

purpose of FMVSS No. 123 is to minimize accidents caused by operator error in responding to the motoring environment, by standardizing certain motorcycle controls and displays.

Among other requirements, FMVSS No. 123 (at S5.2.1, Table 1) requires the control for a motorcycle's rear brakes to be located on the right side of the motorcycle and be operable by the rider's right foot. Section S5.2.1 at Table 1 also requires the control for a motorcycle's front brakes to be located on the right handlebar.

Although the rear brake control is generally operated by the rider's right foot, FMVSS No. 123 permits a "motor-driven cycle"¹ to have its rear brake controlled by a lever on the left handlebar. FMVSS No. 123 also states that, if a motorcycle has an "automatic clutch" (*i.e.*, a transmission which eliminates the need for a clutch lever) and a supplemental rear brake control (in addition to the right foot control), the supplemental control must be located on the left handlebar. If a motorcycle is equipped with a single control for both the front and rear brakes, that control must be located and operable in the same manner as a rear brake control.

II. How Did This Rulemaking Begin?—Vectrix Petition

In a letter dated November 4, 1998, the Vectrix Corporation of New Bedford, Massachusetts, manufacturers of electric scooters, petitioned for rulemaking to change the rear brake control requirement in FMVSS No. 123 to permit the "rear brake to be actuated by the left hand for vehicles with an automatic or fixed ratio [single speed] transmission."

The regulatory change proposed in Vectrix's petition would result in any motorcycle (not just a motor-driven cycle) having its rear brake control on the left handlebar, as long as a clutch lever (which otherwise would have to be placed on the left handlebar) was not present. Vectrix stated the following about motorcycles without clutch levers:

[T]he left hand of the rider is free to operate a brake lever, making the foot pedal mechanism unnecessary. Left hand braking is also more desirable from the standpoint of international harmonization, since motorcycles and scooters with automatic or fixed ratio transmissions sold in Europe and Asia have rear brake controls mounted on the left handlebar. The rear brake pedal required for sale in the United States would not meet with much acceptance in European and Asian markets, and manufacturers seeking to

sell products both domestically and abroad face the unnecessary complication of producing two separate models.

In a letter dated August 29, 2002, NHTSA granted Vectrix's petition for rulemaking.

III. Why NHTSA Granted This Petition—Petitions for Temporary Exemption

NHTSA decided to grant Vectrix's petition for rulemaking in light of a number of recent petitions we have received requesting temporary exemption from the rear brake location requirement of FMVSS No. 123. Since 1999, we have granted several petitions for temporary exemption from the brake control location requirements.² These petitions have come from manufacturers of scooters with automatic transmissions and handlebar-mounted brake controls, which is a common arrangement for scooters sold in Europe, Asia, and other parts of the world outside of the United States. These manufacturers wished to sell their scooters in the United States but were prevented from doing so by the requirement that motorcycles be equipped with a right foot control for the rear brake. Their scooters would be able to meet all other Federal motor vehicle safety standards applicable to motorcycles.

A. Aprilia's Petition for Temporary Exemption

Aprilia S.p.A. of Noale, Italy, was the first manufacturer to petition for a temporary exemption from S5.2.1 (Table 1) of FMVSS No. 123. For the rear brakes, Aprilia's Leonardo 150 motorcycle had a left handlebar control, not the right foot control specified in FMVSS No. 123. Aprilia petitioned to be permitted to use the left handlebar as the location for the rear brake control for the Leonardo 150. The Leonardo's 150 cc engine produces more than the five horsepower maximum permitted for motor-driven cycles, so that it could not

have its rear brake controlled by a lever on the left handlebar. According to Aprilia, the frame of the Leonardo "has not been designed to mount a right foot operated brake pedal, which is a sensitive pressure point able to apply considerable stress to the frame, causing failure due to fatigue * * *" Aprilia, as a motor vehicle manufacturer new to the U.S. market, stated that it "intends to begin sales into the United States for market testing purposes during the 1999 sales year and would like to present a model line including the Leonardo 150 motorcycle." Without NHTSA's grant of a temporary exemption from S5.2.1, of FMVSS No. 123, Aprilia would not have been able to sell the vehicle in the United States. Aprilia requested an exemption for calendar years 1999 and 2000.

B. Motorcycle Crash Causation Studies

When NHTSA received Aprilia's petition, there was little current information available on motorcycle crashes with adequate detail to identify important issues such as to what extent riders' unfamiliarity with motorcycle controls results in crashes. Earlier studies in the area of motorcycle crash causation indicated that ineffective use of brakes is a problem area for crash-involved motorcyclists. NHTSA's 1981 Report on Motorcycle Accident Causation (DOT-HS-805-862), which is still the most comprehensive study of motorcycle crashes, cites lack of rider experience with the motorcycle as an important cause of crashes. Lack of rider experience may include unfamiliarity with the controls. The report's in-depth review of 900 cases showed that riders lacked emergency braking skills, used front and rear brakes together in only 17 percent of the crashes and used the rear brake alone in 18.5 percent of the crashes. After reviewing crash information and conducting interviews, the report concluded that riders failed to use basic motorcycle riding skills during emergencies. The report suggested that the most obvious non-regulatory solution to riders' poor brake application skills was for riders to gain more experience and training for emergencies.

In a 1998 paper titled "Motorcycle Braking Controls—An Ergonomic Dilemma,"³ Rudolph G. Mortimer of the University of Illinois, Urbana-Champaign, pointed out that in the instant of an emergency, riders often do not use the front brake effectively. Mortimer concluded that motorcyclists often favored the rear, foot-operated

¹ "a motorcycle with a motor that produces five brake horsepower or less" (49 CFR section 571.3)

² (1) Aprilia: Leonardo 150 sport (64 FR 44264, 8/13/99); Scarabeo 150 touring, reissued (65 FR 1225, 01/07/00); Habana 150 cruiser (66 FR 59519, 11/28/01).

(2) Vectrix: Electric scooter (64 FR 45585, 8/20/99).

(3) Italjet S.p.A.: Torpedo 125, Formula 125, Millenium 125, and Millenium 150 (64 FR 58127, 10/28/99).

(4) Piaggio: Vespa ET4 125 and 150 (65 FR 64741, 10/30/00).

(5) Honda: NSS250 (65 FR 69130, 11/15/00); FJS600 (66 FR 59519, 11/28/01).

(6) Rex Products, Inc. dba Bajaj USA: Saffire 90cc (66 FR 39222, 7/27/01).

Grant of these petitions has allowed the manufacturers to sell up to 2500 of each noncomplying scooter in the United States during the two-year period of exemption.

³ Proceedings of the Silicon Valley Ergonomics Conference and Exposition, ErgoCon '98.