



SAFETY ALERT

July 2022

Cardan shaft park brake failures

This safety alert provides information on the risks associated with Cardan shaft parking brakes, the dangers that owners and drivers must be aware of and the precautions that should be taken to prevent a vehicle rolling away.

Waka Kotahi NZ Transport Agency has issued this safety alert because there have been several incidents where the Cardan shaft park brake has failed and the vehicle has rolled away. In the last 10 years four of these incidents have resulted in fatalities, and we are aware of other unreported incidents.

Cardan shaft park brakes (also known as driveshaft or transmission type park brakes) are fitted to many small to medium trucks and a small number of passenger service vehicles. They are designed to hold the vehicle and its load but have limitations which can lead to a vehicle rolling away.

Key points to note:

- Due to the design of the brake, the vehicle may roll away when parked on a slope, especially if the load is changing and/or the vehicle is parked on an unstable surface.
- Avoid parking on slopes or use wheel chocks when parked on a slope and when the vehicle is jacked.
- You need to understand the brake mechanism and its limitations.
- Vehicle owners are responsible for ensuring the brake is serviced regularly to maintain performance.



Photo courtesy of TR Group

Parking vehicles safely

- Vehicles can roll away on a slope and there is no guarantee the brake will hold if the load changes.
- Avoid parking on slopes or use wheel chocks when parked on a slope and when the vehicle is jacked.

Using wheel chocks:

- Stop the vehicle, firmly apply the parking brake but continue to hold the vehicle stationary using the foot brake.
- Have another person install chocks in front of or behind the rear wheels (depending on vehicles direction on the slope).
- The person installing the chocks must avoid putting themselves in a position where they are vulnerable to any vehicle movement.
- To remove the chocks, move the vehicle clear of the chocks then have another person pick them up and store them in the vehicle, while the driver holds the vehicle stationary using the foot brake.
- Leaving the vehicle in gear and/or turning the front wheels to the kerb may help, but on its own may not prevent a vehicle from rolling away.
- The park brake lever pull force required increases with slope and additional weight on the vehicle, therefore it is important that sufficient force is used when applying the brake. This differs from other park brake systems where the maximum braking power is available each and every time the parking brake is activated.
- The vehicle should not be parked on surfaces that do not provide good grip for the tyres, such as gravel, mud or snow as slippage of one wheel can allow the other wheel to turn which could result in the vehicle rolling away.
- Towing another vehicle or trailer will exceed the holding capacity of the park brake so must not be used to hold both vehicles on any surface.

Engaging the brake properly

- The park brake must be fully engaged to the manufacturer's recommended setting. The park brake

lever may require more force than an operator is used to, especially if they don't use a vehicle with this type of park brake regularly.

- If the weight of the vehicle is increased through loading, the amount of braking initially applied may not be enough to hold the heavier vehicle and it may roll away. These types of vehicles are designed to carry heavy loads and when loaded the weight may be over double the unloaded weight.
- Don't engage the park brake while the vehicle is moving as this may damage it. This damage is unlikely to be obvious.

Owner's responsibilities

Owners must ensure that any person driving their vehicle:

- knows that it is fitted with a Cardan shaft park brake
- is fully aware of the limitations and dangers of these brakes
- is aware of the safety precautions that must be taken when parking the vehicle
- knows that the park brake must not be applied when the vehicle is moving
- understands that the park brake control lever may require more force than a driver is used to, especially if they usually drive a vehicle with a switch activated or lever park brake.

Owners should also make sure that:

- the parking brake is regularly maintained and adjusted in accordance with the manufacturer's instructions
- the parking brake is regularly inspected to ensure that it is not being contaminated by oil leaks from the engine or gearbox.
- there is a copy of this safety alert in the vehicle
- a warning sticker is clearly visible
- a set of chocks is available in the vehicle for use.

Service and maintenance

The location of Cardan shaft brakes makes them susceptible to contamination, especially from a leaking gearbox output seal. Contamination degrades the effectiveness of the brake and this will not be visible.

Keeping to the manufacturers recommended maintenance schedule and adjustment techniques will help brake performance. Likewise, inadequate maintenance and poor brake adjustment will substantially degrade the performance of the parking brake system.

The key areas to focus your maintenance on are the:

- foundation brake
- actuation system (cables/levers)
- adjustment.

Design and capability

It is important that owners and drivers understand the design, function and use of Cardan shaft park brakes. Mechanics must be able to correctly diagnose, maintain and adjust these to the manufacturer's specifications.

Safety risks can result from a lack of understanding about how to operate and maintain the brake correctly.

Cardan shaft park brakes use a foundation brake system, generally a single drum brake unit mounted to the gearbox housing. This acts directly on the driveshaft of the vehicle to provide the park brake function.

This type of park brake system usually consists of:

- a lever mounted to the floor or dashboard within easy reach of the driver - this provides the operating force
- a linkage or cable system running from the lever to the brake unit
- an actuator connected to the linkage or cable system
- friction material attached to the brake shoes or disc pads to provide the holding power
- a drum unit with a friction surface for the friction material to act on, bolted directly to the drive shaft
- generally, there will also be a device or mechanism for adjustment of the foundation brake and cable or linkages, there may also be an inspection port to check the condition of the brake.

Important information CoF requirements

The current CoF stall test does not adequately assess parking brake performance. It is expected to be replaced by a more rigorous roller brake machine test from 1 October 2022 for most classes of vehicle with Cardan shaft brakes.

CoF requirements will also be updated to make it mandatory to have a warning sticker displayed in the cab.

It is the owner's responsibility to ensure the park brake is kept in good condition through maintenance. Owners and drivers should not assume that a current Certificate of Fitness (CoF) ensures the brake will be fully operational in all circumstances

A previous Cardan shaft park brake alert was issued by WorkSafe.

www.worksafe.govt.nz/about-us/news-and-media/driveshaft-parking-brake-failures-in-commercial-and-industrial-vehicles

More information

For more information on Cardan shaft park brakes, visit: www.nzta.govt.nz/cardanbrakes