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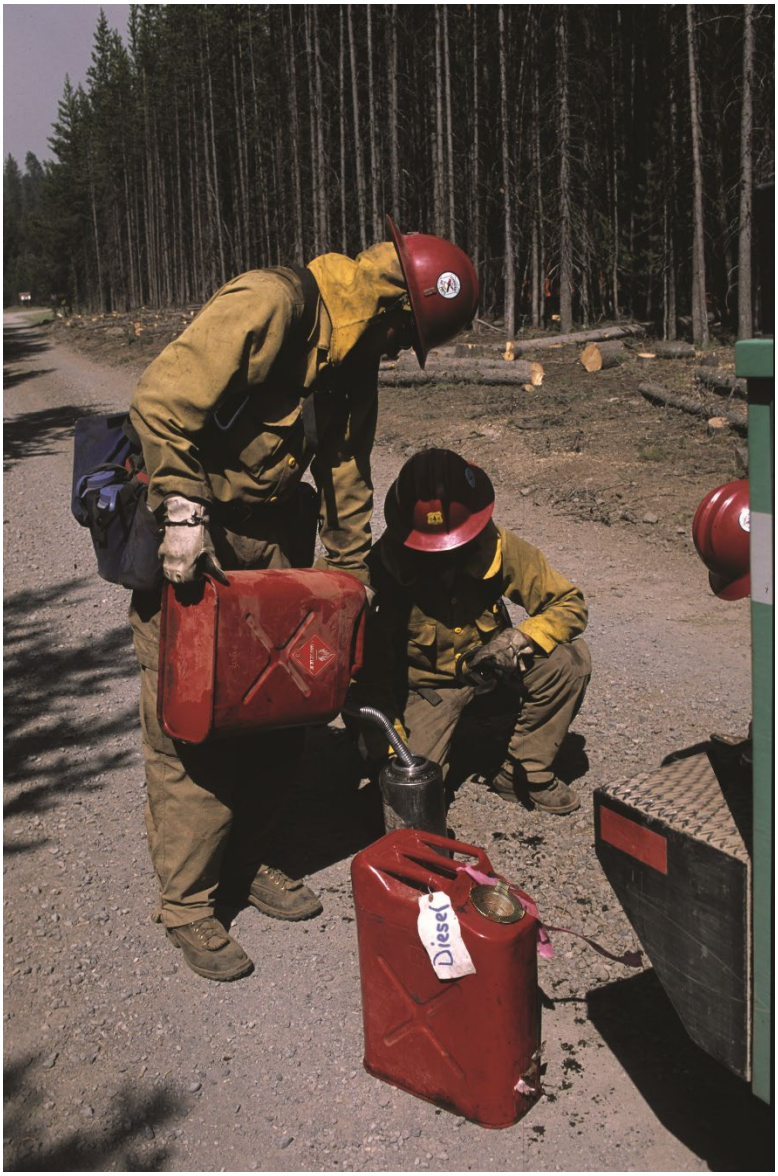
NWCG Standards for Transporting Fuel

PMS 442 OCTOBER 2019



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The *NWCG Standards for Transporting Fuel* establishes standards for the ground transportation of gasoline, mixed gas, drip torch fuel, and diesel in government vehicles driven by government employees. These standards are based as closely as practical on the U.S. Department of Transportation (DOT) and U.S. Department of Labor Occupational Safety and Health Administration (OSHA) regulations.

Fuel Geyser Awareness

Sealed fuel containers have the potential to geyser when opened under certain conditions. Be aware of the dangers of fuel geysering to prevent serious burn injury.

What is a fuel geyser?
A fuel geyser is the forceful expulsion of fuel in vapor and liquid form due to the rapid depressurization of a fuel tank. It is similar to a boiling liquid expanding vapor explosion (BLEVE).

What do you need to know to protect yourself?

- Fuel geysers can occur anytime there is fuel, heat, and pressure from small gasoline-powered engines, chain saws, leaf blowers, or portable pumps, even when opening fuel transport containers.
- Fuel geysers have resulted in injury when sprayed fuel and vapor have ignited.

Appropriate precautions when there is fuel, heat, and pressure may prevent significant burns in the event of fuel spray:

- Always assume fuel tanks and fuel containers are pressurized.
- Ensure the cap is correctly secured.
- Always check fuel levels before opening the fuel tank or filler cap. Fuel tanks that are more than half full may geyser.
- Open the cap slowly. If possible, direct potential spray away from you.
- Cover the cap with a rag to contain potential fuel geyser spray.
- Be extra vigilant when equipment with a fuel level above half a tank is running poorly.
- Allow an engine to cool for 20 minutes before opening the fuel cap.
- Move at least 20 feet or more from any heat source.
- Do not use fuel that is older than 1 month in small engines and equipment.
- It's YOUR job to protect yourself and others. Know how to handle your equipment to avoid fuel geysers anytime there is fuel, heat, and pressure.

What should you do if you experience a fuel geyser?

- Please REPORT every fuel geyser incident you experience! The information you provide can mean the difference between one of our employees getting injured or returning safely.
- To report an incident, go to the Fuel Geyser Incident Reporting Form website at: https://www.nwcg.gov/committees/equipment-technology-committee/fuel-geyser-incident-reporting-form.

Table of Contents

Part One

Introduction

Land management agencies use many liquid fuels, such as gasoline, mixed gas, and drip torch fuel, which are classified as flammable liquids. Special requirements apply for containers and tanks used to transport flammable liquids, and for licensing, and training drivers.

Diesel is classified as a combustible liquid. In some cases, the requirements for transporting diesel may be less stringent than for transporting flammable liquids.

Gasoline, mixed gas, drip torch fuel, and diesel should be transported in the approved fuel containers or tanks listed in this publication. Most of the listed containers meet U.S. Department of Transportation (DOT) specifications for transporting flammable liquids. DOT-specification containers are required, because they meet rigorous testing standards established by the United Nations (UN) before they are accepted for use. DOT-specification containers can be identified by their markings. For example, an approved closed-head steel drum will be marked UN 1A1 (Figure 1), and an approved steel jerrican will be marked UN 3A1. If a drum or jerrican does not have the proper specification marking, do not use it!

Figure 1: An example of a UN 1A1 specification marking.

Regulations requiring retailers to sell only spill-proof fuel containers that meet specific emissions standards have been adopted by the U.S. Environmental Protection Agency (EPA) and by states (such as California) with air pollution problems. Individuals purchasing new fuel containers must buy spill-proof containers that meet emissions standards.

Spill-proof containers, commonly referred to as CARB (California Air Resource Board) or EPA-compliant, are designed to reduce air pollution caused by fuel that evaporates from overfilled containers, containers that are left open, leaks from the container, and spilled fuel.

When these standards were prepared, regulations did not require existing fuel containers to be replaced. Existing non-spill-proof fuel containers approved by this publication may continue to be used until they are no longer serviceable.

Safety cans meeting Occupational Safety and Health Administration (OSHA) requirements are exempt from EPA's and most states' spill-proof container regulations. **Check with your state environmental regulatory agency for details and the applicability of spill-proof container regulations that may be more stringent than EPA regulations.**

The tanks listed for transporting gasoline, mixed gas, and drip torch fuel also meet DOT specifications. Most tanks available at ranch supply stores ***do not meet*** the requirements for transporting flammable liquid and must not be used to transport gasoline, mixed gas, or drip torch fuel, even though they may be used to transport diesel.

Some non-specification containers are allowed, such as aluminum (Sigg) fuel bottles. Additionally, plastic two-compartment fuel and oil containers (often called Dolmars) are allowed, providing they meet Underwriters Laboratories (UL), or Canadian Standards Association (CSA) specifications or an agency's supplemental standards approved by OSHA. Fuel also may be carried in the container it was sold in, such as metal cans of Coleman stove fuel. Manufacturers' original containers must not be reused to transport other flammable liquids.

Summary Tables

Approved Fuel Containers for Gasoline, Mixed Gas, and Drip Torch Fuel

Container type	Specification	Color requirement	Label or placard	Marking (Depends on fuel type)	Number of containers that may be transported
Safety transport cans Page 36	UN 3A1 or UN 1A1	Red with yellow markings	*FLAMMABLE LIQUID* label	Required	Depends on driver, licensing, and training.
Metal jerricans Page 36	UN 3A1	Red	*FLAMMABLE LIQUID* label	Required	Depends on driver, licensing, and training.
Plastic jerricans Page 36	UN 3H1	None	*FLAMMABLE LIQUID* label	Required	Depends on driver, licensing, and training.
Safety cans Page 46	UL or FM	Red with yellow markings	*FLAMMABLE LIQUID* label	Required	No container larger than 8 gallons; total weight of all hazmat being transported is no more than 440 pounds.
Dolmars Page 49	UL, CSA, or ASTM F852 with restrictions	Red	None	None	No container larger than 8 gallons; total weight of all hazmat being transported is no more than 440 pounds.
Consumer plastic containers[1] Page 52	UL or FM	Red	None	None	No container larger than 8 gallons; total weight of all hazmat being transported is no more than 440 pounds.

Container type	Specification	Color requirement	Label or placard	Marking (Depends on fuel type)	Number of containers that may be transported
Aluminum fuel bottles Page 55	NSN 7240–01–351–2133	Red	None	None	40 fuel bottles; no other containers larger than 8 gallons; total weight of all hazmat being transported is no more than 440 pounds.
Pump fuel tanks Page 44	None	None	*FLAMMABLE LIQUID* label on box, rack, or crate	On box, rack, or crate	No more than needed to operate the pump. *Continued*
Drip torches (DOT Spec) Page 31	FS 5100-614 UN 3B1 UN 1B1 UN 3A1 Others	Red	*FLAMMABLE LIQUID* label or *DRIP TORCH FUEL* tag	On box, rack, or crate	Depends on driver, licensing, and training.
Manufacturer's original container Page 57	Per manufacturer	Per manufacturer	Per manufacturer	Per manufacturer	No container larger than 8 gallons; total weight of all hazmat being transported is no more than 440 pounds.
Steel drums 8 to 55 gallons Page 59	UN 1A1/X or Y UN 1A2/X or Y	None	*FLAMMABLE LIQUID* label	Required	Depends on driver, licensing, and training.
Tanks 119 gallons or smaller Page 66	DOT E–11911 or UN 31A	None	*FLAMMABLE LIQUID* label	Required	Depends on driver, licensing, and training.
Tanks larger than 119 gallons Page 66	DOT 406 MC 306 Others per 49 CFR 173.242	None	*FLAMMABLE* placard	Identification number required	Depends on driver, licensing, and training.

[1]Use of consumer plastic fuel containers must be discontinued, except under the very limited conditions discussed in this publication.

Requirements for Gasoline, Mixed Gas, and Drip Torch Fuel That Depend on the Amount of Fuel and the Size of the Container

Amount of fuel and container size	Training Page 28	Shipping paper and *Emergency Response Guidebook* (*ERG*) Page 23	Driver's licensing Page 19	Placarding Page 22	Minimum fire extinguisher size Page 27
All containers smaller than 8 gallons. The total amount of hazardous materials being transported is no more than 440 pounds.	OSHA *Hazard Communication* training; DOT *Materials of Trade* training	Not required	Regular driver's license.	Not required.	One 5–B:C or two 4–B:C
All containers smaller than 8 gallons. The total amount of hazardous materials being transported is more than 440 pounds and less than 1,001 pounds.	OSHA *Hazard Communication* training; DOT general awareness, function-specific, safety, security awareness, and driver training	Required	Regular driver's license.	Not required.	One 5–B:C or two 4–B:C
1,001 pounds or more of hazardous materials is being transported, regardless of size.	OSHA *Hazard Communication* training; DOT general awareness, function-specific, safety, security awareness, and driver training	Required	CDL with hazardous materials endorsement.	*FLAMMABLE* placard with identification number.	One 10–B:C
Any tank larger than 119 gallons.	OSHA *Hazard Communication* training; DOT general awareness, function-specific, safety, security awareness, and driver training	Required	CDL with hazardous materials endorsement. Some states require a tank endorsement as well.	*FLAMMABLE* placard with identification number.	One 10–B:C

Approved Fuel Containers for Diesel

Container type	Specification	Color requirement	Label or placard	Marking (depends on fuel type)	Number of containers that may be transported
Safety transport cans Page 36	UN 3A1 or UN 1A1	None	*FLAMMABLE LIQUID* label	DIESEL	Not limited.
Metal jerricans Page 36	UN 3A1	None	*FLAMMABLE LIQUID* label	DIESEL	Not limited.
Plastic jerricans Page 36	UN 3H1	None	*FLAMMABLE LIQUID* label	DIESEL	Not limited.
Safety cans Page 46	UL or FM	None	*FLAMMABLE LIQUID* label	DIESEL	Not limited.
Steel drums 8 to 55 gallons Page 59	UN 1A1/X or Y UN 1A2/X or Y	None	*FLAMMABLE LIQUID* label	DIESEL	Not limited.
Tanks 119 gallons or smaller Page 66	None	None	*FLAMMABLE LIQUID* label	DIESEL	Not limited.
Tanks larger than 119 gallons Page 66	None	None	*FLAMMABLE* placard	1202 identification number required	Limited only by driver, licensing, and training.

Requirements for Diesel That Depend on the Amount of Fuel and the Size of the Container

Amount of fuel and container size	Training Page 28	Shipping paper and *Emergency Response Guidebook* (*ERG*) Page 23	Driver's licensing Page 19	Placarding Page 22	Minimum fire extinguisher size Page 27
All containers 119 gallons or smaller, regardless of amount transported.	OSHA *Hazard Communication* training	Not required	Regular driver's license.	Not required	One 5–B:C or two 4–B:C
Any tank larger than 119 gallons.	OSHA *Hazard Communication* training	Required	CDL with hazardous materials endorsement. Some states require a tank endorsement as well.	*FLAMMABLE* placard with 1202 identification number	One 10–B:C

Approved Fuel Containers and Drums

The following containers are approved for transporting fuel. These containers must meet the specifications shown in parentheses. Specific requirements for use of these containers are described in Part Two of this publication.

Manufacturers' Original Containers

Manufacturers' containers, such as Coleman fuel cans and premixed mixed gas cans, may be used to transport their original contents but shall not be reused (Figure 2).

Figure 2: Manufacturer's original fuel containers.

Safety Transport Cans (UN 3A1 and UN 1A1)

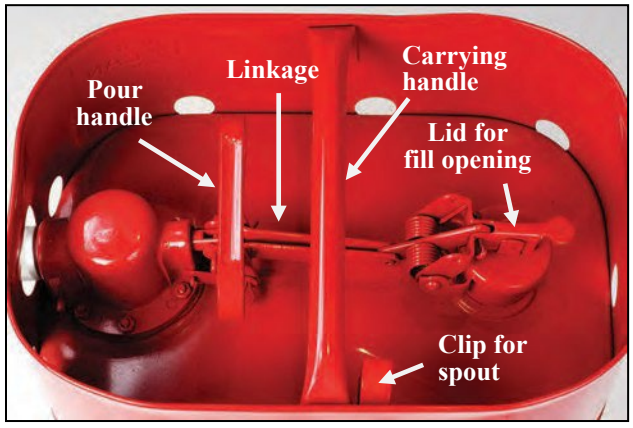
Safety transport cans (Figure 3) are containers that meet DOT specifications for transporting fuel and the OSHA requirements for safety cans. Safety transport cans meeting OSHA requirements are exempt from the EPA's and most states' spill-proof container regulations.

Figure 3: A safety transport can.

A jerrican-style safety transport can, the Safety Transport LM can, is available from Safeway Products, Inc. These cans have the following features:

- A relocated pour handle.
- A linkage between the pour handle and the lid on the fill opening that vents the can during pouring and allows fuel to flow faster (Figure 4).
- A quick-disconnect flexible pour spout and a clip on the top of the can to store the spout.
- A stiffening rib to make the can less prone to damage during temperature changes.
- A carrying handle spanning the top of the metal collar.

Figure 4: A top view of the Safety Transport LM can showing the linkage between the pour handle and lid for the fill opening.



For ordering information, visit NWCG's Ground Ignition Subcommittee website, https://www.nwcg.gov/committees/ground-ignition-subcommittee.

Military-Style Metal Jerricans (UN 3A1)

Military-style metal jerricans are approved for transporting fuel. Several styles are available, including the traditional metal jerrican (Figure 5), a traditional metal jerrican with a self-closing lid (Figure 6), and a metal jerrican with a bayonet-style closure (Figure 7).

Figure 5: Two military-style metal jerricans; a traditional jerrican (left) and a newer style jerrican (right).

Figure 6: Military-style metal jerrican retrofitted with a self-closing lid.

Figure 7: A detailed view of a jerrican with a bayonet-style closure. The locking pin must be in place during transportation.

Warning: Jerricans with bayonet-style closures have produced extreme fuel geysering when opened. These jerricans were removed from the National Interagency Support Caches inventory. Use them with caution. Assume that all fuel containers will geyser.

If required by agency policy, metal jerricans can be retrofitted with a self-closing lid that vents (see Figure 6), such as Justrite part number 11192. Justrite no longer manufactures this part, so these are limited to stock on hand. This self-closing lid shall be approved by a nationally recognized laboratory such as UL or Factory Mutual (FM). The self-closing lid may be removed and replaced with the jerrican's bung (leak-proof screw-in top) when deemed necessary to prevent leakage during transportation. The approved self-closing lid must be reinstalled when the jerrican is used for dispensing or is stored.

The closure locking pin on metal jerricans with bayonet-style closures must be in place during transportation to prevent the jerricans from opening.

New metal jerricans that meet DOT, OSHA, and spill-proof fuel container specifications are commercially available (Figure 8). In addition, replacement spill-proof spouts may be purchased to retrofit older metal jerricans (Figure 9).

When a bayonet-style lid is open, hand or object pressure can bend the hinge, preventing the lid from closing. If the lid will not close, straighten the hinge.

Figure 8: A military-style metal jerrican with a spout that complies with emissions standards.

Figure 9: A detailed view of a spout that complies with emissions standards.

Safety Cans (UL or FM)

Safety cans (Figure 10) meeting OSHA requirements, such as those listed by UL or FM, are exempt from the EPA's and most states' spill-proof container regulations. Because safety cans do not meet the UN specifications, fewer can be transported at a time.

Figure 10: A safety can.

Two-Compartment Fuel and Oil Containers (UL, CSA, or ASTM F852)

Two-compartment fuel and oil containers (Figure 11) – often called Dolmars – may be used to transport fuel.

Figure 11: A two-compartment fuel and oil container, often called a Dolmar.

Two-compartment fuel and oil containers are approved for transporting and dispensing mixed gas. Containers with UL or CSA markings may be used to store gasoline; however, containers with only the American Society for Testing and Materials (ASTM) F852 marking cannot store fuel in fuel container storage areas unless the conditions in the Plastic Fuel Containers section of this publication are met.

Pump Fuel Tanks

Fuel tanks for the Mark 3 pump (Figure 12) and fuel tanks for other pumps are approved for transporting fuel.

Figure 12: A fuel tank for the Mark 3 pump.

Plastic Fuel Containers

Three types of plastic fuel containers have been used: military-style plastic jerricans (UN 3H1, Figure 13), consumer plastic containers (UL or CSA, Figure 14), and plastic fuel bottles, such as Nalgene bottles (Figure 15). Plastic fuel bottles shall no longer be used.

Figure 13: A DOT-specification military-style plastic jerrican.

Figure 14: A consumer plastic fuel container.

Figure 15: A Nalgene plastic fuel bottle.

Military-style plastic jerricans (UN 3H1) are approved only for transporting fuel.

Do not store plastic jerricans containing fuel in inside storage areas unless the storage area meets all the conditions described below, excerpted from OSHA Instruction STD 01-05-014.

If the storage conditions are not met, empty the container as thoroughly as possible and evaporate the residue before placing military-style plastic jerricans into inside storage areas.

OSHA allows fuel to be stored in plastic containers in inside storage areas if:

1. The liquid within the container has a DOT exemption in effect for shipment in polyethylene containers and is identified as meeting the requirements of the DOT exemption.

2. The container storage area is provided with a fire detection system designed and installed to detect incipient stage fires and interconnected with an employee emergency alarm system, which will effectively alert employees when fire is detected.

3. In locations where employees are expected to perform firefighting, the container storage area is provided with a fixed automatic fire suppression system designed and installed to control, if not extinguish, a fire involving the stored polyethylene containers.

4. Employees, except members on fire brigades, will be totally evacuated from the container storage area at the time of initial fire detection. Where fire brigades are provided, member employees will be trained in the specific methods for fighting fires involving polyethylene drums or containers and in the recognition of hazards associated with firefighting in such storage areas.

5. In general purpose warehouses, the container storage area is provided with diking or curbing and drainage, which will contain the volume of stored liquids and the anticipated flow of fire extinguishing agent and will drain it to a remote impounding area having no employee exposure. Employee emergency exit routes may not intersect or pass over or under open drainage paths.

In addition, you must consult your regional/state safety manager to determine and confirm, in writing, that the storage area meets all the conditions before storing fuel in plastic jerricans.

Consumer plastic containers are prohibited unless fuel must be transported or dispensed in environmental conditions that make the use of a metal container dangerous. An example is when fuel must be transported in a saltwater environment that can cause metal containers to corrode and leak. Under those circumstances, consumer plastic containers may be used only if the conditions from OSHA Instruction STD 01-05-014 and the following conditions are met:

- The Regional/State Safety Manager, regional structural fire specialist, fire management officer, or structural fire chief, who has been designated as the authority having jurisdiction as defined by the National Fire Code, approves in writing the storage and use of consumer plastic containers.
- The consumer plastic containers are approved by a nationally recognized laboratory, such as UL, CSA, or FM, for the storage of flammable liquids.

Consumer plastic fuel containers should not be used, except under very limited conditions.

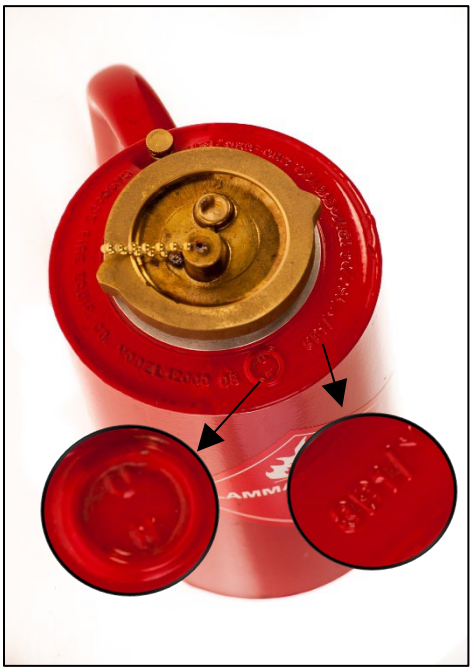
This prohibition of consumer plastic containers does not include plastic two-compartment fuel and oil containers (often called Dolmars) that are used for chain saws. Do not place two-compartment fuel and oil containers that contain fuel in a fuel container storage area, unless the conditions above are met or the containers are approved by a nationally recognized laboratory, such as UL, CSA, or FM for the storage of flammable liquids.

Drip Torches That Meet DOT Specifications (UN 3B1)

All new drip torches must meet Forest Service specification 5100-614 and DOT specifications (UN 3B1, UN 1B1, UN 3A1, and others, Figure 16 and Figure 17).

Figure 16: A drip torch.

Figure 17: The UN marking shows that this drip torch meets DOT specifications.



Aluminum Fuel Bottles

Aluminum fuel bottles (often called Sigg bottles, Defense Logistics Agency National Stock Number 7240–01–351–2133) are approved for transporting fuel (Figure 18). The Sigg bottle supplemental standard, located at NWCG's Ground Ignition Subcommittee website, https://www.nwcg.gov/committees/ground-ignition-subcommittee, contains specific use information.

Figure 18: An aluminum fuel bottle (often called a Sigg bottle).

Note: Red aluminum fuel bottles must never be used as beverage containers!

Steel Drums (8 to 55 Gallons)

- Use steel drums without removable heads (UN 1A1) to transport flammable and combustible liquids (Figure 19).
- Use steel drums with removable heads (UN 1A2, Figure 20) or without removable heads (UN 1A1) for aerial ignition.
- Use steel drums with removable heads (UN 1A2) to transport hazardous waste or damaged fuel containers.

Figure 19: A UN 1A1 drum. This drum does not have a removable head.

Figure 20: A UN 1A2 drum. This drum has a removable head.

Approved Fuel Tanks

The following tanks are approved for transporting fuel. Tanks from other manufacturers may also be available.

All tanks that do not meet DOT specifications that are being used to transport gasoline or drip torch fuel shall be replaced.

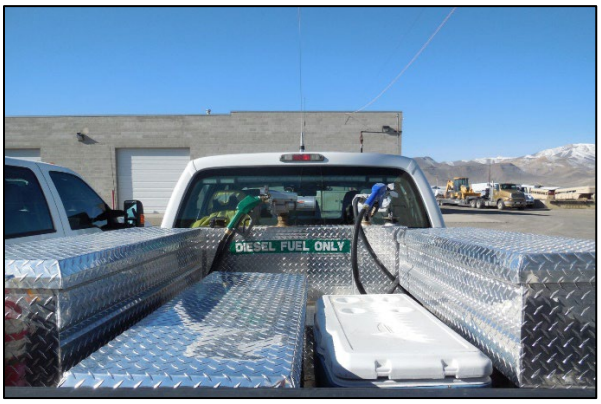
Tanks 119 Gallons or Smaller for Flammable Liquids

- Transfer Flow refueling tanks (UN 31A, marked DOT–SP 11911, Figure 21).
- Custom Metalcraft (UN 31A tanks)—The customer specifies the capacity of these tanks (Figure 22).
- Aluminum Tank Industries (UN 31B, marked DOT–SP 14227, Figure 23).

Figure 21: A 100-gallon Transfer Flow tank.

Figure 22: A Custom Metalcraft tank.

Figure 23: Multiple Aluminum Tank Industries tanks.



Tanks Larger Than 119 Gallons for Flammable Liquids

- DOT 406 (Figure 24)
- MC 306
- Other tanks (see 49 CFR 173.242)

Figure 24: A 240-gallon DOT-406 tank being used as a batch mixer.

Tanks for Diesel

- Tanks that do not meet specifications for transporting flammable liquids, such as the tanks found in ranch supply stores (Figure 25), may be used only to transport diesel.

Figure 25: A typical non-specification tank (left) for transporting diesel. Note the label (right) warning that this tank does not comply with regulations for transporting gasoline. Regulations do not require a DOT-specification tank for transporting diesel. This photo has been digitally manipulated to show the *DIESEL* marking.

Limiting Fuel Transported to Limit Regulator Requirements

The type of driver's license and training required depend on the amount of fuel being transported and the size and type of the fuel container. If no more than 440 pounds of hazardous materials (including the weight of the containers) are being transported in containers with a capacity of no more than eight gallons, shipping papers are not required. The only training needed is OSHA Hazard Communication training and DOT Materials of Trade training. The 440 pounds includes all hazardous materials being transported, not just gasoline, mixed gas, or drip torch fuel. For example, if you are carrying 140 pounds of fusees, you may carry only 300 pounds of fuel and containers. Empty containers that contain residual amounts of fuel also must be included in the 440-pound weight limit.

If the overall weight being transported is more than 440 pounds, but less than 1,001 pounds, or if the capacity of any container is more than eight gallons but is 119 gallons or less, the following are required:

- Shipping papers must be carried in the vehicle (page 23).
- A copy of the *ERG* must be carried in the vehicle (page 25).
- Additional training is required (page 30).

When a shipment weighs 1,001 pounds or more or when fuel is being carried in a container larger than 119 gallons, the following are required:

- A commercial driver's license (CDL) with a hazardous materials endorsement.

To avoid the need for a CDL, limit the total amount of fuel being transported to 119 gallons or less than 1,001 pounds.

- Shipping papers, carried in the vehicle (page 23).
- The *ERG,* carried in the vehicle (page 25).
- Additional training (page 30).
- In certain states, a tank endorsement.

To avoid the need for shipping papers and to reduce training requirements, limit the total amount of hazardous materials – including fuel being transported – to 440 pounds, with no fuel container larger than 8 gallons.

Labeling, Marking, and Placarding

Labeling, marking, and placarding are required so employees and emergency response personnel can identify the contents of a container or tank rapidly and respond appropriately in an emergency.

Labeling

The diamond-shaped (red background with white letters) *FLAMMABLE LIQUID* label (Figure 26) is required on many gasoline, mixed gas, drip torch fuel, and diesel containers of 119 gallons or less. These labels are available through several vendors. They must be maintained in good condition.

Figure 26: A *FLAMMABLE LIQUID* label.

Marking

Most containers must be marked with a description of its contents and the UN identification number, if applicable.

- Metal gasoline or mixed gas containers (except for aluminum fuel bottles) shall be marked *GASOLINE UN1203* (Figure 27).

Figure 27: A label (left) and a tag (right) that can be used as markings for gasoline containers.

- Aluminum fuel bottles that have the words *Fuel Bottle* on the body of the bottle are acceptable for use with no additional marking.
- Plastic fuel containers that have the word *GASOLINE* molded into the side of the container are acceptable for use with no additional marking.
- Drip torch fuel containers shall be marked *FLAMMABLE LIQUIDS NOS (DIESEL GASOLINE MIXTURE) UN1993.* The abbreviation *NOS* stands for *not otherwise specified.* Containers may also be marked with the words *DRIP TORCH FUEL* to help employees identify the contents (Figure 28).

Figure 28: A label (left) and a tag (right) that can be used as markings for drip torch fuel containers.

- Diesel containers shall be marked *DIESEL.*

The minimum size of the lettering depends on the container:

- Safety transport cans, metal jerricans, safety cans 1/4 inch high by 1/8 inch wide.
- 55-gallon drums: 1/2 inch high by 3/16 inch wide.
- Tanks 119 gallons or smaller: 1 inch high by 3/16 inch wide.
- Tanks larger than 119 gallons: 2 inches high by 1/4 inch wide.

Markings shall be printed on the surface of the container, applied to the container as a sign or label, or attached to the container as a tag (Figure 29). They must be maintained in good condition. Previously marked containers with smaller lettering are acceptable until remarking is needed.

Figure 29: Plastic tags are available for marking gasoline, mixed gas, drip torch fuel, and diesel containers. For ordering information, visit NWCG's Ground Ignition Subcommittee website, https://www.nwcg.gov/committees/ground-ignition-subcommittee.

Markings must be displayed on a background of sharply contrasting color, not obscured by labels or attachments, and be far enough away from other labels and signs to prevent confusion.

Placarding

A *FLAMMABLE* placard (Figure 30) is required when the gross weight of all hazardous materials is 1,001 pounds or more or when any tank is larger than 119 gallons. Placards must be installed on each side and on each end of the transport vehicle or tank.

Figure 30: A *FLAMMABLE* placard.

United Nations Identification Numbers

If placards are required, the UN identification number also must be displayed. The identification number may be shown separately as an orange panel (Figure 31) or may be included as part of the placard (Figure 32). The UN identification number for:

- Gasoline or mixed gas is 1203.
- Drip torch fuel is 1993.
- Diesel is 1202.

Figure 31: A *FLAMMABLE* placard with a separate identification number.

Figure 32: A *FLAMMABLE* placard with the identification number included.

Shipping Papers and Emergency Response Information

Shipping papers and the *ERG* are used to help emergency responders during an accident. These materials must be carried so they are available immediately to emergency responders and accident investigators.

For transporting gasoline, mixed gas, and drip torch fuel, shipping papers and the *ERG* must be carried in a vehicle when either:

- A container's capacity is more than eight gallons.
- More than 440 pounds of all hazardous materials, such as fuel, fusees, or propane, are being carried.

Shipping papers and the *ERG* are not required for gasoline, mixed gas, and drip torch fuel when either:

- All containers are eight gallons or smaller and 440 pounds or less of all hazardous materials, such as fuel, fusees, or propane, are being transported.
- Residual fuel (residue) is transported in containers 119 gallons or smaller.

Shipping papers and the *ERG* are required only when diesel is transported in tanks larger than 119 gallons.

Shipping Papers

Follow these steps when preparing shipping papers (see Appendix A for examples) and when determining how long to retain them:

- All entries must be legible and printed in English.
- Codes and abbreviations are not allowed.
- A copy of the shipping paper must be maintained at the local unit for 2 years after the shipment.
- Basic description information must be shown in the following sequence:
    - UN identification number.
    - Proper shipping name.
    - Hazard class or division number.
    - Packing group number.

Information to be shown on a shipping paper:

- The UN identification number.

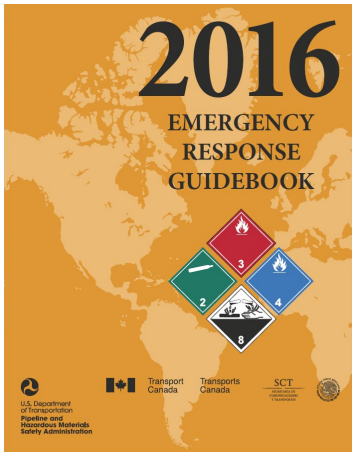
- For gasoline and mixed gas, the identification number is *UN1203*.
- For drip torch fuel, the identification number is *UN1993*.
- For diesel, the identification number is *UN1202*.

- The proper shipping name.
  - For gasoline and mixed gas, the proper shipping name is *GASOLINE*.
  - For drip torch fuel, the proper shipping name is *FLAMMABLE LIQUIDS NOS (DIESEL GASOLINE MIXTURE).*
  - For diesel, the proper shipping name is *DIESEL FUEL.* Shipping papers are required only when the container is larger than 119 gallons.
- The hazard class or division number.
  - For gasoline, mixed gas, drip torch fuel, and diesel, the hazard class is 3.
- The packing group number designated by Roman numerals.
  - For gasoline, mixed gas, and drip torch fuel, the packing group number is *II.*
  - For diesel, the packing group number is *III.*
- The total quantity of fuel.
  - For containers and tanks 119 gallons or smaller, the amount of each type of fuel being carried must be expressed in gallons or liters.
  - For tanks larger than 119 gallons, the total quantity of fuel may be indicated by the words: *1 CARGO TANK.*
- The number and types of containers, including descriptions, such as 14 jerricans.
  - The container specification number may also be identified: for example, 14 UN 3A1 jerricans.
  - A separate description must be included for each type of container being transported.
- An emergency response telephone number and contact name.
  - This phone number must be monitored at all times when the material is in transit (including storage incidental to transportation) and must be the phone number of someone who has comprehensive knowledge of the emergency response and incident mitigation information for the material or has immediate access to a person with this knowledge.
  - The emergency response phone number and contact name must either be printed following the description of the hazardous material or written once on the shipping paper in a clearly visible location. The toll-free CHEMTREC (chemical transportation emergency center) telephone number, commonly listed as an emergency response phone number, cannot be used by most land management agencies because the agencies do not subscribe to this service. When an emergency response provider (such as CHEMTREC) is used, include the contract identification number with the emergency response phone number. In such cases, a contact name is not required.

Emergency Response Guidebook (ERG)

The *ERG* (Figure 33) must be carried in the cab of each vehicle anytime shipping papers are required. The *ERG* describes the hazards of material being transported so emergency responders can take the appropriate actions during an accident. The potential hazards and emergency response information for each hazardous material are listed in the guidebook by guide number. The guide number for gasoline, mixed gas, drip torch fuel, and diesel is 128. The *ERG* is available from several vendors or can be downloaded from the DOT Pipeline and Hazardous Materials Safety Administration website, https://www.phmsa.dot.gov/hazmat/erg/emergency-response-guidebook-erg.

Figure 33: The *Emergency Response Guidebook* (*ERG*).



Location of Shipping Papers and the *Emergency Response Guidebook* (*ERG*)

The shipping papers and *ERG* must be carried where they are easily available to the driver and emergency responders. When the driver is at the vehicle's controls, the shipping paper and *ERG* shall be:

- Within the driver's immediate reach when the driver is restrained by the seatbelt.
- Readily visible to a person entering the driver's compartment, such as in plain sight on the seat or in a holder mounted to the inside of the driver's side door.

When the driver is not at the vehicle's controls, the shipping paper and *ERG* shall either be:

- In a holder mounted on the inside of the driver's side door (Figure 34).
- On the vehicle's driver's seat.

Figure 34: An example of an appropriate storage location for shipping papers and the *ERG*.

Safety Data Sheets (SDSs)

OSHA allows SDSs to be kept at the "primary workplace facility" as long as employees can "immediately obtain the required information in an emergency." Employees must ensure that SDSs for the hazardous materials they will be transporting are available at their duty station (ranger district, work center, fire camp, or other facility) and that they can immediately contact someone at the duty station to obtain the information on the SDS. If employees will be working where they cannot contact their duty station immediately, copies of the SDSs for the hazardous materials they will be transporting and using must be carried in the vehicle, regardless of the amount of fuel being transported.

Find sample SDSs for the following types of fuel:

- Diesel no. 1: https://www.sinclairoil.com/sites/default/files/MSDS.Fuels_.Diesel%20No%201.pdf.
- Diesel no. 2: https://www.sinclairoil.com/sites/default/files/MSDS.Fuels_.Diesel%20No%202.pdf.
- Gasoline: https://www.sinclairoil.com/sites/default/files/MSDS.Fuels_.Gasoline.pdf.
- Gasoline with ethanol: https://www.sinclairoil.com/sites/default/files/MSDS.Fuels_.Gasoline%20with%20Ethanol.pdf.
- Gasoline all grades: https://www.hess.com/docs/us-safety-data-sheets/gasoline-all-grades.pdf?sfvrsn=2.

Incompatible Materials

Do not transport liquid fuels, such as gasoline, mixed gas, drip torch fuel, or diesel in the same vehicle with:

- Explosives.
- Poisonous gases.
- Oxidizers, such as plastic spheres filled with potassium permanganate that are used for aerial ignition (Figure 35). Oxidizers may be transported in the same vehicle with fuels if the oxidizers are placed in a separate compartment.
- Poisonous liquids.

Figure 35: Plastic spheres used for aerial ignition.

Leaking or Damaged Containers

Leaking containers shall not be transported. If a container is damaged in the field, empty the contents of the damaged container into an undamaged container. The damaged container may be transported from the field to a proper disposal location by placing it in a UN 1A2 removable-head drum and installing the drum head or by evaporating the residue. To evaporate the residue from the damaged container, make sure that the container has been emptied as thoroughly as possible into another undamaged container and remove the caps or prop open the spring-loaded lids until the contents evaporate.

Fire Extinguishers

A fire extinguisher must be carried on each vehicle transporting fuel or other hazardous materials. The required size of the extinguisher depends on the amount of hazardous materials being transported and the capacity of any tank that is being used.

If the amount of hazardous materials being transported is less than 1,001 pounds or the tank capacity is 119 gallons or less:

- A minimum of one 5–B:C or two 4–B:C fire extinguishers must be carried on the transport vehicle.

If 1,001 pounds or more of hazardous materials are being transported or the tank is larger than 119 gallons:

- A minimum of one 10–B:C (Figure 36) fire extinguisher must be carried on the transport vehicle.

Figure 36: A 10–B:C fire extinguisher (left) and the label (right) showing that the fire extinguisher is UL listed and that it is rated 10–B:C.

Monthly Inspections

OSHA requires that fire extinguishers be visually inspected monthly by facility personnel (who check the recharge dial and make sure that the pin is in place). Typically, this information is documented on the back of the annual inspection tag or on an additional tag.

Annual Inspections

OSHA requires that fire extinguishers be inspected annually by certified personnel. This inspection checks the condition of a variety of the extinguisher's components including, but not limited to:

- Whether the hose is in good condition.
- Whether the extinguishing agent needs to be replaced.
- Whether the extinguisher is due for hydrostatic testing.

The annual inspection date must be recorded and maintained for at least 1 year. Typically, this information is documented on a tag (Figure 37) or sticker secured to the fire extinguisher.

Figure 37: A fire extinguisher inspection tag.

Training

Training is required for all employees who transport, prepare for transport, load and unload, or are responsible for the safety of hazardous materials that are being transported, such as gasoline, mixed gas, drip torch fuel, and diesel. The type of training required depends on the amount of hazardous materials being transported.

All training must be completed within 90 days of employment if the employee will transport, prepare for transport, load or unload, or is responsible for the safety of transported hazardous materials.

OSHA *Hazard Communication* Training

All employees who transport, prepare for transport, load and unload, or are responsible for the safety of hazardous materials that are being transported must complete OSHA Hazard Communication training.

DOT Materials of Trade Training to Transport Small Amounts of Hazardous Materials

If fuel is being transported in containers eight gallons or smaller and the total weight of hazardous materials being transported is 440 pounds or less, employees must have the DOT Materials of Trade training.

A training program designed specifically for federal land management agencies is available on the National Technology and Development Program (NTDP) Fuel Transport website, https://www.fs.usda.gov/t-d/fueltran/training.

The Materials of Trade training discusses the:

- Identification of common hazardous materials, such as fuels, propane, and plastic spheres filled with potassium permanganate and their associated hazards.
- Container requirements including:
  - Approved containers (page 6).
  - Labeling and marking requirements (page 21).
  - Inspection for damage and leakage (pages 35, 42, 46, 49, 51, 56, 59, 62).
  - Size limitations (maximum size is 8 gallons).
  - Weight limitations (maximum weight is 440 pounds for all hazardous materials).
  - Requirements to secure containers so they cannot move, protecting them from damage (page 36, 44, 48, 51, 54, 57, 59, 61).
- Identification of materials that should not be transported with liquid fuels (page 28).

Training To Transport Large Amounts of Hazardous Materials

When fuel is transported in any container larger than eight gallons or when the total weight of hazardous materials being transported is more than 440 pounds, regardless of container size, employees must have additional training. This training consists of general awareness/familiarization, function-specific, safety, security awareness, and driver training. Before handling or transporting gasoline, mixed gas, or drip torch fuel, DOT regulations require that they:

- Attend this training.
- Pass a test.
- Be certified.

For transporting diesel, this additional training is required only for drivers transporting tanks larger than 119 gallons.

A training program designed specifically for federal land management agencies is available at the NTDP Fuel Transport website, https://www.fs.usda.gov/t-d/fueltran/training. This training program does not include driver training.

Here's a little background about each component of the additional training:

- General awareness/familiarization training acquaints employees with the general requirements of the DOT regulations and enables them to recognize and identify hazardous materials.
- Function-specific training addresses the requirements of the DOT regulations and exemptions that apply directly to the tasks employees are performing.
- Safety training provides employees with the emergency response information required by DOT regulations, measures needed to protect them from the hazards of the materials they will be exposed to, and methods, and procedures for avoiding accidents.
- Security awareness training identifies security risks associated with handling hazardous materials and methods designed to enhance transportation security. This training also covers how to recognize and respond to possible security threats.

- Driver training includes:
  - Pre-trip safety inspections.
  - Use of vehicle controls and equipment.
  - Vehicle operation.
  - Procedures for maneuvering at tunnels, bridges, and railroad crossings.
  - Times when the driver must be present at the vehicle.
  - Procedures for loading and unloading materials.
  - Specialized requirements for tanks.

The requirement for driver training can be met by obtaining a CDL with a hazardous materials or tank endorsement. For drivers who do not need a CDL, driver training must be taken as a separate course.

Training programs required by other federal or international agencies, such as OSHA *Hazard Communication* training or EPA training, may be used to satisfy the referenced training requirements if the training addresses the elements listed. Training is also available from the DOT training center in Oklahoma City and from commercial vendors.

Refresher Training

Employees must receive applicable training at least once every 3 years.

Training Records

Keep records of each employee's training history for the previous 3 years. Retain these records for 90 days beyond the last date of the employee's employment. Training records shall include:

- Employee's name.
- Date of most recent training.
- Description, copy, or location of materials used during training.
- Name and address of trainer.
- Certification of training.

Part Two

Information about Specific Types of Fuel Containers, Drums, and Tanks

Drip Torches

The DOT-specification drip torches (Figure 38) became available in April 2003. All new drip torches shall meet Forest Service specification 5100-614. This specification not only meets the DOT specification, but also requires that the container be red, and that the breather valve be large enough to operate with a gloved hand. No drip torches manufactured before 2003 meet DOT specifications. Non-specification drip torches shall be replaced with drip torches that conform to Forest Service specification 5100-614 as non-specification drip torches wear out or become damaged beyond repair.

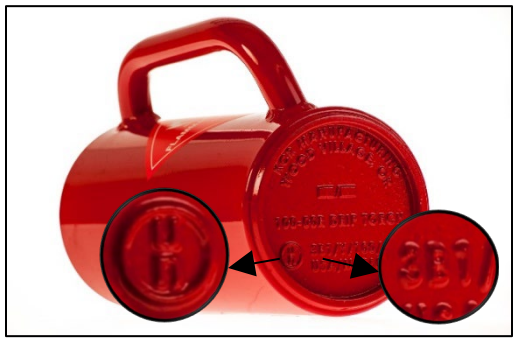
Figure 38: A drip torch.

Drip torches that do not meet DOT specifications must not be purchased. All new and replacement drip torches must be DOT-specification drip torches. Only DOT-specification drip torches should be transported full of fuel. Do not interchange parts between DOT-specification drip torches and those that do not meet DOT specifications. Do not interchange parts between drip torches made by different manufacturers; the components may not fit correctly.

Container Specifications

- UN 3B1 (Figure 39), UN 1B1, UN 3A1, and others.

Figure 39: The UN marking shows that this drip torch meets DOT specifications.



Labeling

- All drip torches must have the diamond-shaped *FLAMMABLE LIQUID* label (Figure 40) or the *DRIP TORCH FUEL* tag.
- If more than a total of 440 pounds of hazardous material (including the weight of the containers) is being transported, the diamond-shaped *FLAMMABLE LIQUID* label must be applied to the box, rack, or crate used to secure the drip torches while they are being transported.

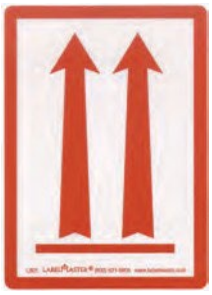
Figure 40: A *FLAMMABLE LIQUID* label.

Marking

- The following marking (see page 20 for additional information) is required on the crate, rack, or box (Figure 41) used to secure drip torches during transport.
  - *FLAMMABLE LIQUIDS NOS (DIESEL GASOLINE MIXTURE) UN1993.*
  - In addition, the box, rack, or holder also may be marked with the words *DRIP TORCH FUEL* to help employees identify the contents.
- Markings must be at least ½ inch high by 3⁄16 inch wide and must:
  - Be permanent.
  - Contrast sharply with the background color of the crate, rack, or box.
  - Not be obscured by any labels or attachments.
  - Be far enough away from other markings or labels to prevent confusion.
- If a closed box is used to secure the drip torches, the box shall be clearly marked with orientation arrows showing up (Figure 42).

Figure 41: This rack is marked properly for transporting drip torches.

Figure 42: Orientation arrows that are used to show up on a closed box of fuel containers.



Placarding

- A *FLAMMABLE* placard (see page 22 for additional information) with UN1993 identification number (Figure 43) is required on all four sides of the vehicle or trailer only if 1,001 pounds or more of all hazardous materials are being transported. Placarding is required to transport 67 or more full drip torches, assuming no other hazardous materials are transported.

Figure 43: A placard with the UN identification number for drip torch fuel included. When the identification number is not included in the placard, a separate identification number (see Figure 31: A *FLAMMABLE* placard with a separate identification number.) must be with the placard.

Inspection Criteria

- Inspect each drip torch before transporting it full of fuel to make sure that the lock ring and plug gaskets are not cut, cracked, or weather checked, and to make sure that neither the body nor the cover of the drip torch has been damaged. Replace or repair drip torches that do not meet these criteria.

Pressure will cause fuel to leak out of drip torch seals when not properly cared for. Tighten, without over-tightening, the lock ring, and vent. If leaks occur, replace the seals. If leaks still occur, transport, and store drip torches empty of fuel.

Container Capacity Restrictions

- Do not fill drip torches to more than 90 percent of their capacity to allow room for fuel to expand and to reduce the possibility that they might leak.

Securing Drip Torches for Transport

- Make sure that the lock ring is tight, the vent is closed, the plug is screwed into the cover, and that no closures leak. Do not transport drip torches that leak.
- Wipe any fuel from the outside of each drip torch.

- Drip torches shall not be mounted on the bumper of a vehicle.
- Secure the drip torches so they will not fall over or move during transport by placing them in a crate, rack, or box, or by restraining them in some other way (Figure 44). If the drip torches are in a closed box, the box shall be clearly marked with orientation arrows pointing up and the words *FLAMMABLE LIQUIDS NOS (DIESEL GASOLINE MIXTURE) UN1993.* Secure each crate, rack, or box so it cannot move or tip over while it is being transported.
- Remove or secure loose articles in the vehicle so they cannot damage the drip torches while they are being transported.

Figure 44: Drip torches secured in a rack.

Special Driver's License Requirements

- If the total weight of all hazardous materials being transported is less than 1,001 pounds and no container is larger than 119 gallons:
  - No special licensing is required.
  - Up to 66 full drip torches can be transported, assuming that no other hazardous materials are being transported.
- If the total weight of all hazardous materials being transported is 1,001 pounds or more, or if any container is larger than 119 gallons:
  - A CDL with hazardous materials endorsement is required.
  - This requirement must be met if 67 or more full drip torches are being transported.

Training

- If the total weight of all hazardous materials being transported is 440 pounds or less and no fuel container is larger than eight gallons, the following training is required:
  - OSHA Hazard Communication training.
  - DOT Materials of Trade training.
  - Up to 29 full drip torches can be transported, assuming that no other hazardous materials are being transported.

- See page 29 for additional information.

- If the total weight of all hazardous materials being transported is more than 440 pounds, or if any container is larger than eight gallons, the following training is required:
  - OSHA Hazard Communication training.
  - DOT general awareness/familiarization, function-specific, safety, security awareness, and driver training.
  - This requirement must be met if 30 or more full drip torches are being transported.

Shipping Papers and the *ERG*

- If the total weight of all transported hazardous materials is less than 440 pounds and no fuel container is larger than eight gallons:
  - None required.
  - Up to 29 full drip torches can be transported without shipping papers and the *ERG,* assuming that no other hazardous materials are being transported.
  - See page 23 for additional information.
- If the total weight of all hazardous materials being transported is more than 440 pounds or if any container is larger than eight gallons:
  - Shipping papers and the *ERG* are required.
  - This requirement must be met if 30 or more full drip torches are being transported.

Fire Extinguishers

- If the total weight of hazardous materials being transported is less than 1,001 pounds:
  - A minimum of one 5–B:C or two 4–B:C fire extinguishers are required.
  - Up to 66 drip torches can be transported, assuming that no other hazardous materials are being transported.
- If the total weight of hazardous materials being transported is 1,001 pounds or more:
  - A minimum of one 10–B:C fire extinguisher is required.
  - This requirement must be met if 67 or more drip torches are being transported.

Warning: Jerricans with bayonet-style closures have produced extreme fuel geysering when opened. These jerricans were removed from the National Interagency Support Caches inventory. Use them with caution. Assume that all fuel containers will geyser.

Safety Transport Cans and Metal and Plastic Jerricans

Gasoline, mixed gas, and drip torch fuel may be transported in safety transport cans (Figure 45), military-style metal jerricans (Figure 46), and plastic jerricans (Figure 47); all containers must meet U.S. DOT regulations.

Figure 45: A DOT-specification safety transport can (UN 3A1).

Figure 46: A military-style DOT-specification metal jerrican (UN 3A1).

Figure 47: A military-style DOT-specification plastic jerrican (UN 3H1).

Do not use inside storage areas to store military-style plastic jerricans containing fuel.

Older jerricans may be equipped with an approved self-closing lid that vents (Figure 48). This lid is no longer manufactured; however, it may still be used.

Figure 48: A self-closing lid, Justrite part number 11192, fits older jerricans.

Container Specifications

- UN 3A1 (Figure 49), UN 1A1, UN 3H1.

Figure 49: A UN 3A1 marking.

OSHA Color Requirements

- Gasoline, mixed gas, and drip torch fuel in metal jerricans or safety transport cans:
  - The container shall be red.
  - Safety transport cans shall have a yellow band around them, or the markings shall be stenciled or painted on the container in yellow (Figure 50).
- Gasoline, mixed gas, and drip torch fuel in plastic DOT-specification jerricans:
  - No color requirements for the container or the markings. Red colored containers are preferred.

- Diesel:
  - No color requirements.

Figure 50: Safety transport cans showing the colors required by OSHA and the proper markings.

Labeling

- A diamond-shaped *FLAMMABLE LIQUID* label (Figure 51) shall be on each can.

Figure 51: A *FLAMMABLE LIQUID* label.

Marking

- Gasoline or mixed gas:
  - *GASOLINE UN1203* (Figure 52).
  - See page 20 for additional information.

Figure 52: A label (left) and a tag (right) that can be used as markings for gasoline containers.

- Drip torch fuel:
  - *FLAMMABLE LIQUIDS NOS (DIESEL GASOLINE MIXTURE) UN1993* (Figure 53).
  - In addition, the container may also be marked with the words *DRIP TORCH FUEL* to help employees identify the contents.

Figure 53: A label (left) and a tag (right) that can be used as markings for drip torch fuel containers.

- Diesel:
  - *DIESEL.*
- Markings must be at least ¼ inch high by ⅛ inch wide and must:
  - Be permanent.
  - Contrast sharply with the background color of the can.
  - Not be obscured by any labels or attachments.
  - Be far enough away from other markings or labels to prevent confusion.

Placarding

- Gasoline and mixed gas:
  - A *FLAMMABLE* placard with *UN1203* identification number is required on all four sides of the vehicle or trailer if 1,001 pounds or more of hazardous materials are being transported.
  - Placarding is required to transport 21 or more full safety transport cans, 22 or more full metal jerricans, or 24, or more full plastic jerricans, assuming that no other hazardous materials are being transported.
  - See page 22 for additional information.
- Drip torch fuel:
  - A *FLAMMABLE* placard with the *UN1993* identification number (Figure 54) is required on all four sides of the vehicle or trailer if 1,001 pounds or more of hazardous materials are being transported.
  - This requirement must be met if 21 or more full safety transport cans, 22 or more full metal jerricans, or 24, or more full plastic jerricans are being transported.

- Diesel:
    - Placarding is not required.

Figure 54: A placard with the UN identification number for drip torch fuel included. When the identification number is not included in the placard, a separate identification number (see Figure 31) must be with the placard.

Inspection Criteria

- Inspect each container before it is transported to make sure that all lid gaskets, pouring valve gaskets, and seals are not cut, cracked, or weather checked. Verify that safety can linkages (see Figure 4) operate without binding and that the lids are not deformed. Check the body of the can to make sure there is no damage that could allow it to leak. Replace or repair cans that do not meet these criteria.

Container Capacity Restrictions

- Do not fill jerricans or safety transport cans beyond the fill line (Figure 55) or 90 percent of capacity to allow fuel to expand and to reduce the possibility that the container might leak.

Figure 55: The fill line on a safety transport can.

Securing Containers for Transport

- If a jerrican is equipped with a spill-proof spout, the spout must be replaced with a bung or other closure before the jerrican is transported.
- Make sure that the can is tightly closed and does not leak. Do not transport containers that leak.
- Wipe any fuel from the outside of the can.
- Secure the containers so they will not fall over or move during transport by placing them in a crate, rack, or box, or by restraining them in some other way (Figure 56). If the containers are in a closed box, the box shall be clearly marked with orientation arrows pointing up and the applicable marking, such as *GASOLINE UN1203*. Secure each crate, rack, or box so it cannot move or tip over while it is being transported.

- Secure other loose items in the back of the vehicle to prevent them from damaging the cans.

Figure 56: Jerricans secured for transport.

Special Driver's License Requirements

- Gasoline, mixed gas, and drip torch fuel:
  - If the total weight of all hazardous materials transported is less than 1,001 pounds, and no container is larger than 119 gallons:
    - No special licensing is required.
    - Up to 20 full safety transport cans, 21 full metal jerricans, or 23 plastic jerricans can be transported, assuming that no other hazardous materials are being transported.
  - If the total weight of all hazardous materials being transported is 1,001 pounds or more or any container is larger than 119 gallons:
    - A CDL with hazardous materials endorsement is required.
    - This licensing requirement must be met if 21 or more full safety transport cans, 22 or more metal jerricans, or 24, or more plastic jerricans are being transported.

Diesel:

- No special licensing is required.

Training

- Gasoline, mixed gas, and drip torch fuel:
  - If the total weight of all hazardous materials being transported is less than 440 pounds, and no fuel container is larger than eight gallons, the following training is required:
    - OSHA Hazard Communication training.
    - DOT Materials of Trade training.
    - Up to nine full safety transport cans or metal jerricans or ten plastic jerricans can be transported, assuming that no other hazardous materials are being transported.
    - See page 29 for additional information.

- If the total weight of all hazardous materials being transported is more than 440 pounds or any container is larger than eight gallons, the following training is required:
  - OSHA *Hazard Communication* training.
  - DOT general awareness/familiarization, function-specific, safety, security awareness, and driver training.
  - This requirement must be met if 10 or more full safety transport cans or metal jerricans or 11 plastic jerricans are being transported.
- Diesel:
  - OSHA *Hazard Communication* training.

Shipping Papers and the *ERG*

- Gasoline, mixed gas, and drip torch fuel:
  - If the total weight of all hazardous materials being transported is 440 pounds or less and no fuel container is larger than eight gallons:
    - None required.
    - Up to nine full safety transport cans or metal jerricans or ten plastic jerricans can be transported, assuming that no other hazardous materials are being transported.
    - See page 23 for additional information.
  - If the total weight of all hazardous materials being transported is more than 440 pounds or any container is larger than eight gallons:
    - Shipping papers and copy of the *ERG* are required.
    - This requirement must be met if 10 or more full safety transport cans or metal jerricans or 11 plastic jerricans are being transported, even if no other hazardous materials are being transported.
- Diesel:
  - None required.

Fire Extinguishers

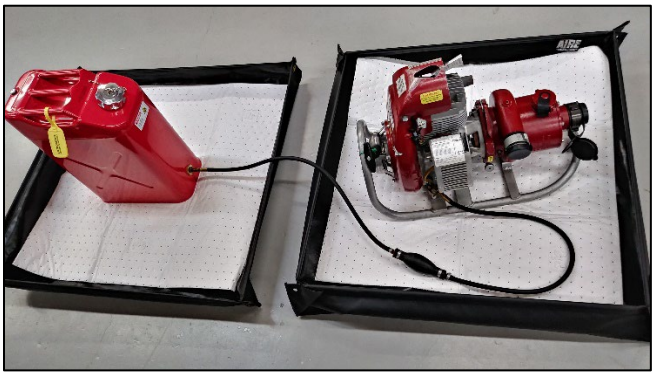
- If the total weight of hazardous materials being trans- ported is less than 1,001 pounds:
  - At least one 5–B:C or two 4–B:C fire extinguishers are required.
  - Up to 20 jerricans can be transported, assuming that no other hazardous materials are being transported.
- If all the hazardous materials being transported weigh 1,001 pounds or more:
  - At least one 10–B:C fire extinguisher is required.
  - This requirement must be met if 21 or more jerricans are being transported, even if no other hazardous materials are being transported.

Pump Fuel Tanks

Fuel for pumps with detachable fuel tanks, such as the Mark 3 (Figure 57), may be transported in the fuel

tank provided with the pump. No more than the minimum number of fuel tanks required to operate the pump shall be transported.

Figure 57: A fuel tank attached to a Mark 3 pump.



Pump fuel tanks shall be used only to transport pump fuel and shall not be used to transport other fuels, such as saw gas, gasoline, and drip torch fuel.

Container Specifications

- None.

Labeling

- Not required for individual tanks.
- Required on boxes, racks, or crates used to secure fuel tanks.

Marking

- Fuel tanks shall have a tag indicating the type of fuel (gasoline or mixed gas), the mix ratio, and the date the fuel was mixed (Figure 58).

Figure 58: A tag identifying mixed fuel in a fuel tank.

Placarding

- Not required.

Inspection Criteria

- Inspect each fuel tank before it is transported to make sure that all gaskets, seals, and O-rings are not cut, cracked, or weather checked. Inspect all fuel connection and vent fittings and verify that the fuel tank has not been damaged in a way that could allow it to leak. Replace or repair fuel tanks that do not meet these criteria.

Container Capacity Restrictions

- Do not fill pump fuel tanks beyond 90 percent of capacity to allow room for the fuel to expand and to reduce the possibility that the tank might leak.

Securing Containers for Transport

- Make sure that the fuel hose is disconnected and the vent is closed.
- Make sure that the fuel tank is tightly closed and does not leak. Do not transport fuel tanks that leak.
- Wipe any fuel from the outside of the fuel tank.
- Secure the fuel tanks so they will not fall over or move during transport by placing them in a crate, rack, or box, or by restraining them in some other way (Figure 59). If the containers are in a closed box, the box shall be clearly marked with orientation arrows pointing up and the words *GASOLINE UN1203.* Secure each crate, rack, or box so it cannot move or tip over while it is being transported.
- Secure other loose items in the back of the vehicle to prevent them from damaging the fuel tanks.

Figure 59: Fuel tanks for the Mark 3 pump secured properly for transport.

Special Driver's License Requirements

- None.

Training

- OSHA Hazard Communication training.
- DOT Materials of Trade training.
- See page 29 for additional information.

Shipping Papers and the *ERG*

- None required.

Fire Extinguishers

- At least one 5–B:C or two 4–B:C fire extinguishers are required.

Safety Cans

Limited quantities of metal safety cans that do not meet DOT specifications (Figure 60) may be transported. Each safety can must have a *UL* or *FM* marking.

Figure 60: A safety can. Because safety cans do not meet UN specifications, no more than 440 pounds of safety cans can be transported at a time.

Packaging Specifications

- UL (Figure 61) or FM (Figure 62) listed.

Figure 61: The Underwriters Laboratories (UL) marking.

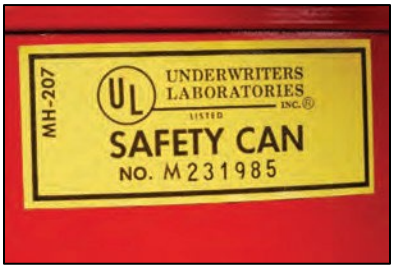


Figure 62: The Factory Mutual (FM) marking.

OSHA Color Requirements

- Gasoline, mixed gas, and drip torch fuel in safety cans:
  - The container shall be red with a yellow band around the can or markings shall be stenciled or painted on the can in yellow.

- Diesel:
  - No color requirements.

Labeling

- Diamond-shaped *FLAMMABLE LIQUID* label (Figure 63).

Figure 63: A *FLAMMABLE LIQUID* label.

Marking

- The following marking is required on each container:
  - Gasoline or mixed gas:
    - *GASOLINE UN1203*.
  - Drip torch fuel:
    - *FLAMMABLE LIQUIDS NOS (DIESEL GASOLINE MIXTURE) UN1993*.
    - In addition, the container may be marked with the words *DRIP TORCH FUEL* to help employees identify the contents (Figure 64).

Figure 64: A safety can marked properly for transporting drip torch fuel. Because safety cans do not meet the UN specifications for safety transport cans, fewer can be transported at a time.

  - Diesel:
    - *DIESEL*.
  - Markings must be at least $^{1}/_{4}$ inch high by $^{1}/_{8}$ inch wide and must:

        - Be permanent.
        - Contrast sharply with the background color of the can.
        - Not be obscured by any labels or attachments.
        - Be far enough away from other markings or labels to prevent confusion.
    - See page 20 for additional information.

Placarding

- Not required.

Inspection Criteria

- Make sure that all lid gaskets, pouring valve gaskets, and seals are not cut, cracked, or weather checked. Verify that linkages operate without binding and that the lids are not deformed. Make sure that the body of the can has not been damaged in a way that could allow it to leak. Replace or repair cans that do not meet these criteria.

Container Capacity Restrictions

- Do not fill safety cans beyond 90 percent of their capacity to leave room for fuel to expand and to reduce the possibility that the cans might leak.

Quantity Limitations

- Gasoline, mixed gas, and drip torch fuel:
    - The total weight of hazardous materials being transported (including container weights) must be 440 pounds or less, and no fuel container shall be larger than eight gallons. Up to nine full 5-gallon safety cans or 17 full 2½-gallon safety cans may be transported, assuming that no other hazardous materials are transported.
- Diesel:
    - None.

Securing Containers for Transport

- Make sure that all closures do not leak. Do not transport containers that leak.
- Wipe any fuel from the outside of each container.
- Secure the containers so they will not fall over or move during transport by placing them in a crate, rack, or box, or by restraining them in some other way. If the containers are in a closed box, the box shall be clearly marked with orientation arrows pointing up and the applicable marking, such as *GASOLINE UN1203*. Secure each crate, rack, or box so it cannot move or tip over while it is being transported.
- Remove or secure loose articles in the vehicle so they cannot damage the cans while they are being transported.

Special Driver's License Requirements

- None.

Training

- Gasoline, mixed gas, and drip torch fuel:
  - OSHA Hazard Communication training.
  - DOT Materials of Trade training.
- Diesel:
  - OSHA Hazard Communication training.
- See page 29 for additional information.

Shipping Papers and the *ERG*

- None required.

Fire Extinguishers

- At least one 5–B:C or two 4–B:C fire extinguishers are required.

Two-Compartment Fuel and Oil Containers

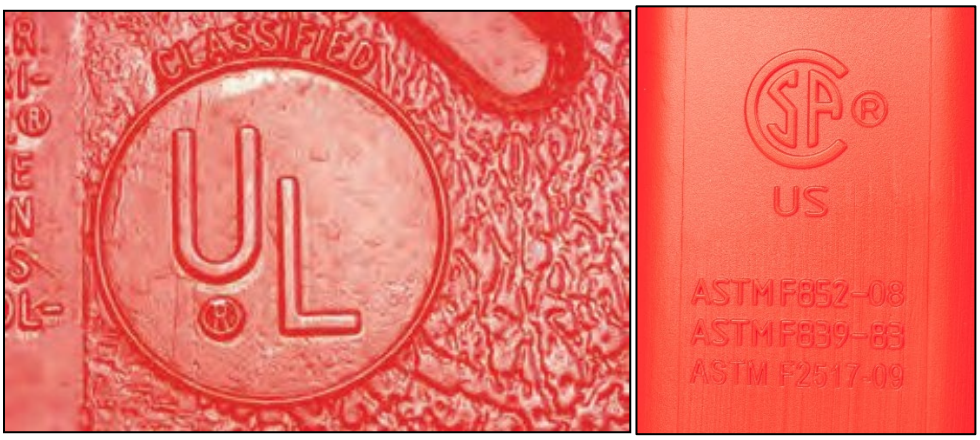
Limited quantities of two-compartment fuel and oil containers, such as Dolmars (Figure 65) may be carried. For the 1½-gallon two-compartment container, no more than 23 full containers may be carried per vehicle, assuming that no other hazardous materials are being transported. The total weight of hazardous materials (including the containers) cannot be more than 440 pounds and no fuel container can be larger than eight gallons. Each container must have a *UL, CSA,* or *ASTM F852* marking.

Figure 65: A two-compartment fuel and oil container (often called a Dolmar).

Packaging Specifications

- *UL* or *CSA* molded into container (Figure 66) (acceptable to store in inside storage areas while containing mixed gas).
- *ASTM F852* without CSA molded into container (must be stored empty unless the conditions in the *Plastic Fuel Containers* section of this publication are met).

Figure 66: The *UL* marking (left) and *CSA* with *ASTM* marking (right) molded into a two-compartment fuel and oil container.



Labeling

- Not required.

Marking

- *GASOLINE* (molded into container, no additional markings required, Figure 67).

Figure 67: The *GASOLINE* marking molded into a two-compartment fuel and oil container.

Placarding

- Not required.

Inspection Criteria

- Inspect each container before using it to transport fuel to make sure that the spout closure cap and spout O-rings are in place and in good condition, the vent cap (if present on older containers) is undamaged and closed, and the body is not damaged. Replace or repair containers that do not meet these criteria.

Container Capacity Restrictions

- Do not fill the container beyond the fill line (Figure 68) or 90 percent of capacity to allow room for fuel to expand and to reduce the possibility that the container might leak.

Figure 68: The fill line molded into a two-compartment fuel and oil container.

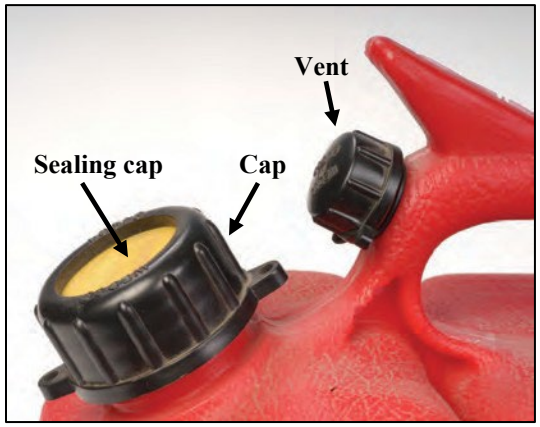
Quantity Limitations

- The total weight of hazardous materials being transported (including the containers) must not be more than 440 pounds, and no fuel container shall be larger than eight gallons.
- Up to 23 full 1½-gallon containers may be transported, assuming that no other hazardous materials are being transported.

Securing Containers for Transport

- Make sure that the vent is closed, the spouts are inserted in the container, and the caps that seal the spouts are screwed on (Figure 69). Verify that all closures are tight and do not leak. Do not transport containers that leak.
- Wipe any fuel from the outside of each container.
- Secure the containers so they will not fall over or move during transport by placing them in a crate, rack, or box, or by restraining them in some other way. If the containers are in a closed box, the box shall be clearly marked with orientation arrows pointing up and the applicable marking, such as *GASOLINE UN1203.* Secure each crate, rack, or box so it cannot move or tip over while it is being transported.
- Remove or secure loose articles in the vehicle so they cannot damage the containers while they are being transported.

Figure 69: Verify that the caps sealing the spouts are screwed on and that the vent cap is undamaged and closed.



Special Driver's License Requirements

- None.

Training

- OSHA Hazard Communication training.
- DOT Materials of Trade training.
- See page 29 for additional information.

Shipping Papers and the *ERG*

- None required.

Fire Extinguishers

- At least one 5–B:C or two 4–B:C fire extinguishers are required.

OSHA Supplemental Standards

- Each agency should request OSHA approval of a supplemental standard for using two-compartment fuel and oil containers that do not have a *UL* or *CSA* marking molded into the container.
- Existing supplemental standards can be found at NWCG's Ground Ignition Subcommittee website, https://www.nwcg.gov/committees/ground-ignition-subcommittee.

Consumer Plastic Containers

Limited quantities of consumer plastic containers (Figure 70) may be carried. Each container must have a *UL* marking.

Figure 70: A consumer plastic fuel container.

Consumer plastic containers shall not be used, except as discussed in Part One of this publication.

Packaging Specifications

- *UL* (Figure 71), *CSA*, or *FM* listed.

Figure 71: The *UL* marking molded into a consumer plastic fuel container.

Labeling

- Not required.

Marking

- *GASOLINE* (molded into the container; no additional markings required, Figure 72).

Figure 72: The *GASOLINE* marking molded into a consumer plastic fuel container.

Placarding

- Not required.

Inspection Criteria

- Inspect each container before using it to transport fuel to make sure that all seals or O-rings are in place and in good condition, the vent cap (if present) is undamaged and closed, and that the body is not damaged. Replace or repair containers that do not meet these criteria.

Container Capacity Restrictions

Do not fill the container beyond the fill line (Figure 73) or 90 percent of its capacity to leave room for the fuel to expand and to reduce the possibility that the container might leak.

Figure 73: The fill line molded into a consumer plastic fuel container.

Quantity Limitations

- The total weight of all hazardous materials being transported (including the containers) must be 440 pounds or less, and no fuel container shall be larger than eight gallons. Up to 22 full 2½-gallon or 11 full 5-gallon containers may be transported, assuming that no other hazardous materials are being transported.

Securing Containers for Transport

- Make sure that the vent (if present) is closed, the spout is inserted in the container, and the cap that seals the spout is screwed on. Verify that all closures are tight and do not leak. Do not transport containers that leak.
- Wipe any fuel from the outside of each container.
- Secure the containers so they will not fall over or move during transport by placing them in a crate, rack, or box, or by restraining them in some other way. If the containers are in a closed box, the box shall be clearly marked with orientation arrows pointing up and the applicable marking, such as *GASOLINE UN1203.* Secure each crate, rack, or box so it cannot move or tip over while it is being transported.
- Remove or secure loose articles in the vehicle so they cannot damage the containers during transport.

Special Driver's License Requirements

- None.

Training

- OSHA Hazard Communication training.
- DOT Materials of Trade training.
- See page 29 for additional information.

Shipping Papers and the *ERG*

- None required.

Fire Extinguishers

- At least one 5–B:C or two 4–B:C fire extinguishers are required.

Aluminum and Plastic Fuel Bottles

Limited quantities of aluminum, 1-quart fuel bottles (Figure 74) may be transported. Plastic fuel bottles shall not be used (Figure 75).

Figure 74: Aluminum fuel bottle.

Figure 75: Plastic fuel bottle.

Never use aluminum fuel bottles as beverage containers! Plastic fuel bottles shall not be used.

Container Specifications

- Aluminum fuel bottle, Defense Logistics Agency National Stock Number 7240–01–351–2133. The only bottle known to meet these requirements now is marketed by Mountain Safety Research (MSR).

Color Requirements

- Bottles must be red.

Labeling

- None required.

Marking

- Aluminum fuel bottles marked *FUEL BOTTLE* by the manufacturer do not require additional marking.

Placarding

- None required.

Inspection Criteria

- Before using a bottle to transport fuel, it shall be inspected to make sure there is no damage to the body, cap, or seal, and that the bottle does not leak. Replace or repair bottles that do not meet these criteria.

Container Capacity Restrictions

- Do not fill the bottle beyond the manufacturer's fill line (Figure 76). If the bottle does not have a fill line, leave 2 inches below the top of the bottle to allow fuel to expand.

Figure 76: The fill line on an aluminum fuel bottle, often called a Sigg bottle.

Aluminum fuel bottles filled above the fill line can develop enough pressure to rupture the container or blow the top off (Figure 77). National Wildfire Coordinating Group Safety Warnings issued in 2002, 2003, and 2005 provide additional details. See the NWCG website, https://www.nwcg.gov/safety-alerts/safety-warnings.

Figure 77: An aluminum fuel bottle that failed because it was overfilled.

Quantity Limitations

- Up to 40 full fuel bottles plus the remaining hazardous materials (including their containers) must not weigh more than 440 pounds, and no fuel container shall be larger than eight gallons.

Securing Containers for Transport

- Make sure that caps are tight and that the containers do not leak. Do not transport bottles that leak.
- Wipe any excess fuel from the outside of each bottle.
- Secure the bottles so they will not fall over or move during transport by placing them in a crate

(Figure 78), rack, or box, or by restraining them in some other way. If a closed box is used, the box shall be clearly marked with orientation arrows pointing up and marked *GASOLINE*. Secure each crate, rack, or box so it cannot move or tip over while it is being transported.

- Remove or secure loose articles in the vehicle so they cannot damage the bottles while they are being transported.

Figure 78: Aluminum fuel bottles secured for transport in a milk crate.

Special Driver's License Requirements

- None.

Training

- OSHA Hazard Communication training.
- DOT Materials of Trade training.
- See page 29 for additional information.

Shipping Papers and the *ERG*

- None required.

Fire Extinguishers

- At least one 5–B:C or two 4–B:C fire extinguishers are required.

OSHA Supplemental Standards

- Each agency should request OSHA approval of a supplemental standard for using aluminum fuel bottles.
- Existing supplemental standards can be found at NWCG's Ground Ignition Subcommittee website, https://www.nwcg.gov/committees/ground-ignition-subcommittee.

Manufacturers' Original Containers

Limited quantities of fuel in the manufacturer's original container, such as Coleman fuel cans and premixed mixed gas cans (Figure 79), may be transported.

Figure 79: Examples of manufacturer original containers.

Container Specifications

- A manufacturer's original container.

Labeling

- A manufacturer's original label.

Marking

- A manufacturer's original marking.

Placarding

- Not required.

Inspection Criteria

- Inspect the container for damage to the body and cap before it is transported. Do not transport leaking containers.

Container Restrictions

- Containers shall not be refilled.

Quantity Limitations

- The total weight of hazardous materials (including their containers) being transported must be 440 pounds or less, and no fuel container shall be larger than eight gallons.

Securing Containers for Transport

- Make sure that the caps are tight and do not leak.
- Make sure the outside of each container is free of fuel.
- Secure the containers so they will not fall over or move during transport by placing them in a crate, box, or rack, or by restraining them in some other way (Figure 80). If a closed box is used,

the box shall be clearly marked with orientation arrows pointing up and with the name of the hazardous material, such as *STOVE FUEL*. Secure each crate, rack, or box so it cannot move or tip over while it is being transported.

- Remove or secure loose articles in the vehicle so they cannot damage the containers.

Figure 80: A box containing the manufacturer's original containers.

Special Driver's License Requirements

- None.

Training

- OSHA Hazard Communication training.
- DOT Materials of Trade training.
- See page 29 for additional information.

Shipping Papers and the *ERG*

- None required.

Fire Extinguishers

- At least one 5–B:C or two 4–B:C fire extinguishers are required.

Fuel in Drums

Gasoline, mixed gas, drip torch fuel, and diesel may be transported in approved steel drums (Figure 81).

Figure 81: A 55-gallon drum.

Container Specifications

- Transportation of gasoline, mixed gas, drip torch fuel, and diesel:
  - 8- to 55-gallon drums (*UN 1A1/X* or *Y*) (Figure 82).
- Transportation of damaged fuel containers:
  - 8- to 55-gallon drums (*UN 1A2/X* or *Y*).
- For aerial ignition:
  - 8- to 55-gallon drums (*UN 1A1/X* or *Y* or *UN 1A2/X* or *Y*).

Figure 82: Approved drums have a UN number.

Labeling

- Gasoline, mixed gas, drip torch fuel and diesel:
  - Diamond-shaped *FLAMMABLE LIQUID* label on each drum (Figure 83).

Figure 83: A *FLAMMABLE* label.

Marking

- Gasoline or mixed gas:
  - *GASOLINE UN1203.*
- Drip torch fuel:
  - *FLAMMABLE LIQUIDS NOS (DIESEL GASOLINE MIXTURE) UN1993* (Figure 84).

Figure 84: A drum marked for transporting drip torch fuel.

- Diesel:
  - *DIESEL.*
- The markings must:
  - Be permanent.
  - Contrast sharply with the background color of the drum.
  - Not be obscured by any labels or attachments.
  - Be far enough away from other markings or labels to prevent confusion. These markings can be stenciled on the drum.
  - Be at least ½ inch high by 3⁄16 inch wide.
  - Be applied to the drum where they can be seen easily.

Placarding

- Gasoline and mixed gas:
  - *FLAMMABLE* placard with *UN1203* identification number required on all four sides of the vehicle or trailer if 1,001 pounds or more of hazardous materials are being transported.
  - Placarding is required to transport three or more 55-gallon drums, even if no other hazardous materials are being transported.
- Drip torch fuel:
  - *FLAMMABLE* placard with *UN1993* identification number (Figure 85) required on all four sides of the vehicle or trailer if 1,001 pounds or more of hazardous materials are being transported.

Figure 85: A placard with the UN identification number for drip torch fuel included. When the identification number is not included in the placard, a separate identification number (see Figure 31) must be with the placard.

  - Placarding is required to transport three or more 55-gallon drums, even if no other hazardous materials are being transported.
- Diesel:
  - None required.
- See page 22 for additional information.

Inspection Criteria

- The bung and head (if the head is removable) seals are in good condition.
- There is no visible rusting or damage to the drum that could allow it to leak.
- The drum does not leak along any seam.
- The head of the drum is not bulged above its rim (Figure 86).
- Replace drums that do not meet these criteria.

Figure 86: A drum that should not be reused because the head is bulging (left) and the side is dented (right).

Container Capacity Restrictions

- Each drum shall be filled to no more than about 90-percent capacity (for instance, no more than 50 gallons of fuel in a 55-gallon drum) to allow fuel to expand and to reduce the possibility that the drum might leak.

Securing Drums for Transport

- Remove the pump before transporting drums on public highways.
- Allow fuel to drain back into the drum from the pump, suction piping, and discharge hose.
- Protect the pump, suction piping, and discharge nozzle from contamination and secure the pump so that it will not move while it is being transported.
- Make sure that all bungs are tight and do not leak.
- Wipe any fuel from the outside of the drum.
- Secure each drum to the vehicle so that it cannot move or tip over while it is being transported (Figure 87). Use ratchet straps, tie downs, or other suitable materials to secure the drums.

Figure 87: A drum that has been secured for transport.

- No part of the drum shall extend above the vehicle's cab or beyond the vehicle's body.
- Other loose items in the back of the vehicle shall be secured to prevent them from damaging the drums.

Do not transport leaking drums.

Special Driver's License Requirements

- Gasoline, mixed gas, and drip torch fuel:
  - If the total weight of hazardous materials being transported is less than 1,001 pounds and no container is larger than 119 gallons:
    - No special licensing is required.
    - Up to two 55-gallon drums can be transported, assuming that no other hazardous materials are being transported.
  - If the total weight of hazardous materials being transported (including their containers) is 1,001 pounds or more or if any container is larger than 119 gallons:
    - A CDL with hazardous materials endorsement is required. This licensing requirement must be met if three or more 55-gallon drums are being transported, even if no other hazardous materials are being transported.
  - Diesel:
    - No special licensing is required.

Training

- Gasoline, mixed gas, or drip torch fuel:
  - OSHA *Hazard Communication* training.
  - DOT general awareness/familiarization, function-specific, safety, security, and driver training sessions are required if any drums larger than eight gallons are being transported.
- Diesel:
  - OSHA *Hazard Communication* training.
- See page 30 for additional information.

Shipping Papers and the *ERG*

- Gasoline, mixed gas, or drip torch fuel:
  - Shipping papers and the *ERG* are required if any drum is larger than eight gallons.
- Diesel:
  - None required.
- See page 23 for additional information.

Pump Requirements

- The pump shall be listed by UL or FM for dispensing flammable liquids (Figure 88).
- The pump hose shall be approved for transferring flammable liquids and shall have an internal bonding wire or a conductive cover (Figure 89). The entire hose assembly, including the ends of the hose, should be electrically conductive.

Figure 88: Example of a manual fuel pump.

Figure 89: An approved hose.

Dispensing Requirements

- Drip torches, jerricans, and other approved containers shall be filled on the ground, never in the back of a vehicle.
- The pump nozzle shall contact the container before and during filling to make sure that the container is electrically bonded to the drum (Figure 90).

Figure 90: When a drip torch is filled properly, the pump nozzle touches the container, preventing sparks from static electricity generated by flowing fuel.

Fire Extinguishers

- If the total weight of hazardous materials being transported (including their containers) is less than 1,001 pounds:
    - At least one 5–B:C or two 4–B:C fire extinguishers are required. Up to two 55-gallon drums can be transported, assuming that no other hazardous materials are being transported.

- If the total weight of hazardous materials being transported (including their containers) is 1,001 pounds or more:
    - At least one 10–B:C fire extinguisher is required. This requirement must be met if three or more 55-gallon drums are being transported, even if no other hazardous materials are being transported.

Drip Torch Fuel, Gasoline, or Mixed Gas in Tanks

Drip torch fuel, gasoline, or mixed gas should be transported only in DOT-specification tanks. Most tanks available at general supply stores are designed just to transport diesel and do not meet DOT specifications for transporting drip torch fuel, gasoline, and mixed gas.

Do not transport drip torch fuel, gasoline, or mixed gas in a tank that does not meet DOT specifications.

Most DOT-specification tanks are larger than 119 gallons (Figure 91), requiring the driver to have a CDL with a hazardous materials endorsement. At least three manufacturers, Transfer Flow, Custom Metalcraft, and Aluminum Tank Industries, manufacture DOT-specification intermediate bulk container (IBC) tanks smaller than 119 gallons. A CDL is not required to transport these tanks. The Transfer Flow tank (Figure 92) is available in several different sizes and configurations.

Figure 91: A 240-gallon DOT–406 tank being used to mix gelled fuel.

Figure 92: A Transfer Flow tank.

The Custom Metalcraft tank (Figure 93) can be manufactured in any capacity specified by the customer.

Figure 93: A Custom Metalcraft tank.

All tanks that do not meet DOT specifications that are used to transport gasoline or drip torch fuel shall be replaced or be used to only transport diesel.

Tank Specifications

- DOT–SP 11911, DOT–SP 14227, UN 31A, MC 306, DOT 406 (Figure 94), and others (see 49 CFR 173.242).

Figure 94: A label plate from a DOT 406 tank.

Labeling and Placarding

- If the tank is 119 gallons or smaller, it must be labeled with the diamond-shaped *FLAMMABLE LIQUID* label (Figure 95).

Figure 95: A *FLAMMABLE LIQUID* label.

- If the tank's capacity is more than 119 gallons, the vehicle or trailer must be placarded with the *FLAMMABLE* placard on all four sides (Figure 96).
- See page 20 for additional information.

Figure 96: A placard with the UN identification number for drip torch fuel included. When the identification number is not included in the placard, a separate identification number (see Figure 31) must be with the placard.

Markings for Tanks 119 Gallons or Smaller

- Gasoline or mixed gas:
  - *GASOLINE UN1203.*
- Drip torch fuel:
  - *FLAMMABLE LIQUIDS NOS (DIESEL GASOLINE MIXTURE) UN1993* (Figure 97).

Figure 97: A Transfer Flow tank marked for drip torch fuel.

- The markings must:
  - Be permanent.
  - Contrast sharply with the background color of the tank.
  - Not be obscured by any labels or attachments.
  - Be far enough away from other markings or labels to prevent confusion.
  - Be at least 1 inch high by $^{3}/_{16}$ inch wide.
  - Be applied on the tank where they can be seen easily.
- See page 20 for additional information.

Identification Numbers for Tanks Larger than 119 Gallons

- UN identification numbers must be displayed on all four sides of the tank or transport vehicle. UN identification numbers can be displayed as part of the placard or on a separate orange panel in addition to the placard.
  - Gasoline or mixed gas:
    - 1203.
  - Drip torch fuel:
    - 1993.
  - See page 22 for additional information.

Inspection Criteria for Tanks 119 Gallons or Smaller

- Small tanks, such as the IBCs sold by Transfer Flow, Custom Metalcraft, and Aluminum Tank Industries, must be inspected by an individual with the knowledge and ability to perform inspections and tests. This individual must be trained in the use of testing equipment. The use of a DOT-registered cargo tank inspector is recommended. For a list of registered cargo tank inspectors, contact the DOT Federal Motor Carrier Safety Administration or use the search function at https://www.fmcsa.dot.gov/contact-us. Tanks must be inspected at the following intervals:
  - A "leak-proofness test" and external visual inspection shall be conducted every $2^{1}/_{2}$ years.
  - An internal visual inspection shall be conducted every 5 years.
  - Records must be kept of tank inspections. These records must include the:
    - Tank's design type and specification.
    - Inspection date.
    - Name and address of the inspection facilities.
    - Name of the inspector.
    - Inspection and test results.
  - Keep the records in a secure location at the unit responsible for the tank as long as the tank is in service.
- Tanks must be marked on a metal corrosion-resistant plate with the following information:

- Rated capacity in liters.
- Date of last leak-proof test, if applicable (month and year).
- Date of last inspection (month and year).

Inspection Criteria for DOT–406 and MC-306 Tanks

- DOT–406 and MC–306 tanks must be inspected by a DOT-registered cargo tank inspector. For a list of registered cargo tank inspectors, contact the DOT Federal Motor Carrier Safety Administration or use the search function at https://www.fmcsa.dot.gov/contact-us. The tank's inspection history is coded (Figure 98) with letters indicating the type of inspections, two numbers indicating the month, and two numbers indicating the year.

Figure 98: Tank inspection markings on a DOT–406 tank. This tank was last inspected during December 2001.

- An external visual inspection shall be performed every year. The letter V indicates that this inspection has been completed.
- An internal visual inspection shall be performed every 5 years. The letter I indicates that this inspection has been completed.
- The "leakage test" shall be performed every year. The letter *K* indicates that this inspection has been completed.
- The pressure test shall be performed every 5 years. The letter *P* indicates that this inspection has been completed.
- Keep records of the inspections in a secure location at the unit responsible for the tank as long as the tank is in service. These records must include the:
  - Tank's design type and specification.
  - Inspection date.
  - Name and address of the inspection facilities.
  - Name of the inspector.
  - Inspection and test results.

Tank Capacity Restrictions

- Tanks shall not be filled to more than 90 percent of the capacity to leave room for fuel to expand and to reduce the possibility that the tank might leak.

Securing Tanks for Transport in Pickup Trucks

- Tanks 119 gallons or smaller must be mounted as close to the front of the bed as possible.
  - Mount the tank in accordance with manufacturer's instructions. Do not exceed the vehicle Gross Vehicle Weight Rating (GVWR) with a full tank.

- Loose items in the vehicle shall be removed or secured so they cannot damage the tank during transport.
- All valves must be closed.
- If the tank is to be transported with an electric or manual pump installed, no part of the pump or its piping shall extend above the vehicle's cab or beyond the vehicle's body.

Special Driver's License Requirements

- For tanks 119 gallons or smaller:
  - None.
- For tanks larger than 119 gallons:
  - CDL with hazmat endorsement. Some states also may require a tank endorsement.

Training

- OSHA *Hazard Communication* and DOT general awareness/familiarization, function-specific, safety, driver's training, and security training sessions are required.
- See page 30 for additional information.

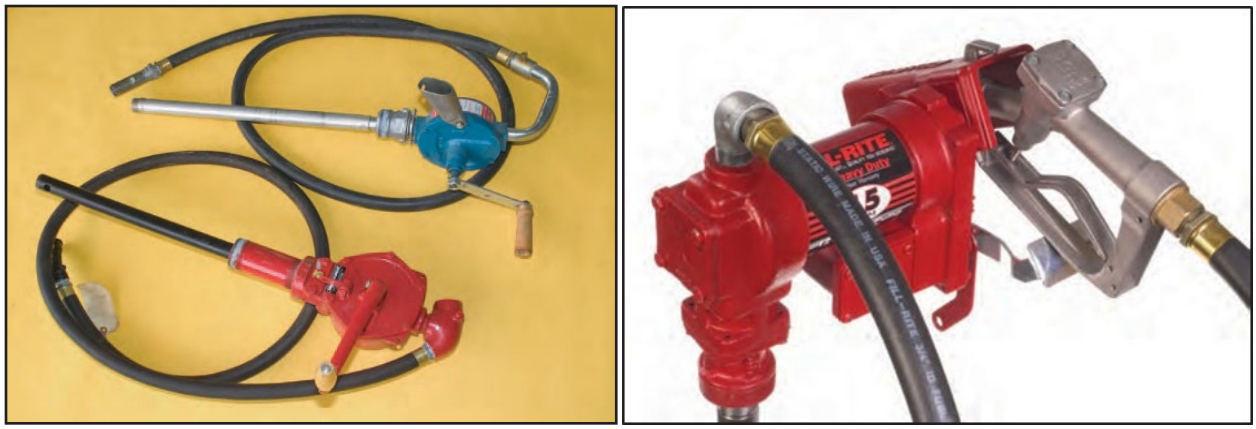
Shipping Papers and the *ERG*

- Required.
- See page 23 for additional information.

Pump Requirements

- The pump shall be UL- or FM-approved for dispensing flammable liquids (Figure 99).

Figure 99: Examples of manual (left) and electric (right) fuel pumps.



- The pump hose shall be UL- or FM-approved for transferring flammable liquids and shall have an internal bonding wire or a conductive cover (Figure 100). The entire hose assembly, including the ends of the hose, shall be electrically conductive.
- A hose swivel should be installed where the hose connects to the nozzle to prevent kinking and to maintain the integrity of the internal bonding wire.

Figure 100: An approved hose.

Dispensing Requirements

- When dispensing fuel, do not leave the tank unattended.
- Drip torches, jerricans, and other approved containers shall be filled on the ground, never in the back of a vehicle.
- The pump nozzle shall contact the container before and during filling to make sure that the container is electrically bonded to the tank (Figure 101).

Figure 101: When a drip torch is filled properly, the pump nozzle touches the container, preventing sparks from static electricity generated by flowing fuel.

Fire Extinguishers

- If the tank is 119 gallons or smaller:
  - At least one 5–B:C or two 4–B:C fire extinguishers are required.
- If the tank is larger than 119 gallons:
  - At least one 10–B:C fire extinguisher is required.

Diesel in Tanks

Diesel may be transported in tanks that do not meet DOT specifications (Figure 102). These tanks are readily available at farm and ranch supply stores. Do not transport drip torch fuel, gasoline, or mixed gas in these tanks.

Figure 102: A typical non-specification tank used for transporting diesel. This photo has been digitally manipulated to show the proper *DIESEL* marking.

Tank Specifications

- None.

Labeling and Placarding

- If the tank is 119 gallons or smaller:
  - The diamond-shaped FLAMMABLE LIQUID label (Figure 103).
  - See page 20 for additional information on labeling.

Figure 103: A *FLAMMABLE LIQUID* label

- If the tank is larger than 119 gallons:
  - The vehicle or trailer must be placarded with the *FLAMMABLE* placard on all four sides (Figure 104, UN identification number included in this example).
  - See page 22 for additional information on placarding.

Figure 104: A placard showing the UN identification number for diesel.

Markings (Only for Tanks 119 Gallons or Smaller)

- *DIESEL* (Figure 105).
- See page 20 for additional information.

Figure 105: A small tank marked for transporting diesel.

- The markings must:
  - Be permanent.
  - Contrast sharply with the tank's background color.
  - Not be obscured by any labels or attachments.
  - Be far enough away from other markings or labels to prevent confusion.
  - Be at least 1 inch high by $^{3}/_{16}$ inch wide.
  - Be applied on the tank where they are easily visible.

Identification Numbers (Only for Tanks Larger than 119 Gallons)

- The identification number *1202* must be displayed on all four sides of the tank or transport vehicle.
- The identification number can be displayed as part of the placard or on a separate orange panel near the placard.
- See page 22 for additional information.

Inspection Criteria

- Visually inspect the outside of the tank before each use to ensure there is no leakage.

Tank Capacity Restrictions

- Tanks shall not be filled to more than 90-percent capacity to leave room for fuel to expand and to reduce the possibility that the tank might leak.

Securing Tanks for Transport in Pickup Trucks

- Tanks 119 gallons or smaller must be mounted as close to the front of the bed as possible.
  - Mount the tank in accordance with manufacturer's instructions. Do not exceed the vehicle GVWR with a full tank.
  - Loose items in the vehicle shall be removed or secured so they cannot damage the tank during transport.
  - All valves must be closed.
  - If the tank is to be transported with an electric or manual pump installed, no part of the pump or its piping shall extend above the vehicle's cab or beyond the vehicle's body.

Special Driver's License Requirements

- For tanks 119 gallons or smaller:
  - None.
- For tanks larger than 119 gallons:
  - CDL with hazmat endorsement. Some states also may require a tank endorsement.

Training

- For tanks 119 gallons or smaller:
  - OSHA *Hazard Communication* training.
- For tanks larger than 119 gallons:
  - OSHA *Hazard Communication* training.
  - DOT general awareness/familiarization, function-specific, safety, security, and driver training.
- See page 29 for additional information.

Shipping Papers and the *ERG*

- For tanks 119 gallons or smaller:
  - Not required.
- For tanks larger than 119 gallons:
  - Required.
- See page 23 for additional information.

Pump Requirements

- The pump shall be approved by UL or FM for dispensing flammable liquids (Figure 106).
- The pump's hose shall be UL- or FM-approved for transferring flammable liquids and shall have an internal bonding wire or a conductive cover (Figure 107). The entire hose assembly, including the ends of the hose, shall be electrically conductive.
- A hose swivel should be installed where the hose connects to the nozzle to prevent kinking and to maintain the integrity of the internal bonding wire.

Figure 106: Examples of manual (left) and electric (right) fuel pumps.

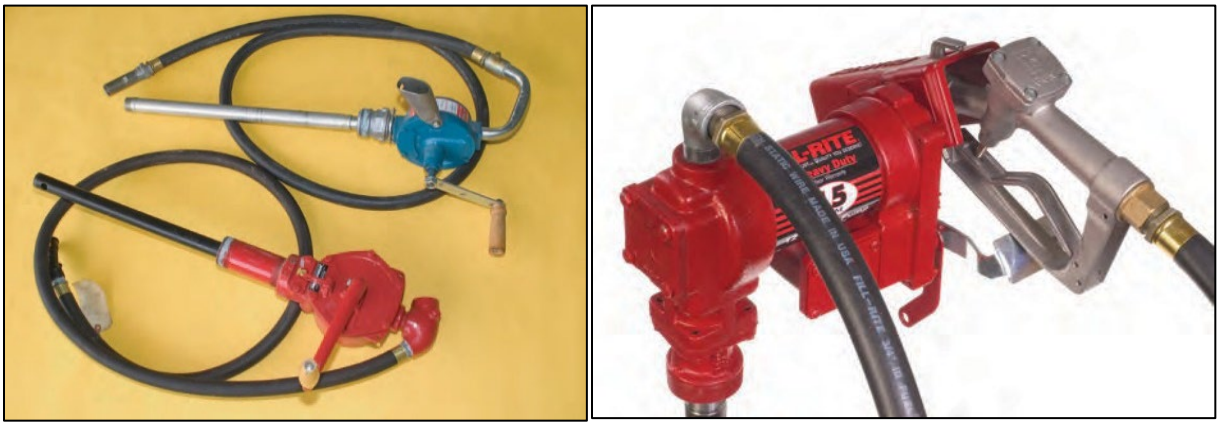


Figure 107: An example of an approved hose.

Dispensing Requirements

- When dispensing fuel, do not leave the tank unattended.
- Containers shall be filled on the ground, never in the back of a vehicle.
- The pump nozzle shall contact the container before and during filling to make sure that the container is electrically bonded to the tank.

Fire Extinguishers

- If the tank is 119 gallons or smaller:
  - At least one 5–B:C or two 4–B:C fire extinguishers are required.
- If the tank is larger than 119 gallons:
  - At least one 10–B:C fire extinguisher is required.

Fuel in Crew Carriers, Helitenders, and Engines

Fuel and other hazardous materials shall not be transported in a crew carrier (Figure 108) if other options are available.

Figure 108: A crew carrier.

Under no circumstances shall fuel be carried in the crew compartment.

If fuel must be transported in a crew carrier, helitender, or engine, the following conditions shall be met:

Allowable Containers and Their Specifications

- Metal jerricans and safety transport cans (UN 3A1 and UN 1A1).
- Plastic jerricans (UN 3H1).
- Drip torches (UN 3B1, UN 1B1, and UN 3A1).

Drip torches that do not meet DOT specifications must not be purchased and must be replaced with DOT-specification drip torches.

- Metal safety cans (UL or FM listed).
- Two-compartment fuel and oil containers (often called Dolmars, CSA, or UL listed).
- Aluminum fuel bottles (National Stock Number 7240–01–351–2133).

Labeling

- Metal jerricans, safety transport cans, drip torches, and metal safety cans:
  - Diamond-shaped *FLAMMABLE LIQUID* label.
- Two-compartment fuel and oil containers and aluminum fuel bottles:
  - Not required.

Marking

- Metal jerricans, safety transport cans, and metal safety cans, gasoline, or mixed gas:
  - *GASOLINE UN1203.*
- Drip torch fuel:
  - *FLAMMABLE LIQUIDS NOS (DIESEL GASOLINE MIXTURE) UN1993.* In addition, the container also may be marked with the words *DRIP TORCH FUEL* to help employees identify the contents.
- Two-compartment fuel and oil containers:
  - *GASOLINE* molded into the container (no additional markings required).
- Drip torches, aluminum fuel bottles, and plastic fuel bottles:
  - None.
- For all of these containers, the markings must:
  - Be permanent.
  - Contrast sharply with the container's background color.
  - Not be obscured by any labels or attachments.
  - Be far enough away from other markings or labels to prevent confusion.
  - Be at least $^{1}/_{4}$ inch high by $^{1}/_{8}$ inch wide.
  - Be applied on the container where they are easily visible.

Inspection Criteria

- Drip torches: Inspect each drip torch before transporting it full of fuel to make sure that the lock ring and plug gaskets are not cut, cracked, or weather checked, and that neither the body nor the cover of the torch has been damaged. Replace or repair drip torches that do not meet these criteria.
- Metal jerricans: Make sure that the lid's gasket is not cut, cracked, or weather checked. Check the body of the can to make sure there is no damage that could allow the can to leak. Replace or repair cans that do not meet these criteria.
- Safety transport cans and safety cans: Make sure that all lid gaskets and pouring valve gaskets and seals are not cut, cracked, or weather checked. Verify that the safety can's linkages operate without binding and that the lids are not deformed. Check the body of the can to make sure there is no damage that could allow the can to leak. Replace or repair cans that do not meet these criteria.
- Two-compartment fuel and oil containers: Make sure that the spout's closure cap and spout O-rings are in place and in good condition, the vent cap is undamaged and closed, and that the container's body has not been damaged. Replace or repair containers that do not meet these criteria.
- Aluminum fuel bottles: Make sure the body, cap, and seal are not damaged and the bottle does not leak. Replace or repair bottles that do not meet these criteria.

Container Capacity Requirements

- Containers shall not be larger than eight gallons.
- Containers shall not be filled more than 90 percent to allow fuel to expand and to reduce the possibility that the container might leak.

Quantity Limitations

- The total weight of all hazardous materials being transported (including their containers) must be 440 pounds or less, and no fuel container should be larger than eight gallons.

Securing Containers for Transport

- If a jerrican is equipped with a spill-proof spout, the spout must be replaced with a bung before the jerrican is transported.
- Make sure that all closures are tight and do not leak. Do not transport leaking containers.
- Wipe any excess fuel from the outside of all containers.
- Containers should be secured so that they will not fall over or move while they are being transported.
- Loose articles in the fuel storage compartment should be removed or secured so they cannot damage the containers while they are being transported.
- Drip torches should not be mounted on a vehicle's bumper.

Incompatible Items

- Fuel should be transported in a separate compartment from other hazardous materials such as fusees, flares, and oxidizers.
- Do not transport fuel in the same vehicle with explosives, poisonous gases, or poisonous liquids.

Design of Fuel Storage Compartments

- If fuel containers will be transported in a vehicle storage compartment, the storage compartment shall be:
    - Separated from the crew compartment by a fireproof boundary, such as a metal floor or walls. The fuel compartment and passenger compartment should not be connected by any openings.
    - As far as possible from the crew compartment doors or exits.
    - As far as possible from the vehicle's exhaust system.
    - Vented to allow fumes to escape. Expanded metal mesh in the sides or floor of the compartment, louvered doors, or a vent pipe may be used for venting (Figure 109). The compartment should not be vented near the exhaust system.

Figure 109: Examples of vented compartments for carrying fuel. The photo on the left shows the vent on the outside of the vehicle. The photo on the right shows the vent on the inside of a compartment used to carry fuel containers.

Do not transport fusees, flares, and oxidizers in the same compartment as fuel.

Labeling Fuel Storage Compartments

- A diamond-shaped *FLAMMABLE LIQUID* label shall be applied to the outside of a storage compartment for flammable liquids (Figure 110).
- This label shall be applied where it is visible, and it must be maintained in good condition.

Figure 110: A *FLAMMABLE LIQUID* label.

Special Driver's License Requirements

- None.

Training

- OSHA Hazard Communication training.
- DOT Materials of Trade training.
- See page 29 for additional information.

Shipping Papers and the *ERG*

- None required.

Fire Extinguishers

- At least one 5–B:C or two 4–B:C fire extinguishers are required.

Fuel Trailers

When fuel is transported on trailers, the container, and tank specifications, labeling, marking, placarding, training, and driver's licensing requirements are the same as those in previous sections of this publication. Additional trailer-specific requirements also must be followed.

Mounting the Tank Properly

- Tanks shall be bolted to metal cross bracing on the trailer—not to expanded metal mesh or wooden decking.

Roll Protection

- Roll protection is not required.

Pump Installation

- The pump shall be removed before the tank is transported on public roads unless the pump does not protrude above the top of the tank. Transfer Flow tanks that have a recessed housing for the pump are designed to meet this requirement (Figure 111). On those tanks, the pump does not have to be removed for transport as long as all of the following requirements are met:
  - The assembly is purchased as a single unit.
  - The tank only has approved gas caps manufactured by Transfer Flow.
  - The tank is tested every 2.5 years with the pump attached.
  - The discharge hose is emptied of all fuel before transport.
  - The pump's electrical power is disconnected during transportation.
- It is not necessary to remove a pump when repositioning the trailer at a burn site.

Figure 111: Transfer Flow tanks that have a recessed housing for the pump are designed so the pump does not protrude above the top of the tank. On these tanks, the pump does not have to be removed for transport as long as it meets requirements. —*Photo courtesy of Transfer Flow, Inc.*

Trailer Brakes

- Trailers with a gross trailer weight rating of 1,500 pounds or more may need to be equipped with trailer brakes that can stop and hold the trailer. The trailer brakes must be designed so the operator can activate them independently of the vehicle's foot brakes. This requirement is based on the trailer's capacity, not on the load the trailer will be carrying. See agency policy for more details.

Trailer Inspections

- The trailer shall be inspected before each use. A more thorough inspection should be performed annually. For sample trailer inspection checklists, visit NWCG's Ground Ignition Subcommittee website, https://www.nwcg.gov/committees/ground-ignition-subcommittee.

Fire Extinguishers

- If the tank is:
  - 119 gallons or smaller:
    - At least one 5–B:C or two 4–B:C fire extinguishers must be carried on the towing unit.
  - Larger than 119 gallons:
    - A minimum of one 10–B:C fire extinguisher must be carried on the towing unit.

Appendix A – Examples of Shipping Papers

Figure 112: Shipping paper for tanks larger than 119 gallons containing gasoline.

Motor carrier		Date
U.S. Department of Agriculture Forest Service		
Number and type	**Description of hazardous materials (ID number, proper shipping name, hazard class, packing group)**	**Quantity and units**
1 tank	***UN1203, gasoline, 3, PG II***	***1 tank***
Emergency response telephone number: (xxx)–xxx–xxxx Name or contract number		

Figure 113: Shipping paper for tanks larger than 119 gallons containing diesel.

Motor carrier	Date

U.S. Department of Agriculture Forest Service

Number and type	Description of hazardous materials (ID number, proper shipping name, hazard class, packing group)	Quantity and units
1 tank	*UN1202, diesel fuel, 3, PG III*	*1 tank*

Emergency response telephone number:
(xxx)–xxx–xxxx
Name or contract number

Figure 114: Shipping paper for tanks smaller than 119 gallons containing drip torch fuel.

Motor carrier		Date
U.S. Department of Agriculture Forest Service		
Number and type	**Description of hazardous materials (ID number, proper shipping name, hazard class, packing group)**	**Quantity and units**
1 tank	***UN1993, flammable liquids, NOS (Diesel Gasoline Mixture), 3, PG II***	***100 gallons***
Emergency response telephone number: (xxx)–xxx–xxxx Name or contract number		

Figure 115: Shipping paper for jerricans containing gasoline and for drums and drip torches containing drip torch fuel.

Motor carrier		Date
U.S. Department of Agriculture Forest Service		
Number and type	**Description of hazardous materials (ID number, proper shipping name, hazard class, packing group)**	**Quantity and units**
10 jerricans	***UN1203, gasoline, 3, PG II***	***50 gallons***
2 drums	***UN1993, flammable liquids, NOS (diesel gasoline mixture), 3, PG II***	***110 gallons***
30 drip torches	***UN1993, flammable liquids, NOS (diesel gasoline mixture), 3, PG II***	***38 gallons***
Emergency response telephone number: (xxx)–xxx–xxxx Name or contract number		

Figure 116: Blank shipping paper.

Motor carrier		Date
Number and type	**Description of hazardous materials (ID number, proper shipping name, hazard class, packing group)**	**Quantity and units**
Emergency response telephone number:		

An editable version of the blank shipping paper can be found at https://www.nwcg.gov/publications/442.

Appendix B – Estimated Weights of Full Containers

These tables assume that no other hazardous materials are being transported.

Container type	Weight when full (pounds)	Maximum number allowed without additional training or shipping papers	Maximum number allowed without placarding or CDL
Drip torch	15	29	66
Safe-T-Way safety transport can (5 gallons)	49	9	20
Metal jerrican (5 gallons)	46	9	21
Plastic jerrican (5 gallons)	43	10	23

Container type	Weight when full (pounds)	Maximum number allowed
Plastic consumer (2½ gallons)	20	22
Plastic consumer (5 gallons)	39	11
Two-compartment container (1½ gallons gasoline plus 2½ quarts oil)	19	23
Metal safety can (2½ gallons)	26	17
Metal safety can (5 gallons)	46	9
Aluminum fuel bottle (1 quart)	2½	40

The *NWCG Standards for Transporting Fuel* is developed and maintained by the Ground Ignition Subcommittee (GISC), under the direction of the Equipment Technology Committee (ETC), an entity of the National Wildfire Coordinating Group (NWCG).

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While they may still contain current or useful information, previous editions are obsolete. The user of this information is responsible for confirming that they have the most up-to-date version. NWCG is the sole source for the publication.

This publication is available electronically at https://www.nwcg.gov/publications/442.

Comments, questions, and recommendations shall be submitted to the appropriate agency program manager assigned to the GISC. View the complete roster at https://www.nwcg.gov/committees/ground-ignition-subcommittee/roster.