# DEPARTMENT OF TRANSPORTATION

# National Highway Traffic Safety Administration

# 49 CFR Part 571

[Docket No. 93-02; Notice 10]

### RIN 2127-AF47

## Federal Motor Vehicle Safety Standards; Compressed Natural Gas **Fuel Containers**

**AGENCY:** National Highway Traffic Safety Administration (NHTSA), Department of Transportation (DOT). **ACTION:** Final rule, petitions for reconsideration.

**SUMMARY:** This document responds to petitions for reconsideration of the final rule that established performance requirements for compressed natural gas (CNG) fuel containers. The final rule specified burst test safety factors of up to 3.33 for use in evaluating the strength of carbon fiber containers. In an initial notice responding to the petitions, a single, lower safety factor of 2.25 was adopted, subject to further consideration of that issue. This final rule reaffirms that decision. Today's document also responds to the other issues raised in the petitions.

DATES: Effective Date: August 23, 1995. Petitions for Reconsideration: Any petition for reconsideration of this rule must be received by NHTSA no later

than August 23, 1995. **ADDRESSES:** Petitions for reconsideration of this rule should refer the Docket number referenced at the beginning of this document and should be submitted to: Administrator, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590.

FOR FURTHER INFORMATION CONTACT: Mr. Garv R. Woodford, NPS-01.01, Special Projects Staff, Office of Safety Performance Standards, National Highway Traffic Safety Administration, 400 Seventh Street SW., Washington, D.C. 20590 (Telephone 202-366-4931) (FAX 202-366-4329).

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# I. Final Rule Establishing FMVSS No. 304

On September 26, 1994, NHTSA published a final rule addressing the safe performance of compressed natural gas (CNG) containers 1 (59 FR 49010). The final rule established a new Federal motor vehicle safety standard (FMVSS) FMVSS No. 304, Compressed Natural Gas Fuel Container Integrity, that specifies pressure cycling, burst, and bonfire tests for the purpose of ensuring the durability, initial strength, and venting of CNG containers. The pressure cycling test evaluates a container's durability by requiring a container to withstand, without any leakage, 18,000 cycles of pressurization and depressurization. This requirement helps to ensure that a CNG container is capable of sustaining the cycling loads imposed on the container during refuelings over its entire service life. The burst test evaluates a container's initial strength and resistance to degradation over time. This requirement helps to ensure that a container's design and material are appropriately strong over the container's life. The bonfire test evaluates a container's ability to relieve internal pressure, primarily pressure

due to temperature rise. In addition, the final rule specifies labeling requirements for CNG fuel containers. FMVSS No. 304 took effect on March 27, 1995.

The new FMVSS is patterned after the American National Standards Institute's (ANSI's) voluntary industry standard known as ANSI/NGV2. ANSI/NGV2 and FMVSS No. 304 specify detailed material and other requirements for four different types of containers. A Type 1 container is a metallic noncomposite container. A Type 2 container is a metallic liner over which an overwrap such as carbon fiber or fiberglass is applied in a hoop wrapped pattern over the liner's cylinder sidewall. A Type 3 container is a metallic liner over which an overwrap such as carbon fiber or fiberglass is applied in a full wrapped pattern over the entire liner, including the domes. A Type 4 container is a nonmetallic liner over which an overwrap such as carbon fiber or fiberglass is applied in a full wrapped pattern over the entire liner, including the domes.

For each type of container, ANSI/ NGV2 and FMVSS No. 304 specify a unique safety factor for determining the internal hydrostatic pressure that the container must withstand during the burst test. The safety factors range from 2.25 to 3.50, depending on the material and design involved. The higher the safety factor, the more material is needed to comply with the requirement. To satisfy this aspect of ANSI/NGV2 and FMVSS No. 304, a container must meet the applicable material and manufacturing requirements as well as the burst test.

While FMVSS No. 304 followed ANSI/NGV2 in most respects, it departed from ANSI/NGV2 in requiring that carbon fiber containers comply with the burst tests based on higher safety factors. Specifically, the final rule establishing FMVSS No. 304 specified a safety factor of 2.50 for Type 2 containers and 3.33 for Type 3 and Type 4 containers. In contrast, ANSI/NGV2 specifies a safety factor of 2.25 for all carbon fiber containers.

# **II. Petitions for Reconsideration**

NHTSA received 133 petitions for reconsideration of the final rule that established FMVSS No. 304. The petitions were submitted by CNG container manufacturers, vehicle manufacturers, natural gas utilities, research and testing laboratories, and Canada and several of its provincial governments.

Most of the petitioners addressed the carbon fiber safety factors. Many of them stated that the levels specified by the agency in the final rule are higher

<sup>&</sup>lt;sup>1</sup>When used as a motor fuel, natural gas is stored on-board a vehicle in cylindrical containers at a pressure of approximately 20,684 kPa (3,000 psi). Among the terms used to describe CNG fuel containers are tanks, containers, cylinders, and high pressure vessels. The agency will refer to them as 'containers'' throughout this document.