



# HAZMAT TRANSPORTATION REQUIREMENTS

*Training, Shipping Assistance, and Packaging Guide for Transporting Hazmat*



U.S. Department  
of Transportation

Pipeline and  
Hazardous Materials  
Safety Administration

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## HAZMAT TRAINING REQUIREMENTS

The Federal hazardous materials transportation law (49 U.S.C. 5101 et seq.) is the statute pertaining to the transportation of hazardous materials (hazmat) in the United States, and requires the training of ALL hazmat employees. The purpose of this training is to increase a hazmat employee's safety awareness and to be an essential element in reducing hazmat incidents. The Hazardous Materials Regulations (HMR) includes training requirements in several sections of Title 49 Code of Federal Regulations (CFR) as follows:

- GENERAL §173.1
- SPECIFIC §172.704
- MODAL
  - ◊◊ Air §175.20
  - ◊◊ Vessel §176.13
  - ◊◊ Highway §§177.800, 177.816

Receiving the required training enhances employee safety and security, and increases employee productivity and skills. Effective training also reduces incidents and accidents thereby reducing operating costs and losses from property damage, thus increasing profits.

## HMR TRAINING REQUIREMENTS

Each hazmat employer must train and test their hazmat employees, certify their training, and develop and retain records of current training.

Hazmat training must include:

- general awareness/familiarization;
- function-specific;
- safety;
- security awareness;
- in-depth security training, if a security plan is required; and
- driver training (for each hazmat employee who will operate a motor vehicle).

## FREQUENCY OF TRAINING

Initial training of new hazmat employees, or an employee who changes job functions, must be completed within 90 days of employment or change in job function. A new employee may perform hazmat job functions before completing training provided the employee does so under the direct supervision of a properly trained and knowledgeable hazmat employee.

Recurrent training is required at least once every three years. The three-year period begins on the actual date of training. Relevant training received from a previous employer or source may be used to satisfy the requirements provided a current record of training is obtained from the previous employer or other sources.

Training conducted by OSHA, EPA, and other Federal or international agencies may be used to satisfy the training requirements in §172.704(a) to the extent that such training addresses the components specified in paragraph (a) of this section (general awareness/familiarization; function-specific; safety; security awareness; in-depth security training, if a security plan is required; and driver training for each hazmat employee who will operate a motor vehicle).

## TRAINING RECORDS

Training records must be kept by the hazmat employer for each hazmat employee, and must include the following:

- the hazmat employee's name;
- the completion date of the most recent training;
- training materials used (copy, description, or location);
- the name and address of the hazmat trainer; and
- certification that the hazmat employee has been trained and tested.

Training records must be retained for each hazmat employee for three years from the date of the last training, and for 90 days after the employee leaves.

## DEFINITIONS

**Training** - a systematic program (consistent approach, testing, and documentation) that ensures a hazmat employee has knowledge of hazmat and the HMR, and can perform assigned hazmat functions properly. See §172.700 through §172.704.

**Hazmat employer** - a person who employs one or more employees regarding:

- transporting hazmat in commerce;
- causing hazmat to be transported or shipped in commerce; or
- designing, manufacturing, fabricating, inspecting, representing, marking, certifying, selling, offering, reconditioning, testing, repairing, or modifying packagings as qualified for use in the transportation of hazmat.

The term "hazmat employer" also includes any department, agency, or instrumentality of the United States, a State, a political subdivision of a State, or Native American Indian tribe engaged in offering or transporting hazmat in commerce. This term includes a person who is self-employed, including an owner-operator of a motor vehicle that transports hazmat in commerce.

**Hazmat employee** - a person employed by a hazmat employer, or person who is self-employed, and who directly affects hazmat transportation safety including:

- an owner-operator of a motor vehicle that transports hazmat;
- a person who:
  - ◊ Loads, unloads, or handles hazmat;
  - ◊ designs, manufactures, fabricates, inspects, tests, reconditions, repairs, modifies, marks, or otherwise represents packagings as qualified for use in the transportation of hazmat;
  - ◊ prepares hazmat for transportation;
  - ◊ is responsible for safety of transporting hazmat; or
  - ◊ operates a vehicle used to transport hazmat.

Compliance Check: Refer to §171.8 for definitions.

## **PREPARING SHIPPING PAPERS**

**§§172.200 - 205, 172.602, 172.604**

The proper shipping description of a hazardous material consists of:

- a Basic Description,
- additional information (depending on materials and mode of transport),
- quantity of hazardous material, and
- Number and type of packaging used.

The Basic Description of a hazardous material includes the Identification Number, the Proper Shipping Name, Hazard Class, and Packing Group (when applicable). This information must be placed on the shipping paper in the specific order required in Part 172, Subpart C of the HMR. The HMR do not require a shipper to use a special form—it requires the proper information be placed on the shipping papers in the proper sequence. The Hazardous Materials Table (HMT) (§172.101) provides a list of hazardous materials.

### **SHIPPING DESCRIPTION**

A correct shipping description includes many components, including the Basic Description, which must be placed on a shipping paper in the sequence required in §172.202(b) of the HMR. An easy way to remember this sequence is to refer to the acronym “ISHP”: **I**dentification **N**umber, **S**hipping **N**ame, **H**azard **C**lass or Division, and **P**acking **G**roup. If a technical name is required, it must be placed in parentheses and listed after the Proper Shipping Name or Basic Description. If applicable, a subsidiary hazard class(es) must be placed in parentheses immediately following the primary hazard class.

The total amount of hazardous materials covered by each description must be indicated by mass or volume with the applicable unit of measure. For example: “200 kgs” or “50 L.” The number and type of packages also

must be indicated and may include the packaging specification, for example: “12 drums,” “12 1H1 drums,” or “12 drums (UN 1A1).” The total quantity and types of packagings must be entered before, after, or both before and after the Basic Description.

### **ADDITIONAL DESCRIPTION**

When additional information is required or provided it must be listed after the Basic Description, unless the HMR states otherwise. Looking at the “Check List” in this guide, you will see many of these identified under Additional Descriptions. Always check §172.203 of the HMR to ensure you have identified all the requirements that pertain to your shipment.

Two exceptions to the regulation for placing additional information after the Basic Description pertain to the “Technical name” and the letters “RQ.” The “Technical Name” may be placed in parentheses after the Proper Shipping Name or after the Basic Description. The “RQ” may be entered either before or after the Basic Description. On a shipping paper with columns specifically identifying hazardous materials, the “RQ” may replace the “X” normally placed in that column.

Some hazardous materials, such as radioactive materials, require much more specific information than is covered here. Always use Part 172, Subpart C, of the HMR for specific details and other information pertaining to your shipment.

## **CHECKLIST**

Check the HMR, Part 172, Subpart C, for specific Shipping paper requirements that may pertain to the materials you are shipping. Use the following as a guide.

The acronym “ISHP” spells out the proper sequence of the Basic Description, as shown: Basic Description (proper sequence §172.202(b)). Use the (HMT) (§172.101) for a complete list of hazardous materials.

Identification Number (HMT Column 4); Proper Shipping Name (HMT Column 2); Hazard Class (HMT Column 3); Packing Group (HMT Column 5).

### **Other Information (§172.202)**

- ① Technical name (“G” in HMT Column 1). See HMR §172.203(k) for specific requirements.
- ② Subsidiary hazard(s) (HMT Column 6)
- ③ Number and type of packages (i.e., “12 drums”or “12 1A1 drums”)
- ④ Total quantity (by mass or volume, i.e., “200 kgs”or “50 L”)
- ⑤ “Net Explosive Mass” for Class 1. See HMR §172.202(a)(5)(i) for specific requirements.
- ⑥ “EX-xxxx” for Class 1 materials when required. See HMR §172.320(d) for specific requirements.

### **Additional Descriptions (§172.203)**

- “DOT-SPxxxxx” Special Permit Number  
“Ltd Qty” or “Limited Quantity”
- ⑦ “RQ” for Reportable Quantity. See Appendix A to §172.101 for specific requirements.  
“RESIDUE: LAST CONTAINED\*\*\*” (Required for tank car with residue)
  - ⑧ “Marine Pollutant” (for non-bulk by vessel and bulk in all modes). See Appendix B of the HMT for specific requirements.
  - ⑨ “Poison-Inhalation Hazard” or “Toxic-Inhalation Hazard” and applicable Hazard Zone, e.g., “Zone A,” “Zone B,” etc., (HMT Column 7 and §172.102)
  - “HOT” for liquid elevated temperature materials, when molten or elevated temperature is not part of proper shipping name. See HMR §172.203(n) for specific requirements.
  - “Organic Peroxides” See HMR §172.203(o) for specific requirements.
  - “Waste” See HMR §172.102 for specific requirements.
  - “Radioactive Material” See HMR §172.203(d) for specific requirements.
  - ⑩ Mode Requirements - Additional information may be required depending on specific mode(s) of transport. See HMR §172.203 for specific requirements.

### **Emergency Response Telephone Number (§172.201(d), §172.604)**

- ⑪ “EMERGENCY CONTACT: xxx-xxx-xxxx” (include international access code, if applicable). Offeror’s name must appear directly before, after, above, or below the ER number unless clearly visible elsewhere.
- ⑫ If the ER number has been contracted with a capable agency, you must include the offeror’s name or the contract number.

### **Shipper’s Certification (§172.204)**

- ⑬ Signed statement: “This is to certify that the above mentioned materials...” See HMR §172.204 for specific certification statements.

## USING THE HAZARDOUS MATERIALS TABLE (HMT) §172.101

Symbols (1)	Hazardous Materials Descriptions and Proper Shipping Names (2)	Hazard Class or Division (3)	Identification Numbers (4)	PG (5)	Label Codes (6)	Special Provisions (\$172.102) (7)	(8) Packaging (\$173.***)			(9) Quantity Limitations	
							Exceptions (8A)	Non-bulk (8B)	Bulk (8C)	Passenger aircraft/rail (9A)	Cargo aircraft only (9B)
	Acrolein, stabilized	6.1	UN1092	I	6.1, 3	1, B9, B14, B30, B42, B77, T22, TP2, TP7, TP13, TP38, TP44	None	226	244	Forbidden	Forbidden
	Copper cyanide	6.1	UN1587	II	6.1	IB8, IP2, IP4 T3, TP33	153	204	242	25kg	100kg
G	Flammable liquids, n.o.s.	3	UN1993	I II III	3 3 3	T11, TP1, TP27 IB2, T7, TP1, TP8, TP28 B1, B52, IB3, T4, TP1, TP29	150 150 150	201 202 203	243 242 242	1L 5L 60L	30L 60L 220L
	Phosphoric acid solution	8	UN1805	III	8	A7, IB3, N34, T4, TP1	154	203	241	5L	60L

The first step in filling out a shipping paper correctly is to refer to the (HMT) §172.101 and find the entry that most appropriately describes the hazardous material(s) you are shipping. This information, known as the Basic Description, will include the Identification Number in Column 4, Proper Shipping Name in Column 2, Hazard Class or Division in Column 3, and Packing Group in Column 5. If a material has one or more subsidiary hazards, they are identified in Column 6. Subsidiary hazards must be listed with the Basic Description.

Codes listed in Columns 1 and 7 indicate there is additional information regarding the hazardous material being shipped—some of which may be required to be entered with the Basic Description. For example, a “G” in Column 1 indicates that the Proper Shipping Name listed must be further identified by the addition of a “technical name” placed in parentheses. The chemical manufacturer or the safety data sheet should provide this information. Special provision codes listed in Column 7 are defined in §172.102.

After the material is identified in the HMT, Appendices A and B also must be checked. Appendix A is a List of Hazardous Substances and Reportable Quantities (RQ). If the material is listed in Appendix A, you must determine if it meets the definition of the hazardous substance(s) prescribed in §171.8. If it does, and the quantity per package meets or exceeds the RQ amount listed, an additional step must be taken to identify it as a reportable quantity on the shipping paper. (See HMR §172.203(c) for specific requirements.)

Appendix B lists Marine Pollutants. Non-bulk packages of hazardous materials that meet the definition of marine pollutant must be marked as such when transported by vessel. When transported by any mode, marine pollutant bulk packages must be identified on the shipping papers. (See HMR §172.203(l) for specific requirements.)

## SHIPPING DESCRIPTIONS

### Hazardous and Non-hazardous Materials\*

No. of Units & Container Type (3)	HM	BASIC DESCRIPTION	TOTAL QUANTITY
1 Box		Carriage Bolts	1000 lbs
4 Drums	X	UN1805, Phosphoric acid solution, 8, PGIII	4 gal
1 Drum	X	UN1993, Flammable liquids, n.o.s. (contains methanol), 3, PGIII	18 gal
		①	
		⑩ This shipment is within limitations for cargo aircraft only.	

\*When not listed first, use a contrasting color or highlight the Basic Description, and/or place an “X” in the “HM” column when provided.

### Toxic Inhalation and Subsidiary Risk

No. of Units & Container Type	BASIC DESCRIPTION	TOTAL QUANTITY
③ 10 drums	UN1092, Acrolein, stabilized, 6.1(3), PG1, Toxic-Inhalation Hazard, Zone A	④ 1 gal

### Reportable Quantity and Marine Pollutant

No. of Units & Container Type	HM	BASIC DESCRIPTION	TOTAL QUANTITY
③	⑦	Identification Number (UN or NA), Proper Shipping Name, Hazard Class, Packing Group, per 172.101, 172.202, 172.203	④
1 Box	X	RQ, UN1587, Copper Cyanide, 6.1, PGII, Marine Pollutant	10 lbs
	⑦	⑧ OR	
1 Box	RQ	UN1587, Copper Cyanide, 6.1, PGII, Marine Pollutant	10 lbs
	⑧		

### Explosives

No. of Units & Container Type	BASIC DESCRIPTION	TOTAL QUANTITY
③ 1 Box	UN0030, Detonators, electric, 1.1B, PGII, EX-number (as applicable)	⑤ .008 Net Explosive Mass

## **SAMPLE SHIPPING PAPER**

## **SHIPPER'S CERTIFICATION**

Persons offering hazardous materials for transportation shall certify that their shipment is offered in accordance with the HMR. The required certification statements are listed in § 172.204. The certification must be signed by a principal, officer, partner, or employee of the shipper or his agent. It may be signed manually, by typewriter, or by other mechanical means.

## **RETENTION**

The person providing the shipping paper shall record the date the hazardous material is accepted by the carrier (this may vary for rail, vessel, or air) and maintain a copy or electronic image of the shipping paper for two years (three years for a hazardous waste). The copies must be accessible at or through the principal place of business and must be made available if requested by an authorized official of a Federal, State, or local government agency at reasonable times and locations. See §172.201 for specific requirements.

## **EMERGENCY RESPONSE INFORMATION**

Shipments of hazardous materials must include emergency response information on the shipping paper itself or a separate document. This emergency response information is used in the event of an incident involving hazardous materials to assist emergency responders at the scene. At a minimum, this information must include:

(1) the Basic Description (including technical name, if applicable),

(2) immediate hazards to health,

(3) risks of fire or explosion,

(4) immediate precautions to be taken in the event of an accident or incident,

(5) immediate methods for handling fires,

(6) initial methods for handling spills or leaks in the absence of fire, and

(7) preliminary first aid measures.

For additional and specific requirements, check Part 172, Subpart G of the HMR.

## **EMERGENCY RESPONSE TELEPHONE NUMBER**

Shipping papers must contain an emergency response telephone number unless specifically excepted in §172.604. This number must include the area code or international access code, as applicable, and be monitored at all times while the material is in transit or in storage incidental to transportation. The person answering must be knowledgeable of the hazardous materials being shipped, or have immediate access to a person with such knowledge. The person must be able to assist first responders at the scene of an incident involving the hazardous materials (e.g., fire or explosion hazards, protective clothing required, and evacuation distances). Answering services, answering machines, beepers, or telephone numbers that require a call back are not permitted.

The emergency response telephone number must be entered immediately following the shipping description for the material or entered once in a prominent area on the shipping paper that is clearly visible and easily identified, for example: "EMERGENCY CONTACT: XXX-XXX-XXXX." If the number is placed in one location, it must apply to all the hazardous materials described on the shipping paper. If separate telephone numbers are needed for different materials, the corresponding emergency response number must be entered immediately after the shipping description to which it applies.

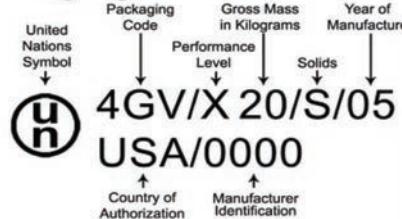
The telephone number may be the number of the person offering the shipment or the number of a hired third-party provider as long as the person monitoring it has the most current information from the offeror on the material and accepts responsibility for providing this information in an emergency. Note that many third-party providers require a contract/fee to provide this service. If a third-party emergency response provider is used, the person who is registered with the provider must be identified by name, contract number, or other unique identifier on the shipping paper directly before, after, above, or below the emergency response number. This information can be entered elsewhere on the shipping paper provided it is prominent, clearly visible, and allows the information to be easily and quickly found.

# PERFORMANCE PACKAGING CODES

## PACKING GROUP (PG)

Packing group means a grouping according to the degree of danger presented by hazardous materials. Packing Group I indicates great danger; Packing Group II, medium danger; Packing Group III, minor danger. Class 2, Class 7, Division 6.2 (other than regulated medical wastes), and ORM-D materials do not have packing groups.

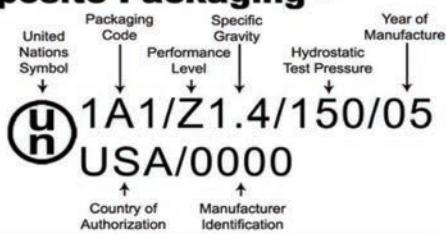
### Combination Packaging



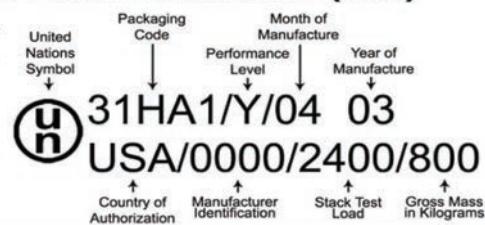
### Single, Combination, or Composite Packaging - Solids



### Single or Composite Packaging - Liquids



### Intermediate Bulk Containers (IBC)



## PACKAGING CODES

### §§178.504 - 178.521

1A1	Steel drum, non-removable head
1A2	Steel drum, removable head
1B1	Aluminum drum, non-removable head
1B2	Aluminum drum, removable head
1D	Plywood drum
1G	Fiber drum
1H1	Plastic drum, non-removable head
1H2	Plastic drum, removable head
1N1	Metal drum, non-removable head
1N2	Metal drum, removable head
2C1	Wooden barrel, bung type
2C2	Wooden barrel, slack type, removable head
3A1	Steel jerrican, non-removable head
3A2	Steel jerrican, removable head
3B1	Aluminum jerrican, non-removable head
3B2	Aluminum jerrican, removable head
3H1	Plastic jerrican, non-removable head
3H2	Plastic jerrican, removable head
4A	Steel box

## INTERPRETING MARKINGS §§178.502 and 178.503

**United Nations Symbol:** For embossing metal receptacles, the letters UN may be applied in place of the symbol.

**Packaging Code:** Designates the type of packaging and material of construction.

A letter "W" designates associate administrator approval. A letter "V" designates special "variation" packaging.

**Performance Level:** Identifies the performance standard for successful testing of the packaging.

- X -** For packagings meeting Packing Group I, II and III tests.
- Y -** For packagings meeting Packing Group II and III tests.
- Z -** For packagings meeting Packing Group III tests.

**Specific Gravity:** Specific gravity for which the packaging design type has been tested. If the specific gravity does not exceed 1.2, the designation may be omitted.

**Gross Mass:** Packaging type tested for maximum gross mass in kilograms.

**S:** Designates that the packaging is intended to contain solids or inner packagings.

**Hydrostatic Test Pressure:** Internal Hydrostatic Test Pressure in Kilopascals. This test is not required for inner packaging of combination packaging.

**Year of Manufacture:** Last two digits of year of manufacture. Plastic drums and jerricans (1H and 3H) must be marked with the month of manufacture. The month marking may be located elsewhere on the package.

## REQUIRED TESTS FOR NON-BULK PACKAGING §§178.502 and 178.503

**Drop Test** (§178.603) All packaging design types.

**Leakproofness Test** (§178.604) All packaging design types intended for liquids.

**Hydrostatic Test** (§178.605) All metal, plastic, and composite design types intended to contain liquids.

**Stacking Test** (§178.606) All packaging design types other than bags.

**Cooperage Test** (§178.607) All bung-type wooden barrels.

**Vibration Test** (§178.608) All packaging design types.

**Infectious Substances** See §178.609 for test requirements for packagings for infectious substances.

**Pressure Differential** (§173.27) Packagings intended for air transport.

## CONVERSION FACTORS §171.10

For compatibility with international transportation standards, most units of measure used in Subchapter C of the 49 CFR are expressed using International System of Units (SI). Where SI units appear (L, kg, kPa) they are the regulatory standard.

U.S. standard or customary units, (gal., lbs., psi) appearing in parentheses following SI units are for information only and not intended to be the regulatory standard.

10 kPa = 1.45 psi
75 kPa = 10.9 psi
95 kPa = 13.8 psi
100 kPa = 14.5 psi
150 kPa = 21.8 psi
250 kPa = 36.3 psi
1 kg = 2.2 lb
25 kg = 55 lb
50 kg = 110 lb
100 kg = 220 lb
150 kg = 330 lb
200 kg = 440 lb
250 kg = 551 lb
0.47 L = 1 pint (US)
0.95 L = 1 quart (US)
1 L = .264 gal (US)
3.8 L = 1 gal (US)
4 L = 1.06 gal (US)
5 L = 1.32 gal (US)
10 L = 2.6 gal (US)

## CONVERSION TABLE

1 lb. = .454 kg; 1 gal. = 3.785 L

Compliance Check. Use the 49 CFR, Parts 100-185

# FEATURED RESOURCES

- 1** HAZMAT Training Modules Online
- 2** DOT CHART 16 Print version
- 3** DOT CHART 16 Mobile App
- 4** Emergency Response Guidebook (ERG) 2016 Mobile Apps
- 5** PHMSA/OSHA Video

All Mobile Apps available at



**1** U.S. Department of Transportation  
Pipeline and Hazardous Materials Safety Administration

**2** DOT CHART 16  
Hazardous Materials Markings, Labeling and Placarding Guide

**3** PHMSA/OSHA  
Hazard Communications

**4** 2016  
EMERGENCY RESPONSE GUIDEBOOK

**5** PHMSA/OSHA Video



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For additional information contact:  
The Hazardous Materials Info Center

1-800-HMR-4922  
(1-800-467-4922)

Email: [infocntr@dot.gov](mailto:infocntr@dot.gov)  
<http://hazmat.dot.gov>

Pipeline and Hazardous Materials  
Safety Administration  
Outreach, Training, and Grants Division  
East Building, 2nd Floor  
1200 New Jersey Ave., SE  
Washington, DC 20590  
Email: [training@dot.gov](mailto:training@dot.gov)  
202-366-4900

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