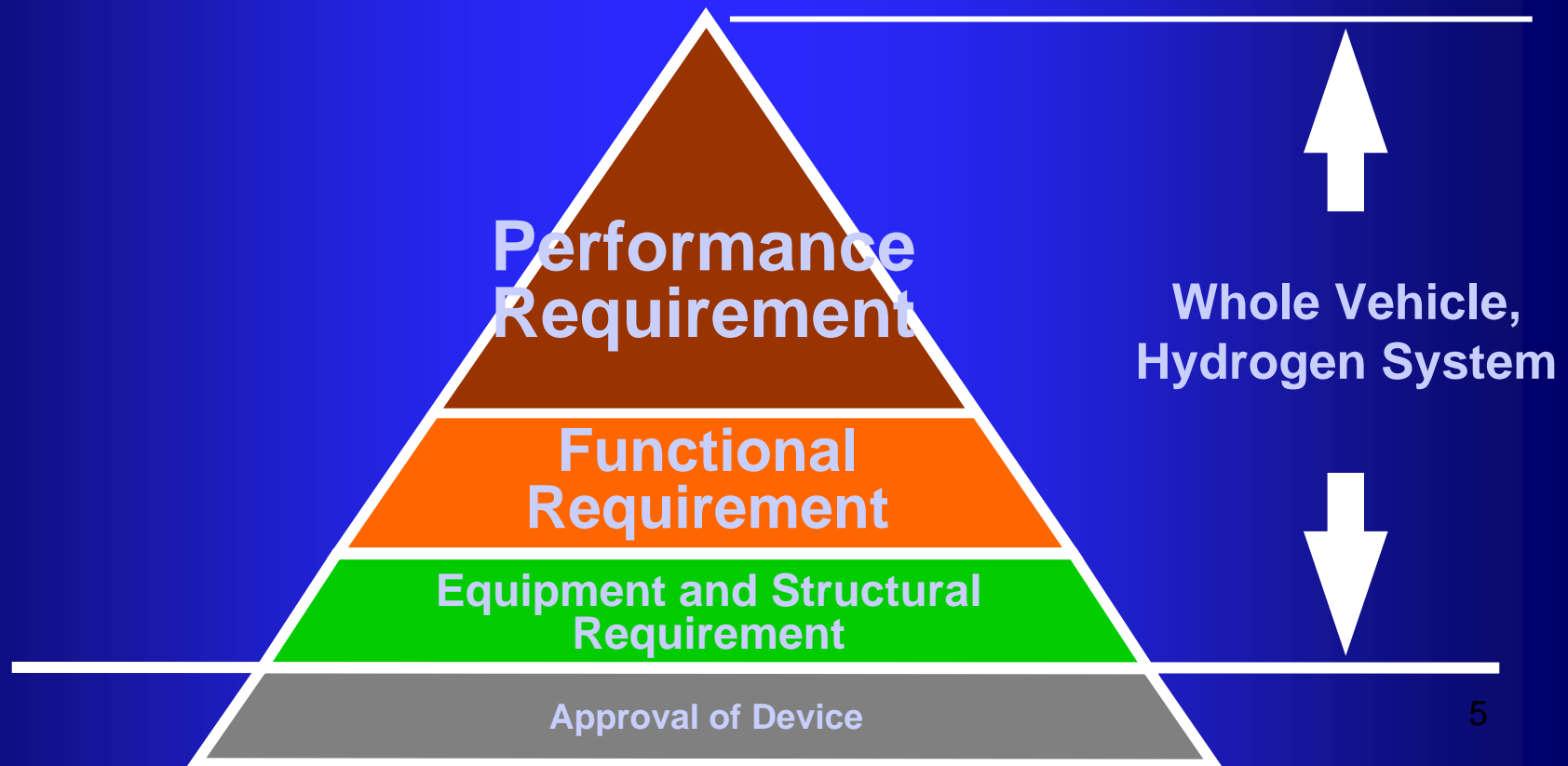


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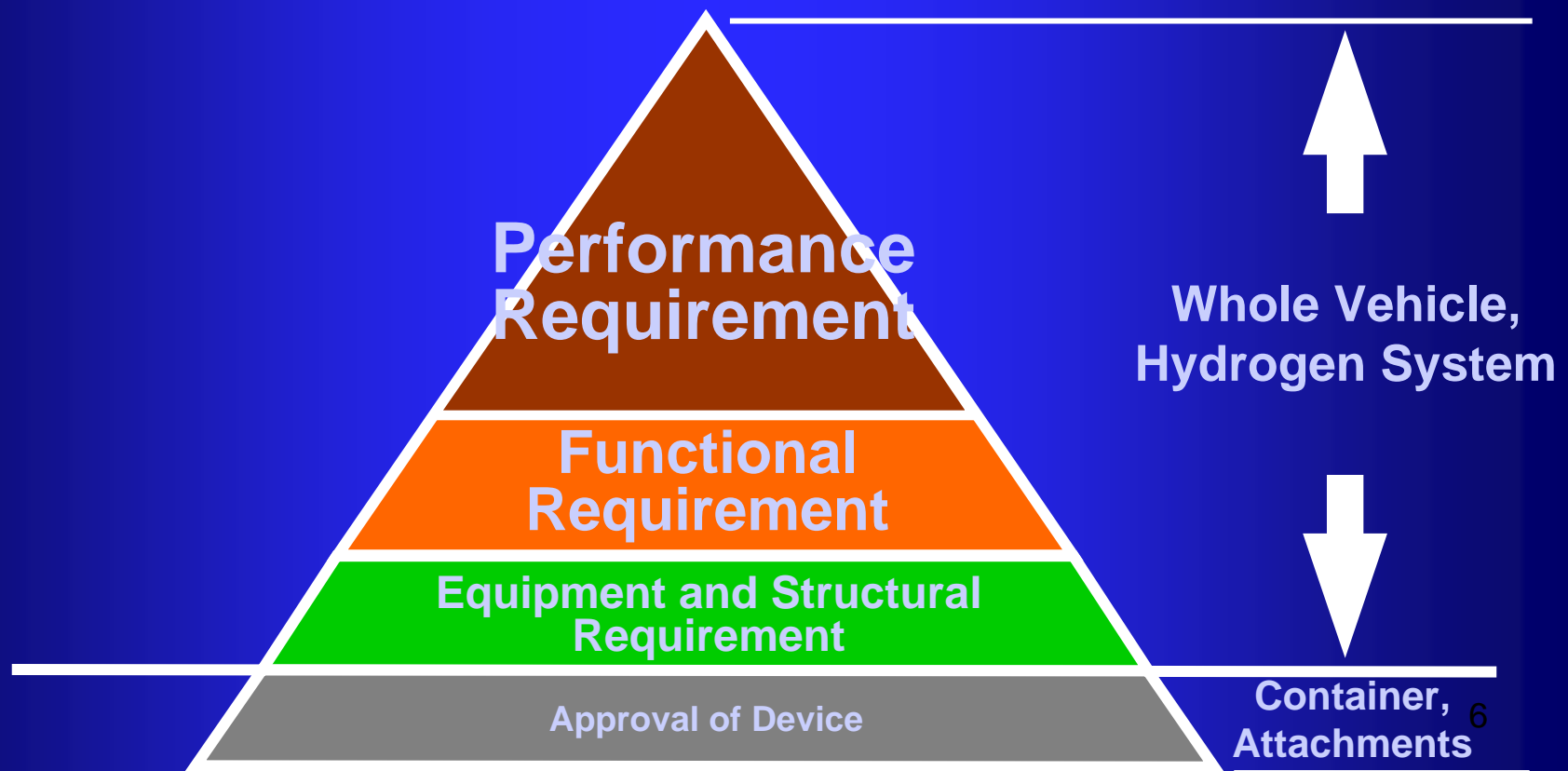


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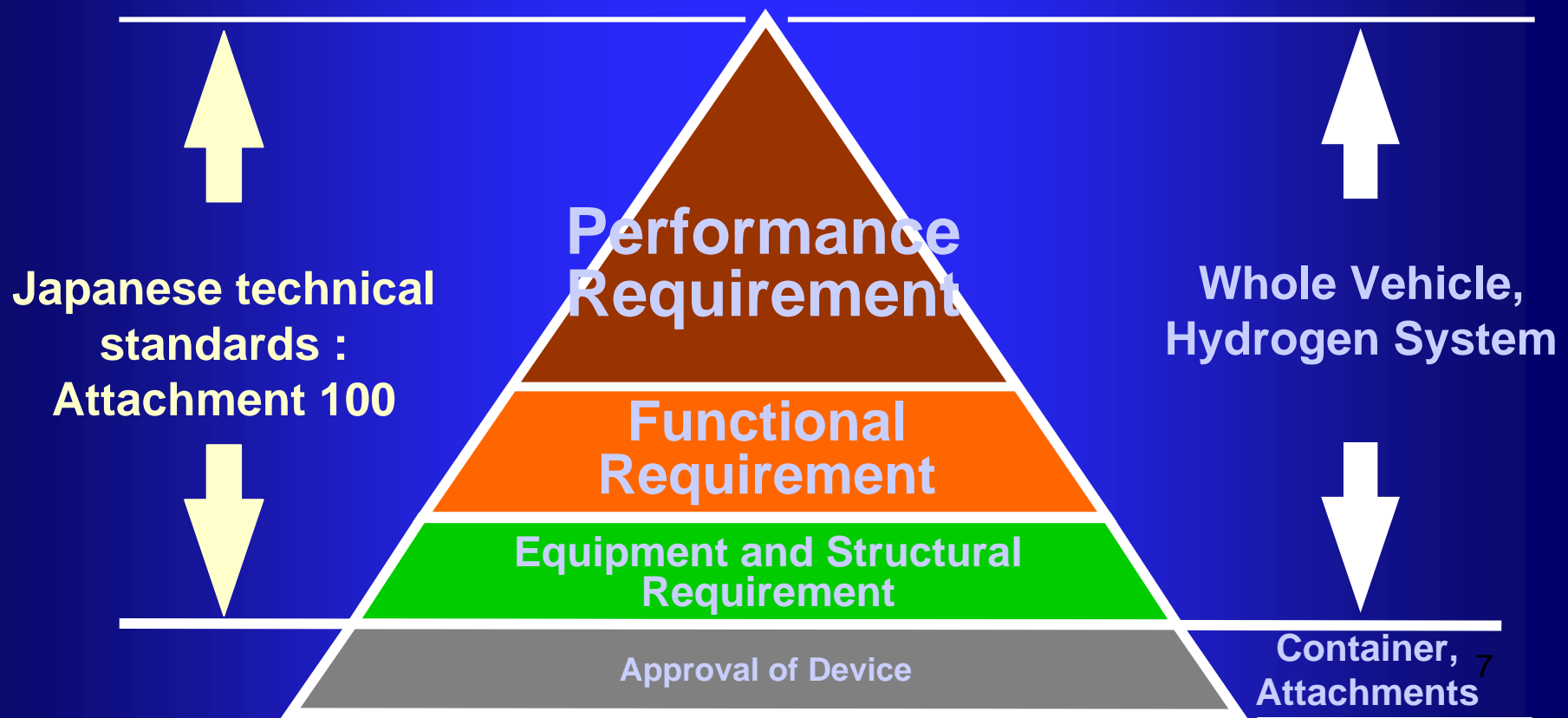


# Construction of Requirements

1. Have no leaks

2. Sense and shut off hydrogen gas when leakage occurs

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# Technical standards Attachment 100

## ■ Approval of Device

- Container and its Attachment (Main shut off valve, Container check valve and PRD) shall be approved.
- Container shall be periodically inspected in law or in service.

## ■ Equipment and Structural Requirement

### 3.1 Container attachments

- Container attachments shall be attached directly to each gas container.
- The direction of hydrogen gas discharge from PRD (...is finished the discussion and is drafting now.)

### 3.2 Excess flow valve, etc.

- One of the devices shall be provided to prevent the excess flow.

### 3.3 Pressure regulator

- The pressure regulator providing the passage to the atmosphere shall not be attached upstream of the main shut off valve.



# Technical standards Attachment 100

## ■ Equipment and Structural Requirement (continued)

### 3.4 Safety device

- A safety device capable of preventing significant over-pressure shall be provided.
- **The direction of hydrogen gas discharge from PRV (...is finished the discussion and is drafting now.)**

### 3.5 Gas containers, piping, etc.

- Gas containers, piping, etc. shall not be removed for re-fueling.
- Gas containers, piping, etc. shall not be provided in the passenger compartment, luggage compartment or other places where ventilation is not sufficient. (This provision shall not apply to cases where the gas containers, piping, etc. are housed in a housing where air-tightness and ventilation is sufficient. )
- Gas containers and piping, etc shall be protected by the cover to the external factor.
- Metal parts of the supporting fixtures for the piping shall not be in direct contact with the piping.

# Technical standards Attachment 100

## ■ Equipment and Structural Requirement (continued)

### 3.5 Gas containers, piping, etc. (continued)

- Gas piping with both ends secured shall have an appropriate bend at its midpoint, and shall be supported at an interval of 1 m or less.
- Gas containers, piping, etc. shall be protected by appropriate heat-insulating measures. Not to be exposed to direct sunlight, containers shall be provided with an adequate cover or other adequate sunshade.

### 3.6 Receptacle

- The receptacle shall be provided with check valve.
- The receptacle shall be located at least 200 mm away from exposed electrical terminals, electrical switches, and other ignition sources.

### 3.7 Air tightness, etc. of piping, etc.

- Piping, etc. shall be durable and sturdy, with air tightness from external atmosphere under nominal working pressure, allowing no gas leakage when tested for air tightness of piping, etc.

# Technical standards Attachment 100

## ■ Equipment and Structural Requirement (continued)

### 3.7 Air tightness, etc. of piping, etc. (continued)

- Piping, etc. from the receptacle to the first pressure regulator in the downstream of the gas container shall be durable and sturdy, having, in addition to the requirement prescribed in mentioned above, the pressure resistance 1.5 times the nominal working pressure, taking into account the embrittlement caused by hydrogen.

### 3.9 Detection of hydrogen gas leakage, etc.

- At least one detector of hydrogen leakage, a device that gives a warning to the driver and a device that shuts off the supply of hydrogen gas should be provided.
- The device which gives a warning to the driver when a hydrogen gas detector fails shall be provided.

### 3.10 Pressure gauge and fuel gauge

- A pressure gage or a fuel meter that pressure was compensated in hydrogen gas temperature shall be provided.

# Technical standards Attachment 100

## ■ Functional Requirement

### 3.1 Container attachments

- The main shut off valve shall be operated electromagnetically, and shall be normally closed when the power source of its operation stops or fails.

## ■ Performance Requirement

### 3.5 Gas containers, piping, etc.

- Allowable hydrogen leakage at post crash (...is finished the discussion and is drafting now.)

### 3.7 Air tightness, etc. of piping, etc.

- Piping, etc. shall be durable and sturdy, with air tightness from external atmosphere under nominal working pressure, allowing no gas leakage when tested for air tightness of piping, etc.

# Technical standards Attachment 100

## ■ Performance Requirement (continued)

### 3.7 Air tightness, etc. of piping, etc. (continued)

- Piping, etc. from the receptacle to the first pressure regulator in the downstream of the gas container shall be durable and sturdy, having, in addition to the requirement prescribed in mentioned above, the pressure resistance 1.5 times the nominal working pressure, taking into account the embitterment caused by hydrogen.

### 3.8 Purge

- Hydrogen concentration of the purge gas discharged in the atmosphere shall not exceed 4% in air by volume at the discharge point .  
( ...is discussing now.)

### 3.9 Detection of hydrogen gas leakage, etc.

- Give a warning to the driver, and shut off the supply of hydrogen gas when hydrogen concentration 4% in air is detected.

**End**