

Title: Lives Saved by Vehicle Safety Technologies and Associated Federal Motor Vehicle Safety Standards, 1960 to 2012 – Passenger Cars and LTVs
Report number: DOT HS 812 069
Report Date: January 2015
Sponsoring Agency: National Highway Transportation Safety Association (NHTSA)
Author: Charles J. Kahane, Ph.D.
Reference: FMVSS 108: Conspicuity tape for heavy trailers
Reference pages: xxxii, 199, 246, 249, 251, and 252 of report DOT HS 812 069
Website: <http://www-nrd.nhtsa.dot.gov/Pubs/812069.pdf>

Abstract:

NHTSA began in 1975 to evaluate the effectiveness of vehicle safety technologies associated with the Federal Motor Vehicle Safety Standards (FMVSS). By June 2014, NHTSA had evaluated the effectiveness of virtually all the life-saving technologies introduced in passenger cars, pickup trucks, SUVs, and vans from about 1960 up through about 2010. A statistical model estimates the number of lives saved from 1960 to 2012 by the combination of these life-saving technologies. Fatality Analysis Reporting System (FARS) data for 1975 to 2012 documents the actual crash fatalities in vehicles that, especially in recent years, include many safety technologies. Using NHTSA’s published effectiveness estimates, the model estimates how many people would have died if the vehicles had not been equipped with any of the safety technologies. In addition to equipment compliant with specific FMVSS in effect at that time, the model tallies lives saved by installations in advance of the FMVSS, back to 1960.

Key Findings

NHTSA estimates the lives of 1,524 car occupants and 1,136 light trucks and vans (LTVs) occupants (for a total of 2,660 persons) were saved from 1960 through 2012 by conspicuity tape on heavy trailers including from the period of 1983 to 1985 a 21 percent reduction in the dark and 16 percent reduction in daylight.

Study Summary

Automobiles and LTVs share the road with large vehicles that are dangerous obstacles when they are at a cross road or stopped. Heavy trailers [also called semi-trailers or “semis”] are difficult for drivers of other vehicles to see in the dark and even more difficult to recognize what they are. Most trailer sides are barely visible until they suddenly emerge in front of the driver, frequently too late to stop or avoid a collision.

According to the Federal Highway Administration, traffic fatalities are three times higher at night than in the day. One of the major causes is drivers do not have the visual cues to their surroundings they have in daylight. A semi may have rear running lights and side clearance

lights but those devices aren't always visible or may not be working, and an oncoming driver may not see enough of them to realize, "There's a heavy trailer ahead of me."

The life-saving technology associated with FMVSS No. 108 is the red-and-white conspicuity tape on heavy truck trailers. Although this tape is furnished on heavy trailers, not cars or LTVs, it is the occupants of cars and LTVs who primarily benefit, because it helps them avoid hitting the trailers in the dark. The tape began to appear on substantial numbers of trailers by 1991, and it has saved an estimated 2,660 car/LTV occupants, including 161 in 2012 alone. (pg. 249)

During the 1980s over 500 deaths a year were caused by collisions between automobiles and heavy trailers at night. A series of road tests of conspicuity tapes from 1983 to 1985 showed significant reductions in rear and side collisions resulted from use of the tape: 21 percent reduction in the dark and, unexpectedly, a 16 percent reduction in daylight.

The U.S. National Highway Traffic Safety Administration (NHTSA) updated FMVSS 108 to require conspicuity tapes on all over-the-road trucks and trailers beginning in June 2001. NHTSA estimates the lives of 1,524 car occupants and 1,136 LTV occupants (for a total of 2,660 persons) were saved from 1960 through 2012 by conspicuity tape on heavy trailers. NHTSA's 2001 evaluation estimates that the tape would prevent approximately 7,800 police-reported crashes per year and save 191 to 350 lives.

Conspicuity tapes rely on a property called "retroreflection" which occurs when light is returned (reflected) back to its source. For retroreflective sheeting used in traffic safety applications, light return can be achieved with tiny glass beads that focus light to a mirror layer, or through advanced prismatic technology that bounces light off the walls of microscopic cube corners. Prismatic materials, such as the material used in 3M conspicuity tapes, are much more efficient at returning light to its source.

The retroreflective traffic sign material was invented by 3M in 1939 and patented as Scotchlite™ Reflective Sheeting for highway markings. Since that time, 3M has been a world leader in developing products for traffic safety and road management.

3M™ Diamond Grade™ Conspicuity Markings are highly retroreflective tapes developed specifically to mark the sides and rear of vehicles for enhanced visibility and detection.



Traffic Safety and Security Division
3M Center, Building 225-04-N-14
St. Paul, MN 55144-1000
www.3m.com/roadwaysafety