

The Effectiveness of Retroreflective Tape on Heavy Trailers

NHTSA Technical Report

DOT HS 809 222

FMVSS 108

Lamps, Reflective Devices, and Associated Equipment



Reprinted with permission of Great Dane Trailers.

Data Collection

- Florida Highway Patrol (FHP)
 - June 1, 1997 – May 31, 1999
- Pennsylvania State Police (PSP)
 - December 1, 1997 – November 30, 1999
- Police Accident Report (PAR) and NHTSA
“Green”

Total Number of Cases

- 10,959 Crashes
 - 6,095 from Florida
 - 4,864 from Pennsylvania
- 11,793 Tractor-Trailer Combination Vehicles
 - 6,444 from Florida
 - 5,349 from Pennsylvania

Basic Analysis

■ Three Critical Parameters

– Trailer Treatment

- » Whether or not the trailer is tape-equipped

– Light Conditions

- » Dark (dark-not-lighted, dark-lighted, dawn & dusk) vs. daylight

– Crash Mode/Point of Impact

- » Relevant vs. non-relevant crashes

- Relevant – side and rear impacts

- Non-relevant – single-vehicle crashes and frontal impacts

Overall Tape Effectiveness

(Reduction of Side and Rear Impacts into Trailers)

- In dark conditions (includes dark-not-lighted, dark-lighted, dawn, and dusk)
- Florida & Pennsylvania
 - 29 percent
 - Statistically significant at 0.01 level
- Florida
 - 18 percent
 - Statistically significant at 0.05 level
- Pennsylvania
 - 38 Percent
 - Statistically significant at 0.01 level

Tape Effectiveness by Light Conditions

	FL & PA		FL		PA	
Dark-Not-Lighted	41%	S	37%	S	44%	S
Dark-Lighted, Dawn, & Dusk	-3%	NS	-18%	NS	19%	NS

S – Statistically significant at 0.01 level.

NS – Not statistically significant.

Tape Effectiveness by Impact Point

	FL & PA		FL		PA	
Rear Impacts						
Dark	43%	S	47%	S	34%	S
Dark-Not-Lighted	51%	S	55%	S	43%	S
Side Impacts						
Dark	17%	S*	-1%	NS	41%	S
Dark-Not-Lighted	32%	S	25%	S*	43%	S

S* - Statistically significant at 0.05 level.

Tape Effectiveness by Weather Conditions

Clear	FL & PA	
Dark	28%	S
Dark-Not-Lighted	43%	S
Rain and Fog		
Dark	31%	S*
Dark-Not-Lighted	39%	S*
Snow and Sleet		
Dark	-12%	NS
Dark-Not-Lighted	-17%	NS

Tape Effectiveness by Trailer Type

Trailer Type	FL & PA	
Van		
Dark	11%	NS
Dark-Not-Lighted	25%	S
Flatbed		
Dark	55%	S
Dark-Not-Lighted	63%	S

Tape Effectiveness in Rear Impacts by Tape Condition on the Rear of Trailers

Rear Impact Analysis	FL & PA	
Clean Tape		
Dark	53%	S
Dark-Not-Lighted	62%	S
Dirty Tape		
Dark	27%	S
Dark-Not-Lighted	33%	S

Tape Effectiveness by Other Driver's Age

15-50 years old	FL & PA	
Dark	44%	S
Dark-Not-Lighted	58%	S
More than 50 years old		
Dark	20%	NS
Dark-Not-Lighted	10%	NS

Tape Effectiveness by Crash-Level Injury Severity

Not Injured	FL & PA	
Dark	6%	NS
Dark-Not-Lighted	14%	NS
Fatal or Injury Crash		
Dark	44%	S
Dark-Not-Lighted	55%	S

Benefits

- When all heavy trailers have conspicuity tape, the tape will prevent approximately (relative to a trailer fleet without tape):
 - 7,800 crashes per year
 - 3,100 to 5,000 injuries per year
 - 191 to 350 fatalities per year