

## Cargo Securement Standards and Braking Maneuvers

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**Abstract :** Road safety is affected by many factors, involving the vehicle, the infrastructure, and the environment. Many efforts have been thus made to improve road safety through rational standards for the different systems involved in freight transportation. Cargo shifting and falling have been recognized as critical and contributive effects for road crashes. To avoid such situations, regional and international standards have been implemented, aiming to prevent such types of cargo-related accidents. In particular, there are specific compulsory standard requirements to maintain the cargo on the vehicle without shifting, when the vehicle performs an emergency braking maneuver. In this paper, a simulation is presented to analyze the effect of the vibration of the cargo on the braking distance of the vehicle. Such vibration can lead to a poor cargo restraining, and higher braking efficiency, as a result of the decoupling of the cargo mass from the vehicle mass. Such higher braking efficiency, on the order of 4.4%, further suggests a greater demand for the current braking standards.

**Keywords :** road safety, cargo securement, shifting cargo, vehicle dynamics, ABS

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