

# Tire explosions (Pyrolysis)

## Explain dangers

When a rubber tire becomes overheated, a chemical reaction in the rubber called pyrolysis can occur. Pyrolysis causes the rubber to deteriorate. At a certain point, this deterioration can create a very rapid pressure increase inside the tire that can lead to a sudden and unexpected explosion.

Pyrolysis can occur when heat is applied to a tire, such as when heating lug nuts using a blow torch.

Other heat sources include the following:

- Overheated brakes
- Aerosol tire inflators
- Welding on or near the tire
- Contact with electricity (e.g., from overhead powerlines or lightning).

Once this chemical reaction starts, it can continue on its own even after the heat source is removed. Pyrolysis can last seconds or hours. There are no visible signs when it's taking place until the explosion occurs.

Pyrolysis can occur in temperatures as low as 185°C and does not require oxygen. Nitrogen-filled tires are also at risk.

The pressure inside the tire can increase to over 7,000 kPa (1,000 psi) before an explosion occurs. Anyone standing near the explosion is at risk of serious injury or even death.

A tire can explode even if it's not sealed on the rim. During the final seconds of the reaction, there is a rapid burst of energy that can even re-seal loose tires.

Extra caution is needed when working around heavy-duty truck tires. The pressure can build up to higher levels than in tires for passenger vehicles, resulting in a larger explosion.



## Identify controls

- Avoid using a heat source on tires if possible. If a heat source must be used, deflate and unseat the tire from the rim or prop the tire seating open with a metal object such as a tire iron before doing the repair. Once completed, let the tire cool to normal temperatures and inspect the tire internally for deterioration before reseating.
- If a tire has been heated and there is concern pyrolysis could be occurring, it's safer to assume it's actually happening and take precautions. Isolate the tire for 24 hours and keep people 200 m (650 ft) away from the potential explosion area. After the 24-hour isolation period has ended, remove the tire from the rim and inspect it for deterioration or physical damage.
- If you suspect pyrolysis may have started in a vehicle from overheated brakes, fire, or electrical contact, isolate the vehicle from passersby and emergency personnel.
- Use tire inflation safety cages where practical. Note that some safety cages will not protect you from smaller projectiles.
- Re-inflate heavy truck tires remotely using a clip-on air chuck. Keep at least 3 m (10 ft) away, even if the tires are in safety cages.
- When inflating a tire, it is safer to face the tread than the rim.
- Maintain tires and brakes in accordance with the manufacturer's instructions and operating manual. Do not drive long distances with underinflated tires.

## Demonstrate

Ask workers if they have been in a situation where pyrolysis could have occurred.

Identify any current work practices that could cause tire pyrolysis at your workplace and discuss ways to reduce this hazard.