

◆ **Power Train**

New and used flammable liquid powered, flammable gas powered or hybrid vehicles that contain internal combustion engines and which contain, or may have contained a flammable liquid or flammable gas fuel, are regulated for transportation as:

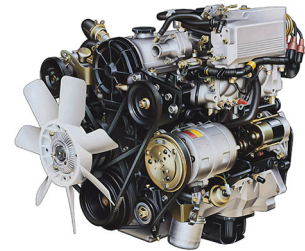
UN3166, VEHICLE, FLAMMABLE LIQUID POWERED, 9
UN3166, VEHICLE, FLAMMABLE GAS POWERED, 9

◆ **Engines**

Engines powered by gasoline or other flammable liquids are also regulated for transportation. Many new engines do not contain any fuel when shipped as new manufacturing or service parts. Therefore, these engines are not subject to the Hazardous Materials Regulations.



Conversely, there are new or used engines which contain small amounts of flammable liquids or residues (e.g., after testing), which subjects them to the hazardous materials transportation requirements.



Engines may be classified as follows (depending upon their fuel type):

UN3528, ENGINES, INTERNAL COMBUSTION, FLAMMABLE LIQUID POWERED, 3
UN3529, ENGINES, INTERNAL COMBUSTION, FLAMMABLE GAS POWERED, 2.1
UN3530, ENGINES, INTERNAL COMBUSTION, 9

New and used engines that contain less than 500 ml (16.9 fluid ounces) of flammable liquid fuel in the tank, engine components or fuel lines are *excepted* from the HMR when offered for transport by ground provided they are securely closed to prevent leakage of fuel during transportation.



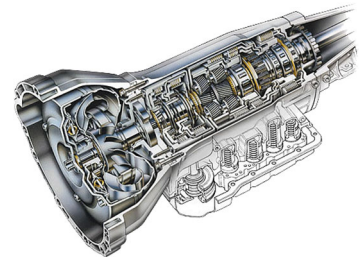
Additional restrictions including documentation and special marking/labeling requirements may apply for air or ocean transport.

Engines must be packed in strong outer, non-specification packagings, in protective enclosures (e.g., in fully enclosed wooden slatted crates, plastic clam shells) or on pallets.

Although *excepted* from the HMR for ground transport, engines may contain motor oil or lubricants which can create a hazardous condition (e.g., environmental damage, slip risk) if they leak while in transit. Accordingly, it is recommended that engines be drained of oil and other fluids, if possible, and packed in strong plastic bags with an absorbent pad to absorb any free liquid.

◆ Transmissions & Gear Boxes

Transmissions, gear boxes, drive shafts, universal joints and differentials are not regulated for transportation as hazardous materials; however, they may contain gear oil or lubricants which can create a nuisance (e.g., environmental damage, slip risk) if they leak while in transit.



Accordingly, it is recommended that transmissions, gear boxes and differentials be drained of oil and other fluids, if possible, and packed in strong plastic bags with an absorbent pad to absorb any free liquid. Transmissions and other non-regulated power train components may be packed in strong outer, non-specification packagings, in protective enclosures (e.g., in fully enclosed wooden slatted crates, plastic clam shells) or on pallets.

◆ Vehicles

Vehicles are self-propelled apparatus designed to carry one or more persons or goods. Examples of vehicles include electrically-powered cars, motorcycles, scooters, three- and four-wheeled vehicles or motorcycles, trucks, locomotives, bicycles (pedal cycles with an electric motor) and other vehicles of this type (e.g. self-balancing vehicles or vehicles not equipped with at least one seating position).

Vehicles also include lawn tractors, self-propelled farming and construction equipment, boats, aircraft, wheelchairs and other mobility aids.

◆ Equipment

Examples of equipment are lawnmowers, cleaning machines or model boats and model aircraft.

It is important to note that Equipment powered by lithium metal batteries or lithium-ion batteries must be consigned under the entries “Lithium metal batteries contained in equipment” or “Lithium metal batteries packed with equipment” or “Lithium ion batteries contained in equipment” or “Lithium ion batteries packed with equipment” as appropriate.

◆ **Battery Powered Vehicle**

New and used vehicles that are powered by batteries are described as:

UN3171, BATTERY-POWERED VEHICLE, 9



Battery-powered vehicles are not subject to the Hazardous Materials Regulations (HMR) when transported by rail, highway or vessel; however, vehicles powered by primary lithium batteries that are transported with these batteries installed are forbidden aboard passenger-carrying aircraft.

Although *excepted* from the Hazardous Materials Regulations (HMR) for ground transport, vehicles are required to conform to the requirements of 49 CFR § 173.220 including:



- fuel tanks and fuel systems containing flammable liquefied or compressed gas fuel are securely closed;
- batteries are prevented from short-circuiting;
- no other hazardous materials may be carried in or on the vehicle, unless they are an integral part of the vehicle (e.g., air bags, batteries, fire extinguishers)

◆ **Fuel Cell Hybrid Vehicles**

Although the primary focus of this module is on hybrid and electric vehicles, it is also important to also address fuel cell vehicles.

Self-propelled vehicles or equipment that contain a fuel cell engine must be consigned under the entries, as appropriate:



- Engine, fuel cell, flammable gas powered
- Engine, fuel cell, flammable liquid powered
- Vehicle, fuel cell, flammable gas powered
- Vehicle, fuel cell, flammable liquid powered

These entries include hybrid electric vehicles powered by a fuel cell engine, an internal combustion engine, and batteries.

◆ Fuel Cell Vehicles

Self-propelled vehicles or equipment that also contain an internal combustion engine must be consigned under the entries:

- Engine, internal combustion, flammable gas powered
- Engine, internal combustion, flammable liquid powered
- Vehicle, flammable gas powered
- Vehicle, flammable liquid powered

These entries include hybrid electric vehicles powered by both an internal combustion engine and batteries.