



# SHIPPING SAFETY FOR DRONES:

## HYDROGEN FUEL CELLS

Hydrogen fuel cells are quickly becoming a new way to power drones. Safety is paramount. Compressed gases like hydrogen are dangerous goods, also known as hazardous materials, and can pose a risk when transported.

When shipping drones containing components such as lithium ion batteries and/or hydrogen fuel cylinders as cargo it's important to know that U.S. Hazardous Materials Regulations (HMR) (HMR; 49 CFR Parts 171-180) apply. Following the applicable regulations, air carrier restrictions, and adhering to manufacturer instructions will ensure the safety of all parts of the airspace system.

This document does not replace any regulation and is not considered training.

### Understanding Risks Related to Hydrogen Fuel Cells

Hydrogen fuel cells combine hydrogen gas with oxygen from the air to generate electricity, with water vapor as the only byproduct. Many fuel cell systems and drones, often called unmanned aircraft systems (UAS), also incorporate lithium batteries for auxiliary power or support functions. While these materials and systems are safe when handled properly, it's crucial to be aware of their identified hazards:

- **Hydrogen is flammable**
- **Lithium batteries can overheat, enter thermal runaway, and catch fire**

### Traveling as a Passenger

Compressed hydrogen is generally forbidden on passenger aircraft. Visit our [PackSafe entry for traveling with your drone.](#)



## Shipping Requirements

Shippers must follow the applicable HMR requirements when shipping hydrogen fuel cell systems and/or lithium batteries as cargo with or without a drone or their components. Exact requirements can vary depending on design, function, and packaging configuration. Always remember:

- You are responsible for knowing the hazard classification of the product you ship.
- Find the Safety Data Sheet (SDS), or reach out to the manufacturer of the product to confirm the product's hazard classification, if applicable.
- Any hydrogen cylinders and cartridges must be authorized for transport.
- Cylinders must be in proper condition to fill and periodically requalified by an authorized professional.
- Any unauthorized cylinder must be emptied, cleaned, and purged of all residual materials and vapors prior to transportation.
- Lithium batteries must be properly protected, tested, and packed. See additional [Lithium Battery Safety Resources](#).
- Proper hazard communication, declarations, and notifications are required.

## Authorized Cylinders

Hydrogen may only be filled and transported in authorized and compatible Department of Transportation (DOT)-specification cylinders, Canadian (CTC, CRC, BTC, and TC) equivalents, or UN (ISO)-pressure receptacles (stamped USA or CAN). Cylinders that only bear a pi-mark ( $\pi$ ) in accordance with European Directive 2010/35/EU are not authorized for transport filled, except under specific import/export conditions.

## Training & Certification

Ensure personnel preparing the drone for shipment (e.g., remote pilots or maintenance personnel) are adequately trained and certified to handle and ship hydrogen-powered drones. Training must cover applicable requirements in the HMR (see [subpart H of Part 172](#)).

### For more information, visit FAA's:

[SafeCargo](#) for Shippers

[OperateSafe](#) for Air Carriers

[PackSafe](#) for Passengers

### Still have questions?

Contact the FAA's Office of Hazardous Materials Safety at **HazmatInfo@faa.gov** or **+1 (405) 954-0088**.