

SafetyTalk

Tire explosions (Pyrolysis)

When a rubber tire becomes overheated, a chemical reaction can cause a rapid increase in pressure inside the tire. This is called pyrolysis. As the heat and pressure increases, the rubber in the tire begins to deteriorate. At a certain point, the tire can explode.

Explain dangers

Pyrolysis can occur whenever heat is applied to a tire. Examples include:

- Heating lug nuts with a blow torch
- Overheating brakes
- Using aerosol tire inflators
- Welding on or near tires
- Contacting electrical sources (e.g., 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 for seconds or hours. There is no sign that it's taking place until the tire explodes.

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

Pyrolysis can occur when the temperature inside the tire is as low as 185°C. It does not require oxygen, so it can happen in nitrogen-filled tires.

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 re-seal loose tires.

Take extra caution 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 that's not possible, deflate and unseat the tire from the rim or prop the tire seating open with a metal object, such as a tire iron, before applying heat. When you're done, let the tire cool to a normal temperature and inspect the inside of the tire for deterioration before reseating it.
- If a tire has been heated, it's safer to assume pyrolysis is occurring and take precautions. Isolate the tire for 24 hours and keep people 200 m (650 ft) away. After 24 hours, take the tire off the rim and inspect it for deterioration or damage.
- If you suspect that pyrolysis may have started in a tire on a vehicle due to overheated brakes, fire, or electrical contact, isolate the vehicle from passersby and emergency personnel. If practical, drive the vehicle to a remote area of a parking lot. Walk away from the vehicle in the direction of the front or back rather than the side to avoid the explosion zone.
- Inflate tires inside a safety cage if practical. Note that some safety cages will not protect you from smaller projectiles.
- Inflate heavy-duty 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, face the tread rather than the rim to avoid the explosion zone.

Demonstrate

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

Point out any current practices at your workplace that could cause tire pyrolysis. Discuss ways to reduce it.

