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Driveshaft parking brake failures in commercial and industrial vehicles

This technical bulletin is aimed at owners and operators of trucks and plant fitted with Cardan shaft parking brakes.

This bulletin has been developed in consultation with, and is endorsed by the Commercial Vehicle Safety Team of the New Zealand Police, and the New Zealand Transport Agency (NZTA).

Background

WorkSafe New Zealand has recently investigated incidents of driveshaft parking brakes failing to keep vehicles stationary.

Driveshaft (also known as Cardan shaft) parking brakes are fitted as original equipment to some small, medium and heavy trucks. They are also fitted to other vehicles, including commercial and industrial vehicles, such as telehandlers.

Driveshaft parking brakes are available as either drum brakes or disc brakes and unlike wheel-mounted parking brakes, act on a single drum or disc attached to the drive shaft of the vehicle. (If you're unsure about your vehicle, ask your mechanic.)

Failures of this type of brake are usually attributed to design, poor maintenance, or misuse.

Design-related failures

- Exceeding the capability of the parking brake by altering the loading of the parked vehicle after the parking brake was set (eg loading equipment onto the vehicle, emptying a truck-mounted tank, or operating truck-mounted equipment).

- Loss of traction or grip at one of the rear wheels while parked on a slope (eg one wheel set parked on grass or other loose surface and the other on a sealed surface). Because the brake acts on the driveshaft, the vehicle's differential still may allow one wheel to rotate freely.

Use and maintenance-related failures

- User failing to fully engage the parking brake (the hand lever may require around 60 kg of force when vehicle is fully laden).
- Brake failure due to wear or misalignment of the brake mechanism, cable stretch etc.
- Oil leaking onto the parking brake (eg a leaking engine or transmission seal).
- Premature wear of the friction material (eg by driving the vehicle without fully disengaging the parking brake).
- Damaging the parking brake (eg engaging the parking brake while the vehicle is still moving).

Controls

If this type of brake is correctly maintained and adjusted, and its limitations are understood by the operator, it can be effective. **However if its limitations are not understood, it is used or maintained incorrectly, or it's damaged, it can become ineffective.**

It is especially important in situations where the vehicle is parked on a slope and the load is being altered that the parking brake not be solely relied upon. Use wheel chocks as an additional precaution. Wheel chocks should be chosen to ensure their size and design will keep the vehicle stationary on the steepest slope on which the vehicle is required to be parked.

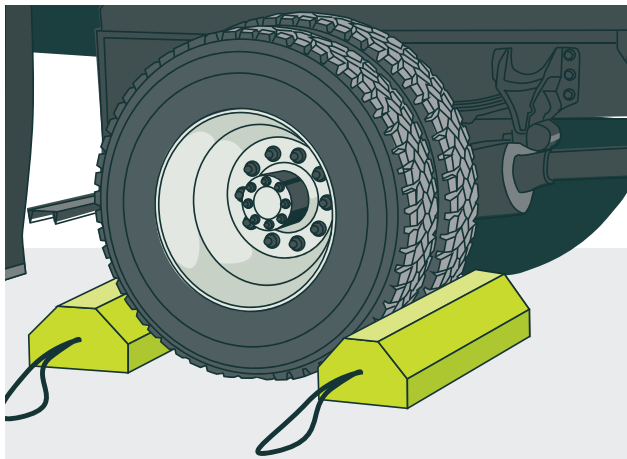


FIGURE 1:
Wheel chock

A wheel chock should be approximately 25% of the diameter of your vehicle tyre and fit snugly into the tyre (eg a 600 mm diameter tyre would require a 150 mm high wheel chock).

Operators of vehicles must:

- Identify all vehicles fitted with a driveshaft parking brake system and ensure there is a maintenance system in place to ensure the vehicles and brakes are regularly and effectively cleaned, inspected, and serviced. This should also include ensuring the operating mechanism is adjusted correctly, and that lever travel and cable stretch is accounted for.
- Ensure that all drivers are trained in and understand the limitations of driveshaft parking brakes and what they need to do to prevent damage to the brake and roll-aways, including when wheel chocks must be used.
- Ensure users are physically capable of engaging the brake fully.
- Keep personnel out of the vicinity or potential path of vehicles where a parking brake is being relied upon to hold a vehicle on a slope.

Operators should not assume that a current Certificate of Fitness (CoF) ensures the brake will be fully operational in all circumstances.

Further information

Our website has further guidance on overlapping duties, risk management, and major hazard facilities: worksafe.govt.nz