



Zender Environmental Health and Research Group
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Hazardous Material Regulations Presentations

Backhaul & HMR Training

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Backhaul & HMR Training

Summary of Sections:

1. HMR Training RequirementsPage 3
2. HMR Table Introduction.....Page 9
3. HMR Packaging..... Page 21
4. Marking & Labeling..... Page 27
5. HMR Placarding Page 33
6. HMR Shipping Paperwork Page 39
7. HMR Security Awareness..... Page 45
8. Appendix – Reference Documents Page 51

Section 1



HazMat Training Requirements

HazMat Training Requirements



Hazardous Materials Transportation Training Requirements

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1

The Federal hazardous materials transportation law requires training of all hazmat employees.

49 U.S.C. Section 5107



U.S. Department of Transportation

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2

What's the Difference???

<u>Haz Mat</u>	<u>Haz Waste</u>
	
US DOT	US EPA

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3

DOT Inspections Trends

Common issues identified during inspections include:

- Failure to maintain training records
- Failure to train hazmat employees
- Packages not properly marked and labeled
- Incorrect shipping papers
- Failure to register with PHMSA

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4

HAZMAT INCIDENTS



Hazmat incidents caused by human error can be reduced by implementing an effective training program.

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5

Human Error

Human error may result from a variety of factors including:

- Lack of knowledge leading to **mishandling of hazmat**
- Lack of knowledge leading to **undeclared shipments**
- Lack of **awareness** that hazmat is present
- Failure to follow established **safety procedures**
- Lack of knowledge of **how to respond** to an incident

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6

HazMat Training Requirements

HAZMAT INCIDENTS



Hazmat incidents caused by human error can be reduced by **implementing an effective training program.**

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HMR Training Requirements - 7

7

Human Error

Human error may result from a variety of factors including:

- Lack of knowledge leading to **mishandling of hazmat**
- Lack of knowledge leading to **undeclared shipments**
- Lack of **awareness** that hazmat is present
- Failure to follow established **safety procedures**
- Lack of knowledge of **how to respond** to an incident

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HMR Training Requirements - 8

8



1970 – Train derailment involving propane tank cars...“**Fortunately, an Illinois State Police officer who arrived on scene had training in chemical incidents and warned firefighters, who moved back to safer positions before the tank cars exploded**”

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HMR Training Requirements - 9

9



1997, Value Jet Flight 592 – Improperly packaged, stored, and labeled hazardous materials resulted in aircraft crashing minutes after takeoff...“**A federal grand jury indicted SabreTech for mishandling hazardous materials, failing to train its employees in proper handling of hazardous materials, conspiracy, and making false statements**”

10



2006 – National Transportation Safety Board believes the fire's point of origin may have been at or near a **shipment of lithium-ion batteries.**

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HMR Training Requirements - 11

11



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HMR Training Requirements - 12

12

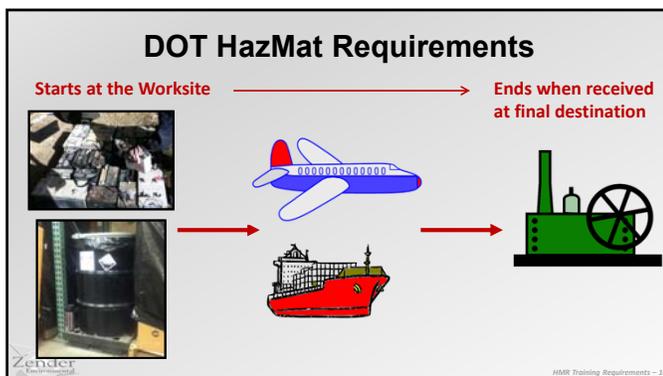
HazMat Training Requirements



13



14



16

DOT HazMat Training Requirements

- The HMR mandates training requirements for persons who prepare hazmat for shipment, who transport hazmat in commerce.
- The intent of the regulations is to ensure that each hazmat employee is familiar with the HMR, is able to recognize and identify hazardous material.
- Understands the functions of his/her job
- Is knowledgeable about emergency response, self-protection measures, security awareness and accident prevention.

Zender Environmental HMR Training Requirements – 17

17

Applicability and Responsibility

- A **hazmat employer** shall ensure that each of their **hazmat employees** are trained.
- The responsibility for training (*and the civil penalties for not training*) rests with the **employer**.

Zender Environmental HMR Training Requirements – 18

18

Who is a Hazmat Employer?

Any person who uses one or more employee in connection with:

- Transporting hazmat in commerce
- Causing hazmat to be transported or shipped
- Representing, marking, certifying, selling, offering, reconditioning, testing, repairing or modifying packagings

Zender Environmental HMR Training Requirements – 19

19

HazMat Training Requirements

Who is a Hazmat Employee

A person who is:

- Employed full-time, part time, or temporarily
- Directly affecting hazmat transportation safety
- Self-employed
- Loads, unloads or handles hazmat
- A railroad signalman or maintenance-of-way employee
- Designs, manufactures, inspects, marks, tests, or reconditions containers
- Prepares hazmat for transportation
- Operates a transport vehicle



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HMR Training Requirements - 20

20

Training Source

- Training may be provided by the employer or other public or private sources
- USDOT does not *approve, endorse, or certify* anyone's training program or product.
- The hazmat employer *certifies* that a hazmat employee has been trained.
- Hazmat training received from a previous employer or other source can be used to meet the HMR requirements provided that a current record of training is obtained from the previous employer.

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HMR Training Requirements - 21

21

Training Frequency

- Initial training must be **completed within 90 days** of hazmat employment or change in job function.
- Hazmat employees must be directly supervised by a trained and knowledgeable employee until trained themselves.
- Recurrent (refresher) training is required **at least every three years**.
- Security awareness training is required at least every three years or when it has been revised.

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HMR Training Requirements - 22

22

Training Requirements

Hazmat employee training must include:

- General awareness / familiarization training
- Function-specific training
- Safety training
- Security awareness training
- In-depth security training (when applicable)

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HMR Training Requirements - 23

23

General Awareness/Familiarization

Designed to:

- Provide familiarity with the requirements of the HMR
- Enable hazmat employees to recognize and identify hazardous materials using the hazard communication standards
- All hazmat employees **must** receive General Awareness Training.



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HMR Training Requirements - 24

24

Function-Specific Training

- Provides a detailed understand of the HMR.
- Each employee must be trained on the specific functions they are required to perform.
- Training needs will depend on the company operations and the employee's responsibilities.



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HMR Training Requirements - 25

25

HazMat Training Requirements

Safety Training

Safety training must cover:

- Hazards presented by hazardous material
- Safe handling
- Emergency response information
- Methods and procedures for accident avoidance
- All hazmat employees must receive this training
- Example: Proper procedures for handling packages containing hazardous materials.



HMR Training Requirements - 26

26

Security Awareness

Security awareness training must provide:

- Awareness of security risks associated with hazmat transportation
- Methods to enhance transportation security
- How to recognize and respond to possible security threats
- **All hazmat employees must receive Security Awareness Training.**



HMR Training Requirements - 27

27

Testing

- Each hazmat employer must ensure that every hazmat employee is tested on the required training subjects.
- The HMR does not set testing methods or standards. The responsibility is on the hazmat employer.
- The regulation does not specify the type of test or grading. This could be a **written** test, **verbal** test or **performance** test. Remember that this must be properly documented.



HMR Training Requirements - 28

28

Record Retention

A record shall be:

- Created and retained by hazmat employer
- A current training record must be retained as long as hazmat employee is employed by that employer, and
- Retained for 90 days after employee is no longer employed by that employer



HMR Training Requirements - 29

29

Record Retention

GENERAL AWARENESS / FAMILIARIZATION					
Description, Copy, and Location of Training	Training Provided By	Test / Score (score not mandatory)	Date Trained	Attachments	

FUNCTION SPECIFIC					
Description, Copy, and Location of Training	Training Provided By	Test / Score (score not mandatory)	Date Trained	Attachments	



HMR Training Requirements - 30

30



Hazardous Materials Transportation Training Modules

Free, interactive training modules available online:

<http://dothazmat.vividlms.com>



HMR Training Requirements - 31

31

Section 2



HazMat Table Introduction

HazMat Table Introduction

Column 1 – Symbols

Symbol	Hazardous materials description and proper shipping name	Hazard class or Division	ID Number	PG	Label Code	Special Provisions (173.102)	(b) Packaging (173.121)				(c) Quantity Limitations (see 173.27 and 173.70)			(d) Vessel Storage	
							Except for	Non-bulk	Bulk	Passenger aircraft only	Cargo aircraft only	Location	Other		
														(8A)	(8B)
(A)	(C)	(3)	(6)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(9C)	(10A)	(10B)	
	Batteries, wet, filled with acid, electric storage	8	UN2794	8	A51	159	159	159	159	35 kg	No limit	A	145		
	Batteries, wet, filled with alkali, electric storage	8	UN2795	8	A51	159	159	159	159	35 kg	No limit	A	52	145	
	Batteries, wet, non-spillable, electric storage	8	UN2800	8		150a	150	150	No limit	No limit	A				
W	Batteries, nickel-metal hydride (see Batteries, dry, sealed, d.s.s. for nickel-metal hydride batteries transported by modes other than vessel)	9	UN3496	9	340								A	25	
	Batteries, dry, containing potassium hydroxide (alkali, electric storage)	8	UN3028	8	237	None	213	None	25 kg	230 kg	A	52			
	Lithium ion batteries including lithium ion polymer batteries	9	UN3480	9	422, 454, 430				185	185	185	Forbidden	35 kg	A	
	Lithium ion batteries contained in equipment (see section 173.155)	9	UN3481	9		185	422	185	185	35 kg		A			

- 7 - DOT HMR Training – General Awareness – HazMat Table

7

Column 1 – Symbols

A – Air Transportation
W – Vessel (Water) Transportation

An “A” or “W” indicates that the material is only subject to HazMat requirements when offered or intended for transportation by aircraft (A) or Vessel (W) respectively.

Note - A hazardous substance or a hazardous waste would need to be managed as HazMat regardless of shipping mode



- 8 - DOT HMR Training – General Awareness – HazMat Table

8

Column 1 – Symbols

Example – The “W” indicates that Nickel Metal Hydride (NiMH) batteries would only be subject to HazMat regulations when shipped by vessel (i.e. water transport).

Symbol	Hazardous materials description and proper shipping name	Hazard class or Division	ID Number	PG	Label Code	Special Provisions (173.102)	(b) Packaging (173.121)				(c) Quantity Limitations (see 173.27 and 173.70)			(d) Vessel Storage	
							Except for	Non-bulk	Bulk	Passenger aircraft only	Cargo aircraft only	Location	Other		
														(8A)	(8B)
(A)	(C)	(3)	(6)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(9C)	(10A)	(10B)	
	Batteries, wet, non-spillable, electric storage	8	UN2800	8		150a	150	150	No limit	No limit	A				
W	Batteries, nickel-metal hydride (see Batteries, dry, sealed, d.s.s. for nickel-metal hydride batteries transported by modes other than vessel)	9	UN3496	9	340								A	25	
	Batteries, dry, containing potassium hydroxide (alkali, electric storage)	8	UN3028	8	237	None	213	None	25 kg	230 kg	A	52			

- 9 - DOT HMR Training – General Awareness – HazMat Table

9

Column 1 – Symbols

G – Generic & Hazard Class, n.o.s.

A “G” indicates shipping names for which one or more technical names of the hazardous material must be entered in parentheses, along with the basic description (i.e. the name used in Column 2).



- 10 - DOT HMR Training – General Awareness – HazMat Table

10

Column 1 – Symbols

Example – The “G” preceding “Refrigerant gases n.o.s.” indicates that more descriptive information would need to be included in parenthesis, after the basic name.

Symbol	Hazardous materials description and proper shipping name	Hazard class or Division	ID Number	PG	Label Code	Special Provisions (173.102)	(b) Packaging (173.121)				(c) Quantity Limitations (see 173.27 and 173.70)			(d) Vessel Storage	
							Except for	Non-bulk	Bulk	Passenger aircraft only	Cargo aircraft only	Location	Other		
														(8A)	(8B)
(A)	(C)	(3)	(6)	(5)	(6)	(7)	(8A) <td>(8B) <td>(8C) <td>(9A) <td>(9B) <td>(9C)</td> <td>(10A)</td> <td>(10B)</td> </td></td></td></td>	(8B) <td>(8C) <td>(9A) <td>(9B) <td>(9C)</td> <td>(10A)</td> <td>(10B)</td> </td></td></td>	(8C) <td>(9A) <td>(9B) <td>(9C)</td> <td>(10A)</td> <td>(10B)</td> </td></td>	(9A) <td>(9B) <td>(9C)</td> <td>(10A)</td> <td>(10B)</td> </td>	(9B) <td>(9C)</td> <td>(10A)</td> <td>(10B)</td>	(9C)	(10A)	(10B)	
G	Refrigerant gases, d.s.s.	2.2	UN1078	2.2		150	306	304	314, 315	75 kg	150 kg	A			

- 11 - DOT HMR Training – General Awareness – HazMat Table

11

Column 1 – Symbols

Example (continued):

Mixed Refrigerant can be designated as and shipped under “Refrigerant gases, n.o.s.”...However, a more descriptive name must be included in parenthesis afterward.

Specifically to mixed recovered refrigerant, the 2 most predominate refrigerant types in the cylinder must be included in parenthesis (the most predominant listed first).

Example – Refrigerant gases, n.o.s. (Refrigerant gas R134a and Refrigerant gas R12)

Symbol	Hazardous materials description and proper shipping name	Hazard class or Division	ID Number	PG	Label Code	Special Provisions (173.102)	(b) Packaging (173.121)				(c) Quantity Limitations (see 173.27 and 173.70)			(d) Vessel Storage	
							Except for	Non-bulk	Bulk	Passenger aircraft only	Cargo aircraft only	Location	Other		
														(8A)	(8B)
(A)	(C)	(3)	(6)	(5)	(6)	(7)	(8A) <td>(8B) <td>(8C) <td>(9A) <td>(9B) <td>(9C)</td> <td>(10A)</td> <td>(10B)</td> </td></td></td></td>	(8B) <td>(8C) <td>(9A) <td>(9B) <td>(9C)</td> <td>(10A)</td> <td>(10B)</td> </td></td></td>	(8C) <td>(9A) <td>(9B) <td>(9C)</td> <td>(10A)</td> <td>(10B)</td> </td></td>	(9A) <td>(9B) <td>(9C)</td> <td>(10A)</td> <td>(10B)</td> </td>	(9B) <td>(9C)</td> <td>(10A)</td> <td>(10B)</td>	(9C)	(10A)	(10B)	
G	Refrigerant gases, d.s.s.	2.2	UN1078	2.2		150	306	304	314, 315	75 kg	150 kg	A			

- 12 - DOT HMR Training – General Awareness – HazMat Table

12

HazMat Table Introduction

Column 2 – Proper Shipping Names

More Examples of Proper Shipping Names...

- Mercury Thermostats = *Mercury contained in manufactured articles*
- Laptops (or cell phones) with batteries = *Lithium ion batteries contained in equipment*
- Wet Nickel Cadmium Batteries – *Batteries, wet, filled with alkali*



- 19 -

DOT HMR Training – General Awareness – HazMat Table

13

Column 2 – Proper Shipping Names

Symbol	Hazardous materials descriptions and proper shipping names	Hazard class or Division	ID Numbers	PG	Label Codes	Special Provisions (§ 173.105)	Packaging (§ 173.171)			Quantity Limitations (see §§ 173.27 and 173.29)		Vessel Storage	
							Except as noted	Non-bulk	Bulk	Passenger aircraft only	Cargo aircraft only	Location	Other
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Batteries, wet, filled with acid, electric storage	8	UN2794	8	A51		159	159	159	30 kg	No limit	A	146
	Batteries, wet, filled with alkali, electric storage	8	UN2795	8	A51		159	159	159	30 kg	No limit	A	52, 146
	Batteries, wet, non-spillable, electric storage	8	UN2800	8			159a	159	159	No limit	No limit	A	
W	Batteries, nickel-metal hydride see Batteries, dry, sealed, e.g., for nickel-metal hydride batteries transported by modes other than vessel	9	UN3495	9	340							A	25
	Batteries, dry, containing potassium	8	UN3028	8	237		None	213	None	25 kg	230 kg	A	52
	Lithium ion batteries including	9	UN3480	9	422, A54		185	185	185	Forbidden	35 kg	A	



- 16 -

DOT HMR Training – General Awareness – HazMat Table

14

Column 2 – Proper Shipping Names

- The HazMat table alphabetically lists the descriptions of hazardous materials & proper shipping names
- Proper shipping names are in:
 - Roman type, and
 - Can be singular or plural

Note – Common names may differ greatly from proper shipping names... The proper shipping name is the formal method of identifying HazMat and must be used on shipping documents.

Example: Lead Acid Batteries = *Batteries, Wet, Filled with Acid*



- 17 -

DOT HMR Training – General Awareness – HazMat Table

15

Column 2 – Proper Shipping Names

Punctuation marks and words in *italics* are not part of the proper shipping name... but may be used in addition to the proper shipping name.

Symbol	Hazardous materials descriptions and proper shipping names	Hazard class or Division
(1)	(2)	(3)
	Batteries, wet, filled with acid, <i>electric storage</i>	8

Lead Acid Batteries (both examples below are acceptable):

- Batteries, wet, filled with acid...*
- Batteries, wet, filled with acid, electric storage*



- 18 -

DOT HMR Training – General Awareness – HazMat Table

16

Column 2 – Proper Shipping Names

More Examples of Proper Shipping Names...

- Mercury Thermostats = *Mercury contained in manufactured articles*
- Laptops (or cell phones) with batteries = *Lithium ion batteries contained in equipment*
- Wet Nickel Cadmium Batteries – *Batteries, wet, filled with alkali*



- 19 -

DOT HMR Training – General Awareness – HazMat Table

17

Column 3 – Hazard Class or Division

Symbol	Hazardous materials descriptions and proper shipping names	Hazard class or Division	ID Numbers	PG	Label Codes	Special Provisions (§ 173.105)	Packaging (§ 173.171)			Quantity Limitations (see §§ 173.27 and 173.29)		Vessel Storage	
							Except as noted	Non-bulk	Bulk	Passenger aircraft only	Cargo aircraft only	Location	Other
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Batteries, wet, filled with acid, electric storage	8	UN2794	8	A51		159	159	159	30 kg	No limit	A	146
	Batteries, wet, filled with alkali, electric storage	8	UN2795	8	A51		159	159	159	30 kg	No limit	A	52, 146
	Batteries, wet, non-spillable, electric storage	8	UN2800	8			159a	159	159	No limit	No limit	A	
W	Batteries, nickel-metal hydride see Batteries, dry, sealed, e.g., for nickel-metal hydride batteries transported by modes other than vessel	9	UN3495	9	340							A	25
	Batteries, dry, containing potassium	8	UN3028	8	237		None	213	None	25 kg	230 kg	A	52
	Lithium ion batteries including	9	UN3480	9	422, A54		185	185	185	Forbidden	35 kg	A	



- 21 -

DOT HMR Training – General Awareness – HazMat Table

18

HazMat Table Introduction

Column 3 – Hazard Class or Division

Column 3 provides a designation of hazard class or division (or “Forbidden”)

A basic description of each hazard class can be found in [49 CFR §173.2](#)



- 22 -

DOT HMR Training – General Awareness – HazMat Table

19

Column 3 – Hazard Class or Division

Examples:

- 2.2 Non-flammable gas (*Refrigerants*)
- 3 Flammable and combustible liquid (*Paint, Diesel*)
- 8 Corrosive Liquid (*Wet Batteries, Thermostats*)
- 9 Miscellaneous (*Lithium batteries, Hazardous waste*)



- 23 -

DOT HMR Training – General Awareness – HazMat Table

20

Column 4 – Identification Numbers

Hazard	Hazardous materials description and proper shipping name	Hazard class or Division	ID Number	PG	Label Code	Special Provisions (§ 173.242)	Packaging (§ 173.243)			Quantity Limitations (see § 173.27 and 173.28)			Vessel Storage	
							Exempt	Non-bulk	Bulk	Passenger aircraft only	Other	Location	Other	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(9C)	(10A)	(10B)
	Batteries, wet, filled with acid, electric storage	8	UN2794	8	A51		159	159	159	35 kg	No limit	A	146	
	Batteries, wet, filled with alkali, electric storage	8	UN2795	8	A51		159	159	159	35 kg	No limit	A	146	
	Batteries, wet, non-spillable, electric storage	8	UN2800	8			159a	159	159	No limit	No limit	A		
W	Batteries, nickel-metal hydride (see Batteries, dry, sealed, § 2.2, for nickel-metal hydride batteries manufactured by models other than 2000)	9	UN3499	9	340								A	25
	Batteries, dry, containing potassium hydroxide (alkali), electric storage	8	UN3028	8	237		None	213	None	25 kg	230 kg	A	52	
	Lithium ion batteries (including lithium ion polymer batteries)	9	UN3480	9	422, 454, 455		185	185	185	Forbidden	35 kg	A		
	Lithium ion batteries contained in equipment including lithium ion polymer batteries	9	UN3481	9	181, 422, 454		185	185	185	5 kg	35 kg	A		
	Lithium ion batteries packed with equipment including lithium ion	9	UN3481	9	181, 422, 454		185	185	185	5 kg	35 kg	A		



- 25 -

DOT HMR Training – General Awareness – HazMat Table

21

Column 4 – Identification Numbers

An **Identification Number** is assigned to each proper shipping name.

Each entry has a 2 letter prefix before a 4 digit number

- “UN” – United Nations
 - Most common prefix and most likely to be used for backhaul materials
 - Appropriate for domestic and international transportation



- 26 -

DOT HMR Training – General Awareness – HazMat Table

22

Column 4 – Identification Numbers

Other ID prefixes to be aware of...

- “NA” – North America
 - Domestic transportation
 - Not recognized for international transportation, except to and from Canada
- “ID” – International Civil Aviation Organization (ICAO)



- 27 -

DOT HMR Training – General Awareness – HazMat Table

23

Column 4 – Identification Numbers

Examples:

- Mercury Thermostats
UN3506 – *Mercury contained in manufactured articles*
- Laptops (or cell phones) with Batteries
UN3481 – *Lithium ion batteries contained in equipment*
- Wet Nickel Cadmium Batteries
UN2795 – *Batteries, wet, filled with alkali*



- 28 -

DOT HMR Training – General Awareness – HazMat Table

24

HazMat Table Introduction

Column 5 – Packing Group

Symbol	Hazardous materials descriptions and proper shipping names	Hazard class or Division	ID Numbers	PG	Label Codes	Special Provisions (173.102)	(8) Packaging (173.21*)					(9) Quantity Limitations (173.27 and 173.7b)		(10) Vessel Storage	
							Except over	Non-bulk	Bulk	Passenger aircraft only	Cargo aircraft only	(8A)	(8B)	(8C)	(8A)
(C)	Lithium metal batteries packed with equipment including lithium alloy batteries	9	UN3091	9	181, 422, A54		185	185	185	5 kg	35 kg	A			
A W	Mercury contained in manufactured articles	8	UN3506	8, 5, 1	A191		154	None	None	No limit	No limit	B	45, 97		
G	Environmentally hazardous substance, solid, 8.5.5	9	UN3077	8, 9	8, 146, 335, 384, A112, 854, 812, 855, 871, 820, 861, 71, 7P(3)		155	213	240	No limit	No limit	A			
	Paint or Paint related material	3	UN1203	8, 3	287, 811, 852, 812, 109, 1P(2)		150	173	242	60 L	220 L	A			
	Paint or Paint related material	8	UN3066	8, 8	287, 82, 852, 7P, 7P(2)		154	173	242	7 L	30 L	A	40		
A W	Rags, oily	4.2	UN3086	8, 4.2	7P(2), 7P(2)		153	213	240	Forbidden	Forbidden	A			
	Dichlorodifluoromethane or	2.2	UN1928	2.2	336		300	300	314	25 kg	330 kg	A			



- 31 -

DOT HMR Training – General Awareness – HazMat Table

31

Column 5 – Packing Group

Packing Group (PG) – Indicates one or more packing groups assigned to a HazMat item.

The PG number helps...

- Determine the relative danger of a HazMat item
- Select the appropriate packaging for a HazMat item

If the PG Column is blank, that indicates the material does not have a Packing Group (and typically more lenient packaging requirements)



- 32 -

DOT HMR Training – General Awareness – HazMat Table

32

Column 5 – Packing Group

Packaging requirements for HazMat items assigned to UN PG I are much higher than the items assigned to PG II and PG III

Packing Group I	PG I	Great Danger
Packing Group II	PG II	Medium Danger
Packing Group III	PG III	Minor Danger

Further details regarding how Packing Groups are determined & assigned are found in [49 CFR 173 Subpart D](#):



- 33 -

DOT HMR Training – General Awareness – HazMat Table

33

Column 6 – Label Codes

Symbol	Hazardous materials descriptions and proper shipping names	Hazard class or Division	ID Numbers	PG	Label Codes	Special Provisions (173.102)	(8) Packaging (173.21*)					(9) Quantity Limitations (173.27 and 173.7b)		(10) Vessel Storage	
							Except over	Non-bulk	Bulk	Passenger aircraft only	Cargo aircraft only	(8A)	(8B)	(8C)	(8A)
(C)	Batteries, wet, filled with acid, electric storage	8	UN2794	8	A51		159	159	159	30 kg	No limit	A	145		
	Batteries, wet, filled with alkali, electric storage	8	UN2795	8	A51		159	159	159	30 kg	No limit	A	52, 145		
	Batteries, wet, non-spillable, electric storage	8	UN2800	8			150a	159	159	No limit	No limit	A			
W	Batteries, nickel-metal hydride see Batteries, dry, sealed, 8.5.5, for nickel metal hydride batteries transported by modes other than vessel	9	UN3496	9	340							A	25		
	Batteries, dry, containing potassium hydroxide or electric storage	8	UN3028	8	237		None	213	None	25 kg	230 kg	A	52		
	Lithium ion batteries including lithium ion polymer batteries	9	UN3480	9	422, A54, A100		185	185	185	Forbidden	35 kg	A			
	Lithium ion batteries contained in equipment including lithium ion	9	UN3481	9	181, 422, A54		185	185	185	5 kg	35 kg	A			



- 34 -

DOT HMR Training – General Awareness – HazMat Table

34

Column 6 – Label Codes

Column 6 specifies the label codes for the required hazard warning labels for a package.

Examples:

Refrigerant gases, n.o.s.



Batteries, Wet, Filled with Acid



Lithium Ion Batteries



- 35 -

DOT HMR Training – General Awareness – HazMat Table

35

Column 6 – Label Codes

If more than one code is present in Column 6:

- The 1st indicates the **primary hazard**
- Additional codes indicate **subsidiary hazards**

Symbol	Hazardous materials descriptions and proper shipping names	Hazard class or Division	ID Numbers	PG	Label Codes	Special Provisions (173.102)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Lithium metal batteries packed with equipment including lithium alloy batteries	9	UN3091		9	181, 422, A54
A W	Mercury contained in manufactured articles	8	UN3506		8, 5, 1	A191
					8, 146, 335,	

Mercury contained in manufactured articles



- 36 -

DOT HMR Training – General Awareness – HazMat Table

36

HazMat Table Introduction

6) Which label is required on a pallet of Lead Acid Batteries?

Start the presentation to see live content. For screen share software, share the entire screen. Get help at pubs.com/app

37

Column 7 – Special Provisions

Symbol	Hazardous materials descriptions and proper shipping names	Hazard class or Division	ID Numbers	PG	Label Codes	Special Provisions (§ 172.102)	Packaging (§ 172.101)			Quantity Limitations (see §§ 172.27 and 172.70)		Vessel Storage	
							Exempt sol.	Non-bulk	Bulk	Passenger aircraft only	Cargo aircraft only	Location	Other
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Batteries, wet, filled with acid, electric storage	8	UN2794	8	A51		159	159	159	30 kg	No limit	A	146
	Batteries, wet, filled with alkali, electric storage	8	UN2795	8	A51		159	159	159	30 kg	No limit	A	52, 146
	Batteries, wet, non-spillable, electric storage	8	UN2800	8			159a	159	159	No limit	No limit	A	
W	Batteries, nickel-metal hydride see Batteries, dry, sealed, s.o.s. for nickel-metal hydride batteries transported by modes other than vessel	9	UN3496	9	340							A	25
	Batteries, dry, containing potassium hydroxide alkali, electric storage	8	UN3028	8	237		None	213	None	25 kg	230 kg	A	52
	Lithium ion batteries including lithium ion polymer batteries	9	UN3480	9	422, A54, A100		185	185	185	Forbidden	35 kg	A	

38

Column 7 – Special Provisions

- Specifies codes for special provisions (SP)
 - Use [49 CFR §172.102](#) for the meaning of the provisions
- Code descriptions
 - Numbers Only = All Applications
 - A = Air Transport Only
 - B = Bulk Transport Only
 - H = Highway Transport Only
 - N = Non-Bulk Transport Only
 - R = Rail Transport Only
 - T = IM Tanks Only
 - W = Water Transport Only

39

Column 7 – Special Provisions

EXAMPLE:
Mercury contained in manufactured articles = SP A191
Note – The “A” in A191 indicates this special provision only applies when transported by aircraft

Symbol	Hazardous materials descriptions and proper shipping names	Hazard class or Division	ID Numbers	PG	Label Codes	Special Provisions (§ 172.102)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Lithium metal batteries packed with equipment including lithium alloy batteries	9	UN3091	9		181, 422, A54
A W	Mercury contained in manufactured articles	8	UN3506	8, 6, 1		A191 8, 146, 335

40

Column 7 – Special Provisions

EXAMPLE:
Mercury contained in manufactured articles
SP A191

Lookup “A191” in [49 CFR §172.102](#)

A191 Except where the defining criteria of another class or division are met, concentrations of formaldehyde solution:

- a. With less than 25 percent but not less than 10 percent formaldehyde, must be described as UN3324, Acute toxic liquid, N.A.S., and
- b. With less than 10 percent formaldehyde, are not subject to this subchapter.

A191 Notwithstanding the Division 6.1 subsidiary risk for this description, the toxic subsidiary risk label and the requirement to indicate the subsidiary risk on the shipping paper are not required for manufactured articles containing less than 5 kg (11 pounds) of mercury.

Note: “most common use” is determined as cargo and may not be carried aboard an aircraft for passengers or crewmembers to carry on baggage, checked baggage, or on their person unless specifically authorized in §175.10.

A210 This substance is forbidden for transport by air. It may be transported on cargo aircraft only with the prior approval of the Associate Administrator.

A212 “UN 2033, Nitric acid, other than red fuming, with more than 20% and less than 65% nitric acid” intended for use in testification devices only, may be transported on passenger aircraft irrespective of the inclusion of “forbidden” in columns (3), of the §172.101 table provided that:

- a. Each inner packaging contains not more than 30 mL;
- b. Each inner packaging is contained in a sealed leak-proof intermediate packaging with sufficient absorbent material capable of containing the contents of the inner packaging;

41

Column 8 – Packaging

Symbol	Hazardous materials descriptions and proper shipping names	Hazard class or Division	ID Numbers	PG	Label Codes	Special Provisions (§ 172.102)	Packaging (§ 172.101)			Quantity Limitations (see §§ 172.27 and 172.70)		Vessel Storage	
							Exempt sol.	Non-bulk	Bulk	Passenger aircraft only	Cargo aircraft only	Location	Other
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Batteries, wet, filled with acid, electric storage	8	UN2794	8	A51		159	159	159	30 kg	No limit	A	146
	Batteries, wet, filled with alkali, electric storage	8	UN2795	8	A51		159	159	159	30 kg	No limit	A	52, 146
	Batteries, wet, non-spillable, electric storage	8	UN2800	8			159a	159	159	No limit	No limit	A	
W	Batteries, nickel-metal hydride see Batteries, dry, sealed, s.o.s. for nickel-metal hydride batteries transported by modes other than vessel	9	UN3496	9	340							A	25
	Batteries, dry, containing potassium hydroxide alkali, electric storage	8	UN3028	8	237		None	213	None	25 kg	230 kg	A	52
	Lithium ion batteries including	9	UN3480	9	422, A54, A100		185	185	185	Forbidden	35 kg	A	

42

HazMat Table Introduction

Column 8 – Packaging

Column 8 identifies the applicable packaging references found in [49 CFR §173.***](#)

- Column 8A - Packaging Exceptions (limited quantities)
- Column 8B - Non-Bulk Packaging requirements
- Column 8C - Bulk Packaging requirements

Note – If “None” listed in column 8B or 8C, YOU cannot use that method

(8) Packaging (§ 173.***)		
Exceptions	Non-bulk	Bulk
(8A)	(8B)	(8C)
159	159	159
159	159	159
159a	159	159



- 43 -

DOT HMR Training – General Awareness – HazMat Table

43

Column 8 – Packaging

Column 8A – Exceptions

- Column 8A contains exceptions from some of the requirements of this subchapter.
- A “None” in this column means no packaging exceptions are authorized, except as may be provided by special provisions in Column 7.
- Exceptions are for small amounts of hazardous materials
- Exceptions and quantity limitations vary based on hazards.



- 44 -

DOT HMR Training – General Awareness – HazMat Table

44

Column 8 – Packaging

Column 8B – Nonbulk Packaging

Non-bulk packaging means a packaging which has:

- (1) Liquids – A receptacle with a maximum capacity of 450 L (119 gallons) or less;
- (2) Solids – A receptacle with a maximum net mass of 400 kg (882 pounds) or less and a maximum capacity of 450 L (119 gallons) or less;
- (3) Gas – A receptacle with a water capacity of 454 kg (1,000 pounds) or less; or
- (4) Regardless of the definition of bulk packaging, a maximum net mass of 400 kg (882 pounds) or less for a bag or a box conforming to the applicable requirements for specification packagings.



- 45 -

DOT HMR Training – General Awareness – HazMat Table

45

Column 8 – Packaging

Column 8C – Bulk Packaging

Bulk packaging means a packaging (other than a vessel or a barge) including a transport vehicle or freight container, in which hazardous materials are loaded with no intermediate form of containment.

Large Packaging in which hazardous materials are loaded with an intermediate form of containment (such as one or more articles or inner packagings) is also bulk packaging.

Additionally, a bulk packaging has:

- (1) Liquid – A receptacle with a maximum capacity greater than 450 L (119 gallons);
- (2) Solid – A receptacle with a maximum net mass greater than 400 kg (882 lbs) and a maximum capacity greater than 450 L (119 gallons); or
- (3) Gas – A receptacle with a water capacity greater than 454 kg (1,000 lbs).



- 46 -

DOT HMR Training – General Awareness – HazMat Table

46

Column 8 – Packaging

EXAMPLE:

Batteries, wet, filled with acid = Packaging Paragraph 159

Symbol	Hazardous materials descriptions and proper shipping names	Hazard class or Division	ID Numbers	PG	Label Codes	Special Provisions (§ 172.102)	(8) Packaging (§ 173.***)		
							Exceptions	Non-bulk	Bulk
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)
	Batteries, wet, filled with acid, electric storage	8	UN2794		8	A51	159	159	159

Note – This example has the same packaging provision reference (173.159) in all 3 columns...this is not always the case



- 47 -

DOT HMR Training – General Awareness – HazMat Table

47

Column 8 – Packaging

EXAMPLE:

Batteries, wet, filled with acid
\$173.159

Lookup §173.159 in [49 CFR §173](#)

Subpart E – NON-BULK PACKAGING FOR HAZARDOUS MATERIALS OTHER THAN CLASS 1 AND CLASS 7	
§ 173.158	Nitric acid.
§ 173.159	Batteries, wet.
§ 173.160	Exceptions for non-spillable batteries.
§ 173.161	Bombs, torpedoes, non-explosive corrosives.
§ 173.162	Chemical kits and first aid kits.
§ 173.163	Gallium.
§ 173.164	Hydrogen fluoride.
§ 173.165	Mercury (metallic and articles containing mercury).
§ 173.166	Polyester resin kits.
§ 173.167	Safety devices.
§ 173.168	Consumer commodities.
§ 173.169	Chemical oxygen generators.
§ 173.170	Black powder for small arms.
§ 173.171	Smokeless powder for small arms.
§ 173.172	Aircraft hydraulic power unit fuel tank.



- 48 -

DOT HMR Training – General Awareness – HazMat Table

48

HazMat Table Introduction

Column 8 – Packaging

EXAMPLE:

Batteries, wet, filled with acid

49 CFR §173.159

This provision provides details on packaging requirements for lead acid batteries under various conditions

173.159 Batteries, wet.

(1) A dangerous evolution of heat (i.e., an amount of heat sufficient to be dangerous to packaging or personal safety to include charring of packaging, melting of packaging, scorching of packaging, or other evidence)

(2) Short circuits, including, but not limited to:

(i) Packaging each battery or each battery-powered device in a manner to prevent contact with other batteries, devices or conductive materials (e.g., metals) in the package(s); or

(ii) Ensuring exposed terminals are protected with non-conductive caps, non-conductive tape, or by other appropriate means; and

(3) Damage to terminals if not impact resistant, the outer packaging must not be used as the sole means of

49

Column 9 – Quantity Limitations

Symbol	Hazardous materials descriptions and proper shipping names	Hazard class or Division	ID Number	PG	Label Codes	Special Provisions (§ 173.162)	Packaging (§ 173.171)			Quantity Limitations (see §§ 173.27 and 173.75)		Vessel Storage	
							Exempt	Net bulk	Bulk	Passenger aircraft only	Cargo aircraft only	Location	Other
(D)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Batteries, wet, filled with acid, electric storage	8	UN2794	8	A51	159	159	159	30 kg	No limit	A	145	
	Batteries, wet, filled with alkali, electric storage	8	UN2795	8	A51	159	159	159	30 kg	No limit	A	52	145
	Batteries, wet, non-spillable, electric storage	8	UN2800	8		159a	159	159	No limit	No limit	A		
W	Batteries, nickel-metal hydride see Batteries, dry, sealed, § 173.163 for nickel-metal hydride batteries transported by modes other than vessel	9	UN3499	9	340							A	25
	Batteries, dry, containing potassium hydroxide alkali, electric storage	8	UN3028	8	237	None	213	None	25 kg	230 kg	A	52	
	Lithium ion batteries including lithium ion polymer batteries	9	UN3480	9	422, A54, A160	185	185	185	Forbidden	30 kg	A		
	Lithium ion batteries contained in				340, 410								

50

Column 9 – Quantity Limitations

- Columns 9A & 9B indicate maximum quantities that may be offered for transportation in one package on...
 - 9A – Passenger-carrying aircraft or passenger-carrying rail car
 - 9B – Cargo aircraft only
- The columns specify the maximum allowable quantities (in Kilograms) per package.
- Quantity limitation is "net" unless otherwise specified.

(9) Quantity Limitations (see §§ 173.27 and 173.75)	
Passenger aircraft/rail (9A)	Cargo aircraft only (9B)
30 kg	No limit
30 kg	No limit
No limit	No limit

51

Column 9 – Quantity Limitations

- "Forbidden" means the material may not be offered for transportation or transported in the applicable mode of transport.
- If "Forbidden" on passenger-carrying aircraft, but permitted on cargo aircraft, it must be labeled with the CARGO AIRCRAFT ONLY label.



52

9) Which material(s) are Forbidden on Cargo Aircraft

- Lithium Batteries
- Lithium-Ion Batteries
- Mercury contained in manufactured articles
- Oily Rags

53

Column 10 – Vessel Stowage

Symbol	Hazardous materials descriptions and proper shipping names	Hazard class or Division	ID Number	PG	Label Codes	Special Provisions (§ 173.162)	Packaging (§ 173.171)			Quantity Limitations (see §§ 173.27 and 173.75)		Vessel Storage	
							Exempt	Net bulk	Bulk	Passenger aircraft only	Cargo aircraft only	Location	Other
(D)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Batteries, wet, filled with acid, electric storage	8	UN2794	8	A51	159	159	159	30 kg	No limit	A	145	
	Batteries, wet, filled with alkali, electric storage	8	UN2795	8	A51	159	159	159	30 kg	No limit	A	52	145
	Batteries, wet, non-spillable, electric storage	8	UN2800	8		159a	159	159	No limit	No limit	A		
W	Batteries, nickel-metal hydride see Batteries, dry, sealed, § 173.163 for nickel-metal hydride batteries transported by modes other than vessel	9	UN3499	9	340							A	25
	Batteries, dry, containing potassium hydroxide alkali, electric storage	8	UN3028	8	237	None	213	None	25 kg	230 kg	A	52	

54

HazMat Table Introduction

Column 10 – Vessel Stowage

Column 10 provides the requirements for storing materials on vessels

- Column 10A specifies authorized stowage locations onboard cargo and passenger vessels – See [49 CFR §172.101\(k\)](#)
- Column 10B specifies codes for more specific stowage requirements – See [49 CFR §176.84](#)

(10) Vessel Stowage	
Location	Other
(10A)	(10B)
A	146
A	52, 146
A	



- 55 -

DOT HMR Training – General Awareness – HazMat Table

55

Appendix A & B

ALSO CHECK THE APPENDICES TO THE HAZMAT TABLE

- Appendix A – The hazardous material may also be a **hazardous substance**
- Appendix B – The hazardous material may also be a **marine pollutant**

56

Appendix A – Hazardous Substances

[Appendix A of 49 CFR 172.101](#) describes and lists **Hazardous Substances** and their **Reportable Quantities**

Hazardous Substances is an EPA term, but overlaps with DOT's Hazardous Materials Requirements.

Table 1 to Appendix A – Hazardous Substances Other Than Radioisotopes

Hazardous substance	Reportable quantity (RQ) (pounds)
A2213	5000 (2270)
Acrylonitrile	100 (45.4)
Average ethylene	5000 (2270)
Acrylonitrile	1000 (454)
Acrylonitrile, inhibited	1000 (454)
Acrylonitrile, trichloro	5000 (2270)
Acrylonitrile	1000 (454)
Acrylonitrile, N-ethylmaleimide	1000 (454)
Acrylonitrile, N-ethylmaleimide	100 (45.4)



- 57 -

DOT HMR Training – General Awareness – HazMat Table

57

Appendix A – Hazardous Substances

A **Hazardous Substances** overlaps with **HazMat** when it...

- Is listed in Appendix A
- Is placed in transportation
- Meets or exceeds the RQ listed on the table per/package (*In pounds and Kilograms*)

Once a material is identified as a **Hazardous Substance** (as defined above) it is now also considered **HazMat**.

Note – “RQ” would be listed along with the *Proper Shipping Name* on shipping documents



- 58 -

DOT HMR Training – General Awareness – HazMat Table

58

Appendix B – Marine Pollutants

[Appendix B of 49 CFR 172.101](#) describes and lists **Marine Pollutants**

Marine Pollutants identified in Appendix B are HazMat, even if the item is not listed on the HazMat table.

“PP” indicates that an item is a **Severe Marine Pollutant**

LIST OF MARINE POLLUTANTS	
S.M.P. Marine pollutants	(2)
Acetone cyanohydrin, stabilized	
Acetylene tetrachloride	
Acetylene tetrachloride	
Acryaldehyde, inhibited	
Acrolein, stabilized	
Acrolein, inhibited	
Acrolein, stabilized	
Acrylic acid, stabilized	
Acrylic aldehyde, inhibited	
Alcohol C-12 - C-16 poly(1-6) ethoxylate	
Alcohol C-6 - C-17 (secondary) poly(3-6) ethoxylate	
Aldehydes	
Alkyls	



- 59 -

DOT HMR Training – General Awareness – HazMat Table

59

Appendix B – Marine Pollutants

If a marine pollutant not listed by name on the HazMat Table...

- You must determine the Hazard class and division
- You must determine the appropriate hazard description and proper shipping name

If a marine pollutant has no Hazard Class 1 - 8 traits, then it shall be described as follows:

- UN 3077 *Environmentally hazardous substance, solid n.o.s.*, 9, or
- UN 3082 *Environmentally hazardous substance, liquid n.o.s.*, 9



- 60 -

DOT HMR Training – General Awareness – HazMat Table

60

HazMat Table Introduction

Summary – Putting it all together

- Step 1:** Determine proper shipping name, Hazard class, ID number and PG (Columns 2-5)
- Step 2:** Determine symbol (Column 1)
- Step 3:** Determine packaging (Columns 5, 7 & 8)
- Step 4:** Determine Labeling (Column 6)
- Step 5:** Determine air/rail quantity limits (if air or rail shipment – Column 9).
- Step 6:** Determine water requirements (if water shipment – Column 10).



- 61 -

DOT HMR Training – General Awareness – HazMat Table

61

Summary: Step 1 – Identify the Material

- Proper Shipping Name (**Column 2**)
- Hazard Class or Division (**Column 3**)
- Identification Number (**Column 4**)
- Packing Group, (**Column 5**)

DON'T FORGET TO CHECK THE APPENDICES TO THE HMT (172.101)

Appendix A – The hazardous material may also be a **hazardous substance**

Appendix B – The hazardous material may also be a **marine pollutant**



- 62 -

DOT HMR Training – General Awareness – HazMat Table

62

Summary: Step 2 – Check the Symbols

Use **Column 1** to determine if any restrictions apply (A, W, G, +, D, or I)



- 63 -

DOT HMR Training – General Awareness – HazMat Table

63

Summary: Step 3 – Determine Packaging

As you will notice, we may use some columns more than once...

- Reference the PG Number (**Column 5**)
- Check special provisions (**Column 7**)
- Determine authorized packaging (**Columns 8A, 8B, 8C**)



- 64 -

DOT HMR Training – General Awareness – HazMat Table

64

Summary: Step 4 – Determine the Labels

Determine the required hazard warning label(s) (**Column 6** – *note certain items may need more than one*)

Furthermore...

- Mark the package appropriately ([49 CFR §172.300](#))
 - Determine placarding requirements ([49 CFR §172.500](#))
- We will discuss marking & placarding in greater detail later*



- 65 -

DOT HMR Training – General Awareness – HazMat Table

65

Summary: Step 5 & 6 – Air, Rail, & Water Restrictions

Step 5: If transporting by air and/or rail – determine packaging limitations (**Column 9A, 9B**)

Step 6: If transporting by water – determine vessel shipment requirements (**Column 10A, 10B**)



- 66 -

DOT HMR Training – General Awareness – HazMat Table

66

Section 3



HazMat Packaging Requirements

HazMat Packaging Requirements



DOT HazMat Training

Packaging

- 1 - DOT HMR Training – General Awareness – Packaging

1

Packaging Module Overview

This Packaging Module will discuss the following topics:

- Special Provisions
 - Packing Group (PG) Numbers
 - Using the HazMat Table
 - Specific Packaging
- Closure Requirement
 - Manufacturers' Responsibilities
 - Shippers' Responsibilities

- 2 - DOT HMR Training – General Awareness – Packaging

2

Special Provisions

Column 7 specifies codes for applicable special provisions

The meaning and requirements of special provisions can be found in [49 CFR §172.102](#)

Symbol	Hazardous materials descriptions and proper shipping names	Hazard class or Division	ID Numbers	PG	Label Codes	Special Provisions (§ 172.102)	Packaging (§ 172.201)				Quantity Limitations (see §§ 172.27 and 172.28)		Vessel Stowage	
							Except air	Non-bulk	Bulk	Passenger aircraft only	Charge aircraft only	Location	Other	
(B)	(D)	(8)	(6)	(B)	(A)	(7)	(NA)	(8B)	(8C)	(8A)	(8D)	(8BA)	(8BB)	
	Batteries, wet, filled with acid, electric storage	8	UN2794	8	A51	159	159	159	30 kg	No limit	A	1A2		
	Batteries, wet, filled with alkali, electric storage	8	UN2795	8	A51	159	159	159	30 kg	No limit	A	1A2	1A3	
	Batteries, wet, non-water, electric storage	8	UN2800	8		159a	159	159	No limit	No limit	A			
(W)	Batteries, nickel-metal hydride see Batteries, dry, sealed, n.o.s. for nickel-metal hydride batteries transported by modes other than aircraft	9	UN3496	9	340							A	25	

- 3 - DOT HMR Training – General Awareness – Packaging

3

Special Provisions – Code Descriptions

Special Provisions identified in Column 7 may...

- Identify additional provisions for the specific hazardous material
- Impose limitations or additional requirements on packaging

- 4 - DOT HMR Training – General Awareness – Packaging

4

Special Provisions – Code Descriptions

The letter preceding the special provision number refers to...

- A** = Air Transport Only
- B** = Bulk Transport Only
- H** = Highway Transport Only
- N** = Non-Bulk Transport Only
- R** = Rail Transport Only
- T** = IM Tanks Only
- W** = Water Transport Only

Numbers Only = All Applications

- 5 - DOT HMR Training – General Awareness – Packaging

5

How to Look-up a Special Provision

EXAMPLE:
Batteries, Dry, Sealed, n.o.s. = SP 130

Note – This is actually a non-Hazmat entry, provided that the requirements specified in special provision 130 are met.

Symbol	Hazardous materials descriptions and proper shipping names	Hazard class or Division	ID Numbers	PG	Label Codes	Special Provisions (§ 172.102)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Batteries, dry, sealed, <u>n.o.s.</u>					130
	Batteries, wet, filled with acid, electric storage	8	UN2794	8	A51	
	Batteries, wet, filled with alkali, electric storage	8	UN2795	8	A51	

- 6 - DOT HMR Training – General Awareness – Packaging

6

HazMat Packaging Requirements

How to Look-up a Special Provision

EXAMPLE:
Batteries, dry, sealed, n.o.s. = **SP 130**

Look up "130" in [49 CFR §172.102](#)

Additional Packaging Requirements

130. Batteries, dry, sealed, n.o.s. are commonly referred to as dry batteries, are hermetically sealed and generally utilize metals as electrodes. These batteries are typically used for portable power applications. They rechargeable (and some non-rechargeable) types have gelated alkaline electrolytes (rather than acidic) making it difficult for them to generate hydrogen or oxygen when over-charged and therefore, differentiating them from non-spillable batteries. Dry batteries specifically covered by another entry in the 172.102 Table must be transported in accordance with the requirements applicable to that entry. For example, nickel-metal hydride batteries transported by vessel in ocean quantities are covered by another entry (see Batteries, nickel-metal hydride, UN3498). Dry batteries not specifically covered by another entry in the 172.102 Table are covered by this entry (i.e. Batteries, dry, sealed, n.o.s.) and are not subject to requirements of this subchapter except for the following:

(a) Incident response. For transportation by aircraft, a telephone report in accordance with §171.15(a) is required if a fire, violent rupture, explosion or dangerous evolution of heat (i.e. an amount of heat sufficient to be dangerous to packaging or personnel safety) is observed during packaging, meeting of packaging, securing of packaging, or other authorized activity as a direct result of a dry battery. For all modes of transportation, a written report submitted, retained, and updated in accordance with §171.16 is required if this incident report, explosion or dangerous evolution of heat occurs as a direct result of a dry battery or battery-powered device.

(b) Preparation for transport. Batteries and battery-powered devices containing batteries must be prepared and packaged for transport in a manner to prevent:

(1) A dangerous evolution of heat;

(2) Short circuits, including but not limited to the following methods:

(i) Packaging each battery or each battery-powered device where practicable, in fully enclosed inner packaging made of non-conductive material;

(ii) Separating or packaging batteries in a manner to prevent contact with other batteries, devices or conductive materials (e.g. metal) in the packaging; or

(iii) Ensuring exposed terminals or connectors are protected with non-conductive caps, non-conductive tape, or by other appropriate means; and

(c) Damage to terminals. If not impact resistant, the outer packaging should not be used as the sole means of protecting the battery terminals from damage or short circuiting. Batteries must be securely cushioned and packed to prevent shifting.

- 9 - DOT HMR Training – General Awareness – Packaging

7

Packing Group Number

Packing Group (PG) – Column 5 indicates one or more packing groups assigned to a HazMat item.

The PG number helps...

- Determine the relative danger, and
- Select the appropriate packaging

If the PG column is blank, that indicates the material does not have a Packing Group (and typically more lenient packaging requirements)

Symbol	Hazardous materials descriptions and proper shipping names	Hazard class or Division	ID Numbers	PG	Label Codes
(1)	(2)	(3)	(4)	(5)	(6)
	Lithium metal batteries packed with equipment including lithium alloy batteries	9	UN3091		9
A-W	Masonry contained in manufactured articles	8	UN3066		8, 6.1
G	Environmentally hazardous substance, sub4, 6.3	9	UN3077		9
	Paint or Paint related material	3	UN1263		3
	Paint or Paint related material	8	UN3066		8
A-W	Rags, oily	4.2	UN3056		4.2
	Dichlorodifluoromethane or	2.3	UN1828		2.3

- 10 - DOT HMR Training – General Awareness – Packaging

8

Packing Group Number

Specifics regarding how Packing Groups are determined & assigned are found in [49 CFR 173 Subpart D](#):

Packing Group I	PG I	Great Danger
Packing Group II	PG II	Medium Danger
Packing Group III	PG III	Minor Danger

The Packing Group number becomes important when we begin selecting our packaging...

We will come back to Packing Groups and their importance in packaging selection a little later.

- 11 - DOT HMR Training – General Awareness – Packaging

9

Packaging

Column 8 identifies the applicable packaging references found in [49 CFR §173.***](#)

The shipper shall determine the packaging depending on if it is a non-bulk or bulk shipment.

Symbol	Hazardous materials descriptions and proper shipping names	Hazard class or Division	ID Numbers	PG	Label Codes	Special Provisions (§ 172.102)	Packaging (§ 173.***)			Quantity limitations (see §§ 173.27 and 173.76)		Tunnel Storage	
							Except non-bulk	Non-bulk	Bulk	Package aircraft only	Other	Location	Other
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Batteries, wet, filled with acid, electric storage	8	UN2794		A51	159	159	159	30 kg	No limit	A	146	
	Batteries, wet, filled with alkali, electric storage	8	UN2795		A51	159	159	159	30 kg	No limit	A	146	
	Batteries, wet, non-spillable, electric storage	8	UN2800			159a	159	159	No limit	No limit	A		
W	Batteries, nickel-metal hydride see Batteries, dry, sealed, s.p.s. for nickel-metal hydride batteries	9	UN3499		340						A	25	

- 12 - DOT HMR Training – General Awareness – Packaging

10

Packaging – Column 8A (Exceptions)

In some cases, packaging exemptions may exist (Column 8A)

All the requirements set forth in the paragraph for exceptions must be met when choosing packaging from an excepted paragraph.

A "None" in this column means no packaging exceptions are authorized, except as may be provided by special provisions in Column 7.

Packaging (§ 173.***)		
Exceptions (8A)	Non-bulk (8B)	Bulk (8C)
159	159	159
159	159	159
159a	159	159

- 13 - DOT HMR Training – General Awareness – Packaging

11

Packaging – Column 8A (Exceptions)

EXAMPLE:
Batteries, wet, non-spillable = Packaging Paragraph 159a

Note – These are the non-spillable variety of lead acid batteries

Symbol	Hazardous materials descriptions and proper shipping names	Hazard class or Division	ID Numbers	PG	Label Codes	Special Provisions (§ 172.102)	Packaging (§ 173.***)		
							Excep-tion (8A)	Non-bulk (8B)	Bulk (8C)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)
	Batteries, wet, non-spillable, electric storage	8	UN2800		8		159a	159	159

- 14 - DOT HMR Training – General Awareness – Packaging

12

HazMat Packaging Requirements

Packaging Selection

EXAMPLE:
Lithium Ion Batteries
§173.185

Lookup §173.185 in
[49 CFR §173](#)

Subpart E—Non-bulk Packaging for Hazardous Materials Other Than Class 1 and Class 7

Contents

- §173.158 Acetic acid.
- §173.159 Batteries, wet.
- §173.159a Exceptions for non-spillable batteries.
- §173.160 Boric, boric, non-explosive boronates.
- §173.161 Chemical kits and first aid kits.
- §173.162 Gases.
- §173.163 Hydrogen fluoride.
- §173.164 Mercury (metals) and articles containing mercury.
- §173.165 Polymer resins.
- §173.166 Safety devices.
- §173.167 Consumer commodities.
- §173.168 Chemical oxygen generators.
- §173.170 Black powder for small arms.
- §173.171 Smokeless powder for small arms.
- §173.172 Aircraft hydraulic power unit fuel tank.
- §173.173 Paint, paint-related material, adhesives, ink and resins.
- §173.174 Refrigrating machines.
- §173.175 Permeation devices.
- §173.176 Capacitors.
- §173.181 Pyrophoric materials (liquids).
- §173.182 Barium azide—50 percent or more water wet.
- §173.183 Hydroperoxide base film.
- §173.185 Lithium cells and batteries.**
- §173.187 Pyrophoric solids, metals or alloys, n.e.c.

- 19 - DOT HMR Training – General Awareness – Packaging

13

Packaging Selection

EXAMPLE:
Lithium Ion Batteries
49 CFR §173.185

Within this paragraph, we can find **specific UN packaging** for this type of HazMat.

(3) For packages containing lithium cells or batteries offered for transportation:

- (i) The lithium cells or batteries must be placed in non-metallic inner packagings that completely enclose the cells or batteries, and separate the cells or batteries from contact with equipment, other devices, or conductive materials (e.g., metal) in the packaging.
- (ii) The inner packagings containing lithium cells or batteries must be placed in one of the following packagings meeting the requirements of part 178, subparts L and M of this subchapter:
 - (A) Metal (4A, 4B, 4C), wooden (4C1, 4C2, 4D, 4F), fiberboard (4G), or solid plastic (4H1, 4H2) box;
 - (B) Metal (1A2, 1B2, 1N2), plywood (1D), fiber (1G), or plastic (1H2) drum;
 - (C) Metal (3A2, 3B2) or plastic (3H2) jerrycan.
- (iii) When packed with equipment, lithium cells or batteries must:
 - (A) Be placed in inner packagings that completely enclose the cell or battery, then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance requirements as specified in paragraph (b)(3)(ii) of this section; or
 - (B) Be placed in inner packagings that completely enclose the cell or battery, then placed with equipment in a package that meets the Packing Group II performance requirements as specified in paragraph (b)(3)(ii) of this section.

- 20 - DOT HMR Training – General Awareness – Packaging

14

Packaging – Review: Bulk Packaging

Column 8C – Bulk Packaging

Bulk packaging means a packaging (other than a vessel or a barge) including a transport vehicle or freight container, in which hazardous materials are loaded with no intermediate form of containment.

Large Packaging in which hazardous materials are loaded with an intermediate form of containment (such as one or more articles or inner packagings) is also bulk packaging.

Additionally, a bulk packaging has:

- (1) Liquid – A receptacle with a maximum capacity greater than 450 L (119 gallons);
- (2) Solid – A receptacle with a maximum net mass greater than 400 kg (882 lbs) and a maximum capacity greater than 450 L (119 gallons); or
- (3) Gas – A receptacle with a water capacity greater than 454 kg (1000 lbs).

- 17 - DOT HMR Training – General Awareness – Packaging

15

Column 8B & 8C – Packaging Selection

EXAMPLE:
Lithium Ion Batteries = Packaging Paragraph 185

Symbol	Hazardous materials descriptions and proper shipping names	Hazard class or Division	ID Number	PG	Label Codes	Special Provisions (§ 172.102)	Packaging (§ 173.185)		
							Except on	Non-bulk	Bulk
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)
	Lithium ion batteries including lithium ion polymer batteries	9	UN3480		9	422, A54, A100	185	185	185

Note – We will be focusing on Non-bulk Packaging, but the same method can be applied to bulk.

- 18 - DOT HMR Training – General Awareness – Packaging

16

Packaging Selection

EXAMPLE:
Lithium Ion Batteries
§173.185

Lookup §173.185 in
[49 CFR §173](#)

Subpart E—Non-bulk Packaging for Hazardous Materials Other Than Class 1 and Class 7

Contents

- §173.158 Acetic acid.
- §173.159 Batteries, wet.
- §173.159a Exceptions for non-spillable batteries.
- §173.160 Boric, boric, non-explosive boronates.
- §173.161 Chemical kits and first aid kits.
- §173.162 Gases.
- §173.163 Hydrogen fluoride.
- §173.164 Mercury (metals) and articles containing mercury.
- §173.165 Polymer resins.
- §173.166 Safety devices.
- §173.167 Consumer commodities.
- §173.168 Chemical oxygen generators.
- §173.170 Black powder for small arms.
- §173.171 Smokeless powder for small arms.
- §173.172 Aircraft hydraulic power unit fuel tank.
- §173.173 Paint, paint-related material, adhesives, ink and resins.
- §173.174 Refrigrating machines.
- §173.175 Permeation devices.
- §173.176 Capacitors.
- §173.181 Pyrophoric materials (liquids).
- §173.182 Barium azide—50 percent or more water wet.
- §173.183 Hydroperoxide base film.
- §173.185 Lithium cells and batteries.**
- §173.187 Pyrophoric solids, metals or alloys, n.e.c.

- 19 - DOT HMR Training – General Awareness – Packaging

17

Packaging Selection

EXAMPLE:
Lithium Ion Batteries
49 CFR §173.185

Within this paragraph, we can find **specific UN packaging** for this type of HazMat.

(3) For packages containing lithium cells or batteries offered for transportation:

- (i) The lithium cells or batteries must be placed in non-metallic inner packagings that completely enclose the cells or batteries, and separate the cells or batteries from contact with equipment, other devices, or conductive materials (e.g., metal) in the packaging.
- (ii) The inner packagings containing lithium cells or batteries must be placed in one of the following packagings meeting the requirements of part 178, subparts L and M of this subchapter:
 - (A) Metal (4A, 4B, 4C), wooden (4C1, 4C2, 4D, 4F), fiberboard (4G), or solid plastic (4H1, 4H2) box;
 - (B) Metal (1A2, 1B2, 1N2), plywood (1D), fiber (1G), or plastic (1H2) drum;
 - (C) Metal (3A2, 3B2) or plastic (3H2) jerrycan.
- (iii) When packed with equipment, lithium cells or batteries must:
 - (A) Be placed in inner packagings that completely enclose the cell or battery, then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance requirements as specified in paragraph (b)(3)(ii) of this section; or
 - (B) Be placed in inner packagings that completely enclose the cell or battery, then placed with equipment in a package that meets the Packing Group II performance requirements as specified in paragraph (b)(3)(ii) of this section.

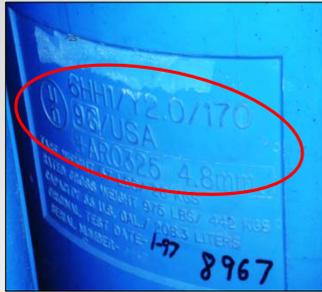
- 20 - DOT HMR Training – General Awareness – Packaging

18

HazMat Packaging Requirements

Packaging – Specific Packaging

- Manufacturers test and mark packaging according to UN Standards
- There are specified codes used for marking



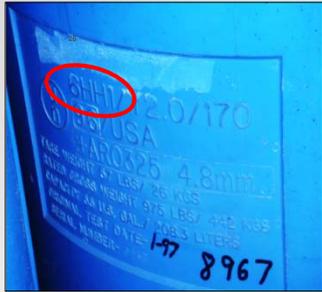
DOT HMR Training – General Awareness – Packaging

19

Packaging – Specific Packaging

The 1st portion of the code indicates type of...

- Container
- Material
- Opening



DOT HMR Training – General Awareness – Packaging

20

Specific Packaging Examples

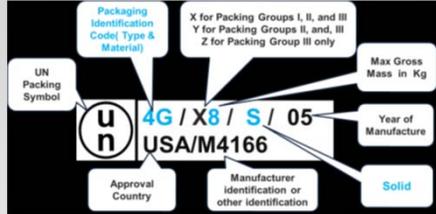


1A1 STEEL DRUM	1A2 STEEL DRUM	1H2 PLASTIC DRUM
1 = Drum	1 = Drum	1 = Drum
A = Steel	A = Steel	H = Plastic
1 = Closed Top (Bung)	2 = Open Top	2 = Open Top

21

Packaging – Specific Packaging

The rest of the code provides additional details...



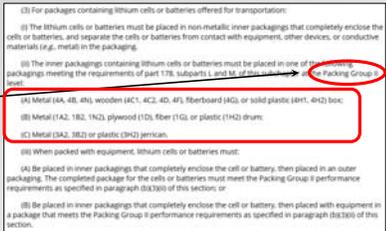
DOT HMR Training – General Awareness – Packaging

22

Packaging Selection

EXAMPLE:
Lithium Ion Batteries
[49 CFR §173.185](#)

Within this paragraph, we can find **specific UN packaging** for this type of HazMat.



DOT HMR Training – General Awareness – Packaging

23

Packaging – Review: Specific Packaging

Read through the packaging provisions

- Review the Special Provisions (**Column 7**)
- Be aware of the Packing Group (**Column 5 - if present**)
- Use the packaging paragraphs to determine adequate packaging material(s) (**Column 8**)



DOT HMR Training – General Awareness – Packaging

24

HazMat Packaging Requirements

Closure Instructions

DOT Specification or UN standard packaging must be closed in accordance with the instructions **provided by the packaging manufacturer** or subsequent distributor



- 29 - DOT HMR Training - General Awareness - Packaging

25

Closure Instructions – Manufactures

Manufacturers...

- The manufacturer of the packaging must provide the closure instructions.

Closure Instructions must...

- Provide for a consistent and repeatable means of closure
- That is sufficient to ensure the packaging is closed in the same manner as it was tested.



- 30 - DOT HMR Training - General Awareness - Packaging

26

Closure Instructions – Manufactures

Notifications of Closure Instructions may be...

- Written
- Embossed
- Printed on the Package

Written Closure Instructions




- 31 - DOT HMR Training - General Awareness - Packaging

27

Closure Instructions – Manufactures

Embossed – “Torque to 20 Ft. Lbs.”

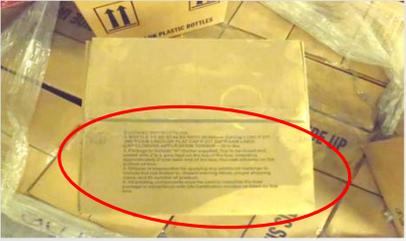



- 32 - DOT HMR Training - General Awareness - Packaging

28

Closure Instructions – Manufactures

Printed on the Packaging




- 33 - DOT HMR Training - General Awareness - Packaging

29

Closure Instructions – Shippers

The shipper **must...**

- Perform all functions necessary to bring the package into compliance (*i.e. – comply with closure instructions*)
- Maintain closure instructions unless permanently embossed or printed on the packaging.



- 34 - DOT HMR Training - General Awareness - Packaging

30

Section 4



HazMat Marking & Labeling

HazMat Marking & Labeling



DOT HazMat Training

Marking & Labeling



- 1 - DOT HMR Training – General Awareness – Marking & Labeling

1

Marking & Labeling Module Overview

This Marking Module will discuss the following topics:

- Marking vs. Labeling
- Markings
 - General Requirements
 - Additional Marking Examples & Requirements
- Labels
 - General Requirements
 - Examples
 - Restrictions & Specifications
 - Placement



- 2 - DOT HMR Training – General Awareness – Marking & Labeling

2

Marking vs. Labeling

What's the difference?

Marking: Mainly refers to UN number, proper shipping names, UN specification marks, and other markings (if applicable);

Labeling: Mainly refers to *hazard symbols* (and handling labels) displayed on small means of packages (usually less than 450 liters)



- 3 - DOT HMR Training – General Awareness – Marking & Labeling

3

Marking – General Requirements

The display of markings must be...

- Durable
- In English
- Affixed to surface or label, tag or sign
- Sharply contrasting background
- Un-obscured by labels or other
- Located away from other marking, such as advertising
- Only authorized abbreviations



- 4 - DOT HMR Training – General Awareness – Marking

4

Marking – General Requirements

Markings shall be placed on the package by the person offering the hazardous material for shipment.

At the very minimum, HazMat markings include...

- Proper shipping name
- UN identification number
- Consignee or Consignor

Additional markings may be required depending on the material, packaging, shipping method, etc.



- 5 - DOT HMR Training – General Awareness – Marking

5

Marking – General Requirements

General Hazard Communication Markings



Proper Shipping Name

Identification Number

Consignor/Consignee



- 6 - DOT HMR Training – General Awareness – Marking

6

HazMat Marking & Labeling

Additional Markings – Examples

Orientation Arrows are required when combination packaging contains a liquid hazardous material.

DOT HMW Training – General Awareness – Marking

7

Additional Markings – Examples

Special Permit Numbers should be included when authorized for use... This example has SP-12283 posted on a "fish tote" of Lead Acid Batteries to be transported by cargo plane.

DOT HMW Training – General Awareness – Marking

8

Additional Markings – Examples

Example – Lead Powder

Technical Names should be included when a "G" is included in Column 1 of the HazMat Table

Symbol	Hazardous materials description and proper shipping name	Hazard class or Division	ID Numbers	PG	Label Codes
(G)	Environmentally hazardous substance, solid, n.o.s.	(9)	(4)	(5)	(6)

DOT HMW Training – General Awareness – Marking

9

Additional Markings – Examples

Example – 10 lbs of Copper Cyanide shipped by Vessel

Marine Pollutant Copper cyanide is listed as a marine pollutant in Appendix B... The Marine Pollutant Mark is required on the packaging if shipped by vessel

Hazardous Substance the letters "RQ" are required on the package in association with the Proper shipping name

DOT HMW Training – General Awareness – Marking

10

Additional Markings – Examples

Example – Lithium Ion Batteries using the "small" battery exemption (Truck & vessel shipments)

Forbidden on Passenger Aircraft Marking Marking indicating this package is forbidden from being transported on passenger aircraft

Lithium-Ion Battery Marking This marking is used for shipping lithium-ion batteries using the "small" battery exemption in [49 CFR §173.185](#)

DOT HMW Training – General Awareness – Marking

11

Additional Markings – Examples

Additional Marking Requirements found in [49 CFR §172 Subpart D](#)

- Prohibited marking – §172.303
- Limited Quantities – §172.315
- Authorized abbreviations – §172.308
- Class 7 (radioactive) – §172.310
- Liquid hazardous materials – §172.312
- ORM-D – §173.316
- Explosives – §172.320
- Infectious Substance – §172.323

DOT HMW Training – General Awareness – Marking

12

HazMat Marking & Labeling

Labeling

General Labeling Requirements:

- 49 CFR 172 Subpart E identifies the requirements for labeling hazardous materials for shipment.
- Similar to marking – each person offering a hazardous material for transportation is also required to communicate the hazard of the material using the applicable label (or labels) for that material
- Exceptions to labeling requirements are identified in 49 CFR §172.400a



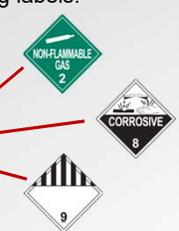
- 15 - DOT HMR Training – General Awareness – Labeling

13

Labeling

Column 6 of the HazMat Table specifies the label codes for the required hazard warning labels.

Symbol	Hazardous materials descriptions and proper shipping names	Hazard class or Division	ID Numbers	PG	Label Codes
(1)	(2)	(3)	(4)	(5)	(6)
	Dichlorodifluoromethane or Refrigerant gas R 12	2.2	UN1028		2.2
	Batteries, wet, filled with acid, electro storage	8	UN2794		8
	Lithium ion batteries including lithium ion polymer batteries	9	UN3480		9




- 16 - DOT HMR Training – General Awareness – Labeling

14

Labeling

Each Hazard Class (and division, when applicable) has a corresponding label




- 17 - DOT HMR Training – General Awareness – Labeling

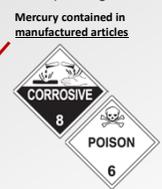
15

Labeling – Subsidiary Risks

If more than one code is present in Column 6:

- The 1st indicates the **primary hazard**
- Additional codes indicate **subsidiary hazards**
- Both labels (in most cases) would need to be affixed to the package

Symbol	Hazardous materials descriptions and proper shipping names	Hazard class or Division	ID Numbers	PG	Label Codes	Special Provisions (§ 172.102)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Lithium metal batteries packed with equipment including lithium alloy batteries	9	UN3091		9	151, 422, A54
A W	Mercury contained in manufactured articles	8	UN3506		8, 6, 1	A191




- 18 - DOT HMR Training – General Awareness – Labeling

16

Labeling – Other Label Examples



Cargo Aircraft Only
Used when forbidden on passenger aircraft
Example: Shipping lead acid batteries by air using SP 12293



Lithium/Li-Ion Label
Used for shipping Lithium-type batteries (under certain conditions)
Example: Shipping fully regulated Lithium/Li-Ion batteries



Empty Label
Used for to indicate a container normally used for HazMat is empty
Example: Shipping an empty DOT approved refrigerant recovery cylinder



- 19 - DOT HMR Training – General Awareness – Labeling

17

Labeling – Restrictions

Restrictions regarding HazMat labeling include...

- Package contains a hazardous material
- Label represents the hazardous material inside package
- Label meets specification requirements of HMR



- 20 - DOT HMR Training – General Awareness – Labeling

18

HazMat Marking & Labeling

Labeling – Specifications

There are specific requirements for the HazMat labels:

- Each label must be...
 - Durable,
 - Weather resistant, and
 - Withstanding a 30-day exposure to conditions in transportation without deterioration or a substantial change in color.
- Hazard labels are...
 - Diamond (square-on-point), and
 - Minimum of 3.9 inches on each side with a solid line border.
- The colors are specific to the hazard class and or division as identified in the 49 CFR §172 Subpart E



- 21 -

DOT HMR Training – General Awareness – Labeling

19

Labeling – Specifications for Other Labels

The Cargo Aircraft Only label must be:

- A rectangle measuring at least 4.3-in tall by 4.7-in wide
- Black on an orange background



- 22 -

DOT HMR Training – General Awareness – Labeling

20

The Lithium-type Battery label must:

- Top half – White with 7 black vertical stripes.
- Black vertical stripes must be spaced, so that, visually, they appear equal in width to the 6 white spaces between them.
- Lower half – White with the symbol (batteries, one broken and emitting flame) & class number "9" underlined and centered at the bottom in black.



Labeling – Placement

Labels must be placed in the following manner...

- On package surface other than bottom
- Same surface near proper shipping name
- Affixed to tag
- Hazard labels
 - Primary and subsidiary label displayed next to each other
 - Within 6 inches
- Contrasting background
- Visible – not obscured



- 23 -

DOT HMR Training – General Awareness – Labeling

21

Labeling – Placement: How Many?

The following number of labels are needed for packaging

- In General, only **one each** for non-bulk packaging (e.g., fiberboard box or 55-gal drum)
- IBCs (i.e.: totes), packages, overpacks w/ volume over 1.8m³ (64 cubic feet) – **two** on two sides or two ends



- 24 -

DOT HMR Training – General Awareness – Labeling

22

Marking & Labeling – Summary

- For each HazMat package, the preparer will need to determine the appropriate markings and labels needed to communicate hazards
- Markings and labels should be...
 - Appropriate/relevant to the packaged HazMat
 - Durable & meet the specification found within the HazMat regulations
 - Appropriately placed & displayed.



- 25 -

DOT HMR Training – General Awareness – Labeling

23

Backhaul & HMR Training

Section 5



HazMat Placarding

HazMat Placarding

DOT HazMat Training

Placarding

DOT HMR Training – General Awareness – Placarding

1

Placarding Module Overview

This Placarding Module will discuss the following topics:

- General Requirements
- Placarding Tables
- “Dangerous” Placards
- ID Numbers
- Subsidiary Hazards
- Exceptions
- Display of Placards

DOT HMR Training – General Awareness – Placarding

2

Placarding

Placarding requirements are found in [49 CFR §172 Subpart F](#):

- Placarding HazMat loads assists in...
 - Hazard Communication
 - Emergency Response
- Each person who offers or transports hazardous materials must comply with the placarding requirements.

DOT HMR Training – General Awareness – Placarding

3

Placarding

Placarding refers to the *hazardous identifiers* used on bulk packaging, freight container, unit load device, transport vehicle or rail car

Placarding may seem similar to labeling requirements, but important differences exist.

DOT HMR Training – General Awareness – Placarding

4

Placarding – General Requirements

How many Placards are needed?

Each...

- Bulk packaging,
- Freight container,
- Unit load device,
- Transport vehicle, or
- Rail car...

that requires placarding must be placarded on each side and each end (i.e. 4 Placards – one on each side)

Note – Freight Containers and Aircraft Unit Load Devices

- Over 640 cubic feet: Placard these with four.
- Under 640 cubic feet: Placard with one by air. Not required by barge

DOT HMR Training – General Awareness – Placarding

5

Placarding – General Requirements

Placards **may not** be displayed on a transport vehicle, portable tank, or freight container **unless**:

- The transported material is a hazardous material
- The placarding represents a hazard of the material
- The placarding conforms to the HazMat regulations

DOT HMR Training – General Awareness – Placarding

6

HazMat Placarding

Placarding – General Requirements

Placarding requirements **do not** apply to:

- Small quantities of certain hazard classes
- Limited quantities
- Infectious substances
- Other regulated material (ORM-Ds)
- Combustible liquids in non-bulk packagings
- Materials prepared in accordance with [49 CFR §173.13](#)



- 7 -

DOT HMR Training – General Awareness – Placarding

7

Placarding Tables

The **Placarding Tables** can be used to determine if a load needs to be placarded

Placarding Tables can be found in:

[49 CFR §172.504\(e\)](#)



- 8 -

DOT HMR Training – General Awareness – Placarding

8

Placarding Tables

Table 1 – Placard Any Quantity

Placarding is required for any quantity of HazMat found within Table 1

Category of material (Hazard class or division number and additional description, as appropriate)	Placard name	Placard design section reference (§)
1.1	EXPLOSIVES 1.1	172.522
1.2	EXPLOSIVES 1.2	172.522
1.3	EXPLOSIVES 1.3	172.522
2.3	POISON GAS	172.540
4.3	DANGEROUS WHEN WET	172.548
5.2 (Organic peroxide, Type B, liquid or solid, temperature controlled)	ORGANIC PEROXIDE	172.552
6.1 (material poisonous by inhalation (see §171.8 of this subchapter))	POISON INHALATION HAZARD	172.555
7 (Radioactive Yellow III label only)	RADIOACTIVE ¹	172.556



- 9 -

DOT HMR Training – General Awareness – Placarding

9

Placarding Tables

Table 2 – 454 kg (1,001 lbs.) aggregate gross weight or more **must** be placarded

Placarding is required for HazMat found in Table 2, if they occur in quantities of 1,001 lbs or greater.

Quantities less than 1,001 lbs **may** be placarded, but it is not required

Category of material (Hazard class or division number and additional description, as appropriate)	Placard name	Placard design section reference (§)
1.4	EXPLOSIVES 1.4	172.522
1.5	EXPLOSIVES 1.5	172.524
1.6	EXPLOSIVES 1.6	172.525
2.1	FLAMMABLE GAS	172.532
2.2	NON-FLAMMABLE GAS	172.535
3	FLAMMABLE	172.542
3.1	COMBUSTIBLE LIQUID	172.544
3.2	FLAMMABLE SOLID	172.544
3.3	SPONTANEOUSLY COMBUSTIBLE	172.547
3.4	POISON	172.550
5.1	ORGANIC PEROXIDE	172.552
5.2 (Other than organic peroxide, Type B, liquid or solid, temperature controlled)	ORGANIC PEROXIDE	172.552
6.2 (other than material poisonous by inhalation)	POISON	172.554
6.3	POISON	172.554
8	CORROSIVE	172.560
9	CHRY 9 (see §173.24(a)(2))	172.560
10	CHRY 10 (see §173.24(a)(2))	172.560
11	CHRY 11 (see §173.24(a)(2))	172.560
12	CHRY 12 (see §173.24(a)(2))	172.560
13	CHRY 13 (see §173.24(a)(2))	172.560
14	CHRY 14 (see §173.24(a)(2))	172.560
15	CHRY 15 (see §173.24(a)(2))	172.560
16	CHRY 16 (see §173.24(a)(2))	172.560
17	CHRY 17 (see §173.24(a)(2))	172.560
18	CHRY 18 (see §173.24(a)(2))	172.560
19	CHRY 19 (see §173.24(a)(2))	172.560
20	CHRY 20 (see §173.24(a)(2))	172.560
21	CHRY 21 (see §173.24(a)(2))	172.560
22	CHRY 22 (see §173.24(a)(2))	172.560
23	CHRY 23 (see §173.24(a)(2))	172.560
24	CHRY 24 (see §173.24(a)(2))	172.560
25	CHRY 25 (see §173.24(a)(2))	172.560
26	CHRY 26 (see §173.24(a)(2))	172.560
27	CHRY 27 (see §173.24(a)(2))	172.560
28	CHRY 28 (see §173.24(a)(2))	172.560
29	CHRY 29 (see §173.24(a)(2))	172.560
30	CHRY 30 (see §173.24(a)(2))	172.560
31	CHRY 31 (see §173.24(a)(2))	172.560
32	CHRY 32 (see §173.24(a)(2))	172.560
33	CHRY 33 (see §173.24(a)(2))	172.560
34	CHRY 34 (see §173.24(a)(2))	172.560
35	CHRY 35 (see §173.24(a)(2))	172.560
36	CHRY 36 (see §173.24(a)(2))	172.560
37	CHRY 37 (see §173.24(a)(2))	172.560
38	CHRY 38 (see §173.24(a)(2))	172.560
39	CHRY 39 (see §173.24(a)(2))	172.560
40	CHRY 40 (see §173.24(a)(2))	172.560
41	CHRY 41 (see §173.24(a)(2))	172.560
42	CHRY 42 (see §173.24(a)(2))	172.560
43	CHRY 43 (see §173.24(a)(2))	172.560
44	CHRY 44 (see §173.24(a)(2))	172.560
45	CHRY 45 (see §173.24(a)(2))	172.560
46	CHRY 46 (see §173.24(a)(2))	172.560
47	CHRY 47 (see §173.24(a)(2))	172.560
48	CHRY 48 (see §173.24(a)(2))	172.560
49	CHRY 49 (see §173.24(a)(2))	172.560
50	CHRY 50 (see §173.24(a)(2))	172.560
51	CHRY 51 (see §173.24(a)(2))	172.560
52	CHRY 52 (see §173.24(a)(2))	172.560
53	CHRY 53 (see §173.24(a)(2))	172.560
54	CHRY 54 (see §173.24(a)(2))	172.560
55	CHRY 55 (see §173.24(a)(2))	172.560
56	CHRY 56 (see §173.24(a)(2))	172.560
57	CHRY 57 (see §173.24(a)(2))	172.560
58	CHRY 58 (see §173.24(a)(2))	172.560
59	CHRY 59 (see §173.24(a)(2))	172.560
60	CHRY 60 (see §173.24(a)(2))	172.560
61	CHRY 61 (see §173.24(a)(2))	172.560
62	CHRY 62 (see §173.24(a)(2))	172.560
63	CHRY 63 (see §173.24(a)(2))	172.560
64	CHRY 64 (see §173.24(a)(2))	172.560
65	CHRY 65 (see §173.24(a)(2))	172.560
66	CHRY 66 (see §173.24(a)(2))	172.560
67	CHRY 67 (see §173.24(a)(2))	172.560
68	CHRY 68 (see §173.24(a)(2))	172.560
69	CHRY 69 (see §173.24(a)(2))	172.560
70	CHRY 70 (see §173.24(a)(2))	172.560
71	CHRY 71 (see §173.24(a)(2))	172.560
72	CHRY 72 (see §173.24(a)(2))	172.560
73	CHRY 73 (see §173.24(a)(2))	172.560
74	CHRY 74 (see §173.24(a)(2))	172.560
75	CHRY 75 (see §173.24(a)(2))	172.560
76	CHRY 76 (see §173.24(a)(2))	172.560
77	CHRY 77 (see §173.24(a)(2))	172.560
78	CHRY 78 (see §173.24(a)(2))	172.560
79	CHRY 79 (see §173.24(a)(2))	172.560
80	CHRY 80 (see §173.24(a)(2))	172.560
81	CHRY 81 (see §173.24(a)(2))	172.560
82	CHRY 82 (see §173.24(a)(2))	172.560
83	CHRY 83 (see §173.24(a)(2))	172.560
84	CHRY 84 (see §173.24(a)(2))	172.560
85	CHRY 85 (see §173.24(a)(2))	172.560
86	CHRY 86 (see §173.24(a)(2))	172.560
87	CHRY 87 (see §173.24(a)(2))	172.560
88	CHRY 88 (see §173.24(a)(2))	172.560
89	CHRY 89 (see §173.24(a)(2))	172.560
90	CHRY 90 (see §173.24(a)(2))	172.560
91	CHRY 91 (see §173.24(a)(2))	172.560
92	CHRY 92 (see §173.24(a)(2))	172.560
93	CHRY 93 (see §173.24(a)(2))	172.560
94	CHRY 94 (see §173.24(a)(2))	172.560
95	CHRY 95 (see §173.24(a)(2))	172.560
96	CHRY 96 (see §173.24(a)(2))	172.560
97	CHRY 97 (see §173.24(a)(2))	172.560
98	CHRY 98 (see §173.24(a)(2))	172.560
99	CHRY 99 (see §173.24(a)(2))	172.560
100	CHRY 100 (see §173.24(a)(2))	172.560



- 10 -

DOT HMR Training – General Awareness – Placarding

10

Placarding – Dangerous Placard

In Lieu of Hazard Class Placards, the "Dangerous" Placard may be used when...

1. There are 2 or more hazardous materials
2. HazMat are only Table 2 items
3. Only Non-Bulk Packages
4. Less than 2,205lbs. Aggregate gross weight loaded at one facility



Note – The "Dangerous" Placard is for Domestic Use Only



- 11 -

DOT HMR Training – General Awareness – Placarding

11

Placarding – Dangerous Placard

You cannot use the "Dangerous" Placard if...

- Any quantity of HazMat found in Table 1,
- 2,205 lbs or more from one class in Table 2,
- Material was loaded at multiple facilities, or
- Utilizing Bulk Packaging



- 12 -

DOT HMR Training – General Awareness – Placarding

12

HazMat Placarding

Placarding – ID Numbers

ID Numbers must be used when...

- **Non-Bulk Packages if:**
 - 8,882 LBS of a Single Commodity, loaded at one facility, and containing no other materials.
- **Bulk Packages: (all Bulk Packages)**
 - ID Number displayed on 4 Sides if > 1,000 Gallons
 - ID Number displayed on 2 Sides if < 1,000 Gallons



- 13 - DOT HMR Training – General Awareness – Placarding

13

Placarding – ID Numbers

UN ID Numbers may be placed on...

<p>Placards</p> 	<p>Orange Panel</p> 	<p>White Square on Point</p> 
---	--	---



- 14 - DOT HMR Training – General Awareness – Placarding

14

Placarding – ID Numbers

Examples of ID Numbers on Non-Bulk Loads






- 15 - DOT HMR Training – General Awareness – Placarding

15

Placarding – ID Numbers

Examples of ID Numbers on Bulk Loads



Greater than 1,000 Gallons
ID No. on 4 Sides

Less than 1,000 Gallons
ID No. on 2 Sides





- 16 - DOT HMR Training – General Awareness – Placarding

16

Placarding – Subsidiary Hazards

Do Subsidiary Hazards need to be Placarded?
For Domestic Transport...

- The subsidiary hazards may be placarded, but
- Placarding subsidiary hazards is only required for three hazards:
 - Poison inhalation
 - Uranium hexafluoride
 - Dangerous when wet

Note – For international transport, any hazard label must also be placarded (including subsidiary hazards)



- 17 - DOT HMR Training – General Awareness – Placarding

17

Placarding – Subsidiary Hazards

Primary and subsidiary placards must display their appropriate class or division number




- 18 - DOT HMR Training – General Awareness – Placarding

18

HazMat Placarding

Placarding – Exceptions

Class 9 Hazards are not required to be placarded when shipping domestically

Note – Bulk shipments must still be marked with the UN number




- 19 - DOT HMR Training – General Awareness – Placarding

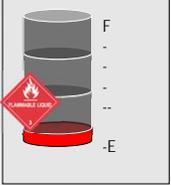
19

Placarding – Exceptions

Empty Containers

Placards not required domestically when...

- Non-bulk packages contain residue of a Table 2 commodity.
- Internationally, packages containing residue shall be treated the same as when full unless steps have been taken to nullify the hazard.
- Bulk packages must remain placarded



- 20 - DOT HMR Training – General Awareness – Placarding

20

Placarding – Exceptions

The following are also examples of exceptions from the placard requirements:

- Domestically Division 6.2 Infectious Substances (*Note – Placard is required for International Shipment*)
- Limited Quantities
- Small/Excepted Quantities
- ORM-D
- Combustible Liquids in Non-Bulk Packaging

Greater details regarding the above and other placarding exceptions can be found in [49 CFR §172.504\(f\)](#)



- 21 - DOT HMR Training – General Awareness – Placarding

21

Placard Specifications

Placards must be:

- Able to withstand 30 day exposure to the elements
- Designed in accordance with [49 CFR §172.519](#)
- Must measure at LEAST 250mm x 250mm (9.84 x 9.84 inches)

Note: Regulations allow use of International placards and may be used in most situations.

For Domestically Bulk Packages containing "Inhalation Hazards," domestic placard must be used.



- 22 - DOT HMR Training – General Awareness – Placarding

22

Display of Placards

Placards must be displayed in the following manner...

- Must be securely attached
- Maintained in good condition
- Located on each side & each end
- Each placard must be readily visible from the direction it faces




- 23 - DOT HMR Training – General Awareness – Placarding

23

Display of Placards

Placards must be displayed in the following manner...

- Displayed horizontally, reading from left to right
- Located clear of devices and materials such as ladders, pipes, doors, tarps etc...
- Away from markings which could reduce the effectiveness




- 24 - DOT HMR Training – General Awareness – Placarding

24

HazMat Placarding

Placards - Summary

- It is the responsibility of shipper or carrier to make sure the correct placards are offered or affixed
- Use the HazMat Regulations and refer to both placarding Table 1 and Table 2 (including the exceptions) to determine required placarding
- Ensure placards are affixed in a manner that meets the display requirements



- 25 -

DOT HMR Training - General Awareness - Placarding

Section 6



HazMat Shipping Paperwork

HazMat Shipping Paperwork



DOT HazMat Training

Shipping Papers

DOT HMR Training – General Awareness – Shipping Papers

1

Shipping Papers Module Overview

This Shipping Papers Module will discuss the following topics:

- General Requirements
- Proper Shipping Descriptions
- Additional Information
- Shipper's Certification
- Record Retention
- Emergency Response

DOT HMR Training – General Awareness – Shipping Papers

2

Shipping Papers

Shipping Papers requirements are found in [49 CFR §172 Subpart C](#):

- There is no specific required document or form for shipping HazMat
- Shipping orders, bill of lading (BOLs), manifests, or other documents may serve as shipping papers
- The only requirement is that the HazMat description on a shipping paper is in accordance with HazMat regulations

DOT HMR Training – General Awareness – Shipping Papers

3

Shipping Papers – General Requirements

In general, display of HazMat Descriptions on Shipping Papers shall be..

- Listed first; or
- Contrasting color; or
- Identified with "X" in HM Column
- Legible
- English
- Use only authorized abbreviations
- Include additional information, where required
- Note continuation pages (i.e., "Page 1 of 4")
- Provide an Emergency response telephone number

DOT HMR Training – General Awareness – Shipping Papers

4

Shipping Papers – General Requirements

EXAMPLE:
Bill of Lading (BOL)



- Listed first; or
- Contrasting color; or
- Identified with "X" in HM Column

DOT HMR Training – General Awareness – Shipping Papers

5

Proper Shipping Description

All columns of the HazMat Table may be relevant when preparing shipping documents, but we will be paying close attention to **Columns 2-5**

Symbol	Hazardous materials descriptions and proper shipping names	Hazard class or Division	ID Numbers	PG	Label Codes	Special Provisions (§ 173.22)	Packaging (§ 173.22)				Quantity Limitations (see §§ 173.27 and 173.28)		Vessel Storage	
							Except as	Yus. Inch.	Ball.	Passenger aircraft only	Other	Location	Other	
(E)	(D)	(3)	14	(8)	(6)	(7)	(A)	(B)	(C)	(4)	(5)	(1)	(2)	
	Batteries, wet, filled with acid, electric storage	8	UN2794	8	A51	159	159	159	30 kg	No limit	A	145		
	Batteries, wet, filled with alkali, electric storage	8	UN2795	8	A51	159	159	159	30 kg	No limit	A	145		
	Batteries, wet, non-spillable, electric storage	8	UN2800	8		159a	159	159	No limit	No limit	A			
	Batteries, nickel-metal hydride see Batteries, dry, sealed, § 173.22 for nickel-metal hydride batteries	9	UN3496	9	340						A	25		

DOT HMR Training – General Awareness – Shipping Papers

6

HazMat Shipping Paperwork

Proper Shipping Description

The Proper Shipping Description of HazMat includes the following elements (in order below):

- Identification number (**Column 4**)
- Proper shipping name (**Column 2**)
- Hazard class or division – including subsidiary risks (**Column 3**)
- Packing Group (**Column 5**)



- 7 -

DOT HMR Training – General Awareness – Shipping Papers

7

Proper Shipping Description

I S H P

No. of Packages & Container Type	HM	Identification Number (UN or NA)	Proper Shipping Name, Hazard Class, and Subsidiary Risk(s)	Packing Group	TOTAL QUANTITY (Mass or Volume)
4 Boxes	X	UN2794	Batteries, wet, filled with acid, 8	8	600 lbs

Id Number

Shipping Name

Hazard Class

Packing Group No. (when present)



- 8 -

DOT HMR Training – General Awareness – Shipping Papers

8

Additional Information

Additional Information to document includes...

- **Technical names** (required for “n.o.s.” entries – such as “Environmentally Hazardous Substance, solid, n.o.s.”)
 - In association with the proper shipping name
 - (Written in parenthesis)
- **Total quantity**
 - Mass or volume
- **Number and type of packages**



- 9 -

DOT HMR Training – General Awareness – Shipping Papers

9

Additional Information – Example

Example:
Bill of Lading (BOL)

STRAIGHT BILL OF LADING					
Shipper's Name		Consignee's Name		Date	
4 Boxes	X	UN2794	Batteries, wet, filled with acid, 8	8	600 lbs
1 Drum	X	RQ, UN3077	Environmentally Hazardous Substance Solid, n.o.s., (contains Polychlorinated Biphenyls), 9, 10	18 lbs	18 lbs

Number and type of packages

Technical Name

Total Quantity



- 10 -

DOT HMR Training – General Awareness – Shipping Papers

10

Additional Information

More examples of Additional Information includes...

- **Special Permits (Exemptions)**
- **Using the word “Waste”** if it is a Hazardous Waste



- 11 -

DOT HMR Training – General Awareness – Shipping Papers

11

Additional Information – Example

Example: Air Carrier Dangerous Goods Declaration

NATURE AND QUANTITY OF DANGEROUS GOODS					
Dangerous Goods Identification			Quantity and type of packaging	Packing Inst.	Authorization
UN or NA No.	Proper Shipping Name	Hazard Class, Division, and Subsidiary Risk(s)			
UN2794	Batteries, Wet, Filled with Acid	8	1 Plastic Totals - 1,800 lbs		DOT-SP 12263

Special Permit Number



- 12 -

DOT HMR Training – General Awareness – Shipping Papers

12

HazMat Shipping Paperwork

Additional Information – Example

Example:
Hazardous Waste Manifest

“Waste” indicating the material is a Hazardous Waste

DOT HMR Training – General Awareness – Shipping Papers

13

Shipper’s Certification

Each person who offers a HazMat for transportation shall certify that the material is offered in accordance with HazMat Regulations.

Shipper certifications...

- (1) Must be legibly signed by a principal, officer, partner, or employee of the shipper or his agent; and
- (2) May be legibly signed manually, by typewriter, or by other mechanical means.

Emergency Contact: 1-800-555-1234

This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

Signed: *HTM Annual*
Date: *Oct. 10, 2005*

DOT HMR Training – General Awareness – Shipping Papers

14

Record Retention Requirements

Shipping paper records must be...

- Copy or electronic images
 - Include date of acceptance by initial carrier
 - Retained by shipper for two years
 - Retained by carrier for one years
 - Hazardous waste retained 3 years
- Accessible at or through principal place of business
- Must be made available upon authorized official request

DOT HMR Training – General Awareness – Shipping Papers

15

Emergency Response

The person offering HazMat for transport must provide and maintain information regarding **Emergency Response** relevant to the shipment. This includes...

- Emergency Response Information
- Emergency Response Telephone Number

Emergency response information must be immediately available for use at all times the hazardous material is present

DOT HMR Training – General Awareness – Shipping Papers

16

Emergency Response Information

At minimum, Emergency Response Information for HazMat offered for transport must include...

- Basic description and technical name
- Immediate hazards to health
- Risks of fire or explosion
- Immediate precautions to be taken in the event of an accident or incident
- Immediate method for handling fires
- Initial methods for handling spills or leaks in the absence of fire
- Preliminary first aid measures

DOT HMR Training – General Awareness – Shipping Papers

17

Emergency Response Information

Emergency Response Information must be available during transportation and at facilities where the HazMat is...

- Loaded for transportation
- Stored incidental to transportation
- Handled during any phase of transport

Emergency Response Information must be available and maintained by persons who...

- Offer HazMat for transportation
- Accept HazMat for transportation
- Transfer HazMat during transportation
- Handle HazMat during transportation

DOT HMR Training – General Awareness – Shipping Papers

18

HazMat Shipping Paperwork

Emergency Response Information

The Emergency Response information must be...

- Printed legibly in English
- Availability away from hazardous materials package
- Presented on the shipping paper or in another document that includes:
 - Basic description
 - Technical names



- 23 - DOT HMR Training - General Awareness - Shipping Papers

19

Emergency Response Information

Example:
Safety Data Sheet (SDS)

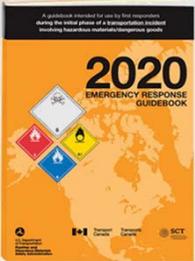



- 24 - DOT HMR Training - General Awareness - Shipping Papers

20

Emergency Response Information

Example:
Emergency Response Guidebook




- 25 - DOT HMR Training - General Awareness - Shipping Papers

21

Emergency Response Information

Emergency Response Information must be available...

- At all times the HazMat is present
- Immediately available during accident or incident to emergency personnel (*including the emergency response telephone number*)
- During investigations to Federal, State, or Local government representatives



- 26 - DOT HMR Training - General Awareness - Shipping Papers

22

Emergency Response Telephone Number

HazMat Regulations require that the Emergency Response Telephone Number is 1) listed on the shipping papers and 2) is monitored at all times while the HazMat is in transport (not just during business hours).

Further, the contact number must be monitored by someone who...

- Is knowledgeable of the hazardous materials listed,
- Accepts responsibility for providing pertinent information, and
- Has comprehensive emergency response and incident mitigation information for that material; or
- Has immediate access to a person who possesses such knowledge



- 27 - DOT HMR Training - General Awareness - Shipping Papers

23

Emergency Response Telephone Number

The Emergency Response Telephone numbers must include:

- Contract number for use of agency or organization taking responsibility for answering
- Name of consignor (shipper)
- Additional requirement for International numbers
 - International access code or "+" (plus) sign
 - Country code and city code as appropriate



- 28 - DOT HMR Training - General Awareness - Shipping Papers

24

HazMat Shipping Paperwork

Emergency Response Telephone Number

Must be listed – 1) immediately after the HazMat description



- 29 -

DOT HMR Training – General Awareness – Shipping Papers

25

Emergency Response Telephone Number

Or must be listed – 2) In a prominent, readily identifiable, and clearly visible manner that allows the information to be easily and quickly found.



- 30 -

DOT HMR Training – General Awareness – Shipping Papers

26

Shipping Papers - Summary

- The person completing the shipping papers is also responsible for its accuracy
- Remember to enter HazMat Proper Shipping Description onto shipping papers in "I", "S", "H", "P" order
- Include all required additional information
- Certify the shipment conforms to all applicable HazMat regulations
- Provide the relevant Emergency Response Information and Telephone Number
- Retain records, as appropriate



- 36 -

DOT HMR Training – General Awareness – Shipping Papers

27

Section 7



HazMat Security Awareness

HazMat Security Awareness



DOT HazMat Training

Security Awareness



- 1 - DOT HMR Training - Security Awareness

1

Training Objectives...

The goal of this training is to provide awareness of security risks associated with HazMat transportation

This training will assist HazMat employees in...

- Identifying HazMat security risks;
- Methods to enhance security;
- Recognizing and responding to security threats.



- 2 - DOT HMR Training - Security Awareness

2

Training Requirements...

Federal regulations require all HazMat employees to be **trained and tested** in security awareness within...

- 1) 90 days of hire; or
- 2) 90 days of a current employee beginning a position where performing HazMat activities.

HazMat employees are required to be retrained (refresher training) **every 3 years**.



- 3 - DOT HMR Training - Security Awareness

3

Security Risks...

Hazardous materials, by definition, pose an unreasonable risk to health, safety, and property.

The processes of storing, preparing for shipment, and transporting HazMat poses additional **security risks**.



- 4 - DOT HMR Training - Security Awareness

4

Security Risks...

Due to its hazardous nature, unauthorized access to HazMat can pose a significant security risks such as...

- Theft;
- Vandalism;
- Sabotage;
- Acts of violence (including acts of terrorism).

The intentional or unintentional misuse of HazMat can (and has) harmed people and caused property damage.



- 5 - DOT HMR Training - Security Awareness

5

Potential Threats

Risks to HazMat security can come from both **internal** and **external** sources.



- 6 - DOT HMR Training - Security Awareness

6

HazMat Security Awareness

Potential Threats – Internal Sources

Internal security threats occur from within an organization.

Examples...

- _____
- _____
- _____
- _____
- _____



- 7 -

DOT HMR Training – Security Awareness

7

Potential Threats – External Sources

External security threats occur from outside the organization (i.e. nonemployees).

Examples...

- _____
- _____
- _____
- _____
- _____



- 8 -

DOT HMR Training – Security Awareness

8

Potential Targets

Potential targets will be dependent largely on the...

- 1) Type of HazMat an organization manages; and
- 2) HazMat activities an organization conducts.



- 9 -

DOT HMR Training – Security Awareness

9

Potential Targets

Examples of Potential Targets:

- _____
- _____
- _____
- _____
- _____



- 10 -

DOT HMR Training – Security Awareness

10

Methods to Enhance Security

Specific method to enhance HazMat security will be dependent on...

- 1) An organizations' activities; and
- 2) The HazMat they are responsible for managing.

An organization should identify and implement the measures that best fit their current practices and would best enhance their HazMat security.



- 11 -

DOT HMR Training – Security Awareness

11

Methods to Enhance Security

Examples of methods of enhancing HazMat security are categorized in the following manner:

- Employee Security Measures
- Facility Security Measures
- Transportation Security Measures
- Receiving Security Measures



- 12 -

DOT HMR Training – Security Awareness

12

HazMat Security Awareness

Methods to Enhance Security - Employees

Examples of security measures taken with employees...

- _____
- _____
- _____
- _____
- _____



- 13 - DOT HMR Training - Security Awareness

13

Methods to Enhance Security - Facilities

Examples of security measures taken at facilities...

- _____
- _____
- _____
- _____
- _____



- 14 - DOT HMR Training - Security Awareness

14

Methods to Enhance Security - Transport

Examples of security measures while HazMat is in transport...

- _____
- _____
- _____
- _____
- _____



- 15 - DOT HMR Training - Security Awareness

15

Methods to Enhance Security - Receiving

Examples of security measures taken when receiving HazMat...

- _____
- _____
- _____
- _____
- _____



- 16 - DOT HMR Training - Security Awareness

16

Recognizing Security Threats

Examples of security threats that should prompt further investigation...

- _____
- _____
- _____
- _____
- _____



- 17 - DOT HMR Training - Security Awareness

17

Responding to Security Threats

Examples of Responses to Security Threats...

- _____
- _____
- _____
- _____
- _____



- 18 - DOT HMR Training - Security Awareness

18

HazMat Security Awareness

Responding to Security Threats

Responses will depend on the specific situation and the nature of the threat. The following are responses that may be appropriate to take when confronting a HazMat security threat:

- Do not endanger yourself or others;
- Alert others in the immediate area;
- Initiate evacuation procedures if the scene is unsafe;
- Notify designated person(s) (Lead, supervisor, manager, etc.);



- 19 -

DOT HMR Training – Security Awareness

19

Responding to Security Threats

Continued – The following are responses that may be appropriate to take when confronting a HazMat security threat:

- Notify law enforcement;
- Gather important details;
 - License plate numbers or vehicle descriptions;
 - Description of persons involved;
 - Location of occurrence;
 - Document occurrences;
- Revisit security plan and improve, if relevant or necessary.



- 20 -

DOT HMR Training – Security Awareness

20

Security Plans & In-Depth Training

A local security plan and security assessment can be useful in enhancing HazMat security...

- Some organizations are legally required to have a written *security plan* and provide *in-depth security training*.
- Security plans and in-depth security training requirements are stipulated in [49 CFR §172 Subpart I](#).
- If your organization is not legally required to have a security plan, creating one is optional.



- 21 -

DOT HMR Training – Security Awareness

21

Security Plans & In-Depth Training

In most situations, communities backhauling hazardous materials will **not** be required to have a security plan & perform in-depth security training.

For more information & guidance concerning this training requirement, please review the **DOT HazMat Security Plan & In-Depth Security Requirements** document.



- 22 -

DOT HMR Training – Security Awareness

22

Conclusion

If there are any questions or concerns regarding HazMat security awareness, this training, or other HazMat matters, please contact the Backhaul Alaska Program for assistance info@backhaulalaska.org.

This concludes the instructional portion of this training. Please remember to complete the **DOT HMR Security Awareness Test** to fulfill this training module.



- 23 -

DOT HMR Training – Security Awareness

23

Appendix



HazMat Reference Documents

Backhaul & HMR Training

Summary of Sections:

HMR Training Requirements

1. DOT HMR Training Requirements Overview..... Page 52
2. DOT HMR Training Components..... Page 54
3. HMR Training Record – Blank & Fillable Page 57

HazMat Table Introduction

4. HazMat Table (Example)..... Page 58
5. 49 CFR §173.159 – Packaging Lead Acid Batteries..... Page 60
6. 49 CFR §173.102, SP 130 – Special Provisions Example Page 64
7. 49 CFR §173.159a – Packaging Exceptions Lead Acid Batteries Page 66
8. Packaging Lithium Cells & Batteries– 49 CFR §173.185..... Page 67

HazMat Packaging

9. UN Packaging Examples Page 74

HazMat Marking, Labeling, & Placarding

- 10.US DOT Marking, Labeling, & Placarding Chart..... Page 76

HazMat Shipping Paperwork

- 11.AML Shipping Bill-of-Lading (Blank) Page 80
- 12.AML Shipping Bill-of-Lading (Example)..... Page 81
- 13.Dangerous Goods Shippers Declaration (Blank)..... Page 82
- 14.Dangerous Goods Shippers Declaration (Example) Page 83

HazMat Security Awareness

- 15.HMR Do I Need a Security Plan Page 84

DOT HMR Training Requirements – Overview

The following document provides an overview of the DOT Hazardous Material Regulations (HMR) training requirements, as established in [49 CFR §172 Subpart H](#). The intent of HMR training is to ensure those trained are...

- Familiar with the HMR,
- Able to recognize and identify hazardous material.
- Understand the functions of his/her job
- Is knowledgeable about emergency response, self-protection measures, security awareness and accident prevention.

Who Needs HazMat Training?

DOT Hazardous Material Regulation training is required of companies & individuals performing any function in any way regulated by the US DOT Hazardous Material Regulations (HMR).

More simply, all *HazMat Employers* must ensure all *HazMat Employees* are trained to the HMR requirements.

Who is a HazMat Employer?

A hazmat employer is any person who uses one or more employee in connection with:

- Transporting hazmat in commerce,
- Causing hazmat to be transported or shipped,
- Designs, manufactures, fabricates, inspects, marks, maintains, reconditions, repairs or tests a package, container, or packaging component that is represented, marked, certified, or sold by that person as qualified for use in transporting hazardous materials in commerce.

Who is a HazMat Employee?

Employed on a full-time, part-time, or temporary basis by a hazmat employer (or who is self-employed) and who in the course of such directly affects hazmat transportation safety. This includes, but is not limited to, individuals who perform the following job functions:

- Prepares hazmat for transportation,
- Loads, unloads, or handles hazardous materials,
- Is responsible for safety of transporting hazardous materials,
- Operates a vehicle used to transport hazardous materials,
- Designs, manufactures, fabricates, inspects, marks, maintains, reconditions, repairs, or tests a package, container or packaging component that is represented, marked, certified, or sold as qualified for use in transporting hazardous material in commerce.

Who is Responsibility for HMR Training?

It is the *hazmat employer's* responsibility to ensure that each hazmat employees is trained. The responsibility for training (including the civil penalties for not training) lies with the *hazmat employer*.

Note: A hazmat employer can train and test themselves, so long as all the training requirements stipulated in [49 CFR §172.704](#) are met.

What Information Needs to be Included in a HMR Training?

Federal regulations (as established in [49 CFR §172.704](#)) state that HMR training for hazmat employees shall include the following components:

1. General Awareness/Familiarization Training
2. Function Specific Training
3. Safety Training

4. Security Awareness Training
5. In-Depth Security Training (when applicable)

For further information regarding training requirements for each component, please reference the *DOT HMR Training Requirements – Training Components* guidance document.

How Often do HazMat Employees Have to be Trained?

All hazmat employees must receive HMR training...

- Initially, a hazmat employee's training must be completed within 90 days of employment or change in job function (ex: moving from a non-hazmat job position to one that has hazmat functions).
- Hazmat employees must be directly supervised by a trained & knowledgeable employee until trained.
- Recurrent (refresher) training is required *at least* every 3 years.

What are the HMR Training Recordkeeping Requirements?

Maintaining hazmat employee training records are the responsibility of hazmat employer. Training records must be...

- Documented and retained by hazmat employer
- A current training record must be retained for as long as a hazmat employee is employed, and
- HMR training records must be retained for 90 days after employee is no longer employed.

HMR training records must include the following information...

- Hazmat employee's name
- Most recent training completion date
- Description, copy, or location of the training materials
- Name and address of person providing the training
- "Certification" that the hazmat employee has been trained and tested

Who Can Provide HMR Training?

- HMR training may be provided by the employer or other public or private sources
- Ultimately, it is the hazmat employer who *certifies* that a hazmat employee has been trained.
- Hazmat training received from a previous employer or other source can be used to meet the HMR training requirements provided that a current training record is obtained from the previous employer.

What are the Testing Requirements?

Hazmat employers are responsible for the training *and testing* of all hazmat employees.

- The HMR does not set any testing methods or standards. The hazmat employer is responsible for ensuring HMR testing is conducted and documented.
- The HMR does not specify what type of test is appropriate, nor what constitutes a "passing grading". The hazmat employer is responsible for establishing and testing methods and grading criteria.
- HMR testing methods may be a written test, verbal test, performance test or a combination of methods.
- Employee tests must be documented and retained with their HMR training records.

Can Other Trainings be used to Meet HMR Training Requirements?

Trainings completed to meet OSHA or EPA requirements that address training elements specified in [49 CFR §172.704\(a\)](#) may be used to satisfy HMR training requirements, provided it satisfies those requirements.

Authors Note: This documents only provides a general overview of HMR training requirements. Please refer to the federal regulations ([49 CFR §172 Subpart H](#)) to ensure compliance with all applicable training requirements.

DOT HMR Training Requirements – Training Components

Federal regulations (as established in [49 CFR §172.704](#)) state that Hazardous Materials Regulations (HMR) training for hazmat employees shall include the following components:

1. General Awareness/Familiarization Training
2. Function Specific Training
3. Safety Training
4. Security Awareness Training
5. In-Depth Security Training (when applicable)

The table below provides quick-reference for general objectives for each HMR training component:

HMR Training Component	Training Objectives
General Awareness/ Familiarization Training	<p>General awareness training should provide a broad overview of the HMR resulting in the...</p> <ul style="list-style-type: none"> ▪ General familiarization of the HMR and requirements ▪ Enabling hazmat employees to recognize & identify hazardous materials using the hazardous materials table and the hazard communication standards
Function Specific Training	<p>Function specific training content/material will depend upon the functions an employee performs. In short, function specific training objectives include...</p> <ul style="list-style-type: none"> ▪ Providing a detailed understand of the HMR specific to an employee's job functions. ▪ Each employee must be trained on the specific functions they are required to perform. ▪ Training needs and content will vary and should be tailored an organization's operations and the employee's responsibilities. <p><i>Example: An individual who packages hazmat needs may need to be trained in package selection, packaging and closures, marking and labeling.</i></p>
Safety Training	<p>Similar to function specific training, safety training content/material will depend upon the functions an employee performs and the materials an employee handles. Objectives include...</p> <ul style="list-style-type: none"> ▪ Hazards presented by relevant hazardous materials ▪ Safe handling ▪ Emergency response information ▪ Methods and procedures for accident avoidance <p><i>Example: Proper procedures for handling packages containing hazardous materials than an employee is responsible for managing and how to respond in the case of emergency.</i></p>
Security Awareness Training	<p>Security awareness training objectives include the following...</p> <ul style="list-style-type: none"> ▪ Awareness of security risks associated with hazmat transportation ▪ Methods to enhance transportation security ▪ How to recognize and respond to possible security threats
In-Depth Security Training (when applicable)	<p>In-depth security training, when required, should provide and overview of the organization's security plan, how it is implemented, and the roles & responsibilities of involved employees.</p>

The following information provides a more detailed outline of the DOT HMR training requirements. The wording used below sources the U.S. Code of Federal Regulations (CFR), but has been adapted slightly for brevity, relevance, and clarity. If there is any question or confusion regarding the exact wording relating to DOT HMR training requirements, please reference the regulations within [49 CFR §172 Subpart H](#).

Federal regulations specify that each HMR training component must include the following:

(1) *General Awareness/Familiarization Training*

Each hazmat employee shall be provided general awareness/familiarization training designed to...

- a) Provide familiarity with the requirements of this subchapter, and
- b) Enable the employee to recognize and identify hazardous materials consistent with the hazard communication standards of this subchapter.



(2) *Function-Specific Training*

Each hazmat employee must be provided function-specific training...

- a) That are specifically applicable to the functions the employee performs, and
- b) Exemptions or special permits issued under [49 CFR Subchapter A](#).

As an alternative to function-specific training on the requirements, training relating to the requirements of the [ICAO Technical Instructions](#) and the [IMDG Code](#) may be provided to the extent such training addresses functions authorized by [49 CFR §171 Subpart C](#).

(3) *Safety Training*

Each hazmat employee shall receive safety training concerning...

- a) Emergency response information, as required in [49 CFR §172 Subpart G](#),
- b) Measures to protect the employee from the hazards associated with hazardous materials to which they may be exposed in the work place, including specific measures the hazmat employer has implemented to protect employees from exposure, and
- c) Methods and procedures for avoiding accidents, such as the proper procedures for handling packages containing hazardous materials.

(4) *Security Awareness Training*

Each hazmat employee must receive training that provides

- a) An awareness of security risks associated with hazardous materials transportation, and
- b) Methods designed to enhance transportation security.

Security awareness training must also include a component covering how to recognize and respond to possible security threats.

New hazmat employees must receive the security awareness training required by this paragraph within 90 days after employment.

(5) *In-Depth Security Training*

In-depth security training is necessary for organizations required to have a security plan (as stipulated in [49 CFR §172 Subpart I](#)). For organizations required to have a security plan, training covering the security plan and its implementation is required for each hazmat employee who...

- a) Handles hazardous materials covered by the plan,
- b) Performs a regulated function related to the hazardous materials covered by the plan, or
- c) Is responsible for implementing the plan.

In-depth security training must include the following elements:

- a) Company security objectives,
- b) Organizational security structure,
- c) Specific security procedures,
- d) Specific security duties & responsibilities for each employee, and
- e) Specific actions to be taken by each employee in the event of a security breach.

In most situations, communities backhauling hazardous materials will not be required to perform in-depth security training. For more information and guidance concerning this training requirement, please review the *DOT HazMat Security Plan & In-Depth Security Requirements* document.



Hazardous Material Regulations Training Record

Training Company Name: _____ Trainer Name: _____

Company Address: _____ Training Company Phone: _____

Employee Name: _____ Title: _____ Org.: _____

I certify that the hazmat employee identified on this training record has been trained and tested as required by the Hazardous Materials Regulations, Subpart H.

Name: _____ Title: _____ Signature: _____

GENERAL AWARENESS / FAMILIARIZATION

Description, Copy, and Location of Training	Training Provided By	Test / Score (score not mandatory)	Date Trained	Attachments

FUNCTION SPECIFIC

Description, Copy, and Location of Training	Training Provided By	Test / Score (score not mandatory)	Date Trained	Attachments

SAFETY TRAINING

Description, Copy, and Location of Training	Training Provided By	Test / Score (score not mandatory)	Date Trained	Attachments

SECURITY TRAINING

Description, Copy, and Location of Training	Training Provided By	Test / Score (score not mandatory)	Date Trained	Attachments

INDEPTH SECURITY TRAINING

Description, Copy, and Location of Training	Training Provided By	Test / Score (score not mandatory)	Date Trained	Attachments



EXAMPLE – HazMat Table (49 CFR §172.101)

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	ID Numbers	PG	Label Codes	Special Provisions (§ 172.102)	(8) Packaging (§ 173.***)			(9) Quantity Limitations (see §§ 173.27 and 175.75)		(10) Vessel Stowage	
							Exceptions	Non-bulk	Bulk	Passenger aircraft/rail	Cargo aircraft only	Location	Other
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Batteries, wet, filled with acid, <i>electric storage</i>	8	UN2794		8	A51	159	159	159	30 kg	No limit	A	53, 58 146
	Batteries, wet, filled with alkali, <i>electric storage</i>	8	UN2795		8	A51	159	159	159	30 kg	No limit	A	52, 146
	Batteries, wet, non-spillable, <i>electric storage</i>	8	UN2800		8		159a	159	159	No limit	No limit	A	
W	Batteries, nickel-metal hydride see Batteries, dry, sealed, n.o.s. for <i>nickel-metal hydride batteries transported by modes other than vessel</i>	9	UN3496		9	340						A	25
	Batteries, dry, containing potassium hydroxide solid, <i>electric storage</i>	8	UN3028		8	237	None	213	None	25 kg	230 kg	A	52
	Batteries, dry, sealed, n.o.s.					130							
	Lithium ion batteries <i>including lithium ion polymer batteries</i>	9	UN3480		9	388, 422, A54, A100	185	185	185	Forbidden	35 kg	A	156
	Lithium ion batteries contained in equipment <i>including lithium ion polymer batteries</i>	9	UN3481		9	181, 360, 388, 422, A54	185	185	185	5 kg	35 kg	A	156
	Lithium ion batteries packed with equipment <i>including lithium ion polymer batteries</i>	9	UN3481		9	181, 360, 388, 422, A54	185	185	185	5 kg	35 kg	A	156
	Lithium metal batteries <i>including lithium alloy batteries</i>	9	UN3090		9	388, 422, A54	185	185	185	Forbidden	35 kg	A	156
	Lithium metal batteries contained in equipment <i>including lithium alloy batteries</i>	9	UN3091		9	181, 360, 388, 422, A54, A101	185	185	185	5 kg	35 kg	A	156

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EXAMPLE – HazMat Table (49 CFR §172.101)

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	ID Numbers	PG	Label Codes	Special Provisions (§ 172.102)	(8) Packaging (§ 173.***)			(9) Quantity Limitations (see §§ 173.27 and 175.75)		(10) Vessel Stowage	
							Exceptions	Non-bulk	Bulk	Passenger aircraft/rail	Cargo aircraft only	Location	Other
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Lithium metal batteries packed with equipment <i>including lithium alloy batteries</i>	9	UN3091		9	181, 360, 388, 422, A54	185	185	185	5 kg	35 kg	A	156
A W	Mercury contained in manufactured articles	8	UN3506		8, 6.1	A191	164	None	None	No limit	No limit	B	40, 97
G	Environmentally hazardous substance, solid, n.o.s	9	UN3077	III	9	8, 146, 335, 384, A112, B54, B120, IB8, IP3, N20, N91, T1, TP33	155	213	240	No limit	No limit	A	
	Paint or Paint related material	3	UN1263	III	3	367, B1, B52, B131, IB3, T2, TP1, TP29	150	173	242	60 L	220 L	A	
	Paint or Paint related material	8	UN3066	II	8	367, B2, IB2, T7, TP2, TP28	154	173	242	1 L	30 L	A	40
A W	Rags, oily	4.2	UN1856	III	4.2		151	213	240	Forbidden	Forbidden	A	
	Dichlorodifluoromethane or Refrigerant gas R 12	2.2	UN1028		2.2	T50	306	304	314, 315	75 kg	150 kg	A	
	Chlorodifluoromethane or Refrigerant gas R 22	2.2	UN1018		2.2	T50	306	304	314, 315	75 kg	150 kg	A	
	1,1,1,2-Tetrafluoroethane or Refrigerant gas R 134a	2.2	UN3159		2.2	T50	306	304	314, 315	75 kg	150 kg	A	
G	Refrigerant gases, n.o.s.	2.2	UN1078		2.2	T50	306	304	314, 315	75 kg	150 kg	A	

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HazMat Table Column 8B & 8C, Packaging Lead Acid Batteries – 49 CFR §173.159

§173.159 Batteries, wet.

(a) Electric storage batteries, containing electrolyte acid or alkaline corrosive battery fluid (wet batteries), may not be packed with other materials except as provided in paragraphs (g) and (h) of this section and in §§ 173.220 and 173.222; and any battery or battery-powered device must be prepared and packaged for transport in a manner to prevent:

(1) A dangerous evolution of heat (i.e., an amount of heat sufficient to be dangerous to packaging or personal safety to include charring of packaging, melting of packaging, scorching of packaging, or other evidence);

(2) Short circuits, including, but not limited to:

(i) Packaging each battery or each battery-powered device when practicable, in fully enclosed inner packagings made of non-conductive material;

(ii) Separating or packaging batteries and battery-powered devices in a manner to prevent contact with other batteries, devices or conductive materials (e.g., metal) in the packagings; or

(iii) Ensuring exposed terminals are protected with non-conductive caps, non-conductive tape, or by other appropriate means; and

(3) Damage to terminals. If not impact resistant, the outer packaging must not be used as the sole means of protecting the battery terminals from damage or short circuiting. Batteries must be securely cushioned and packed to prevent shifting which could loosen terminal caps or reorient the terminals. Batteries contained in devices must be securely installed. Terminal protection methods include but are not limited to:

(i) Securely attaching covers of sufficient strength to protect the terminals;

(ii) Packaging the battery in a rigid plastic packaging; or

(iii) Constructing the battery with terminals that are recessed or otherwise protected so that the terminals will not be subjected to damage if the package is dropped.

(b) For transportation by aircraft:

(1) The packaging for wet batteries must incorporate an acid- or alkali-proof liner, or include a supplementary packaging with sufficient strength and adequately sealed to prevent leakage of electrolyte fluid in the event of spillage; and

(2) Any battery-powered device, equipment or vehicle must be packaged for transport in a manner to prevent unintentional activation or must have an independent means of preventing unintentional activation (e.g., packaging restricts access to activation switch, switch caps or locks, recessed switches, trigger locks, temperature sensitive circuit breakers, etc.).

(c) The following specification packagings are authorized for batteries packed without other materials provided all requirements of paragraph (a) of this section, and for transportation by aircraft, paragraph (b) of this section are met:

(1) Wooden box: 4C1, 4C2, 4D, or 4F.

(2) Fiberboard box: 4G.

(3) Plywood drum: 1D.

(4) Fiber drum: 1G.

(5) Plastic drum: 1H2.

(6) Plastic jerrican: 3H2.

(7) Plastic box: 4H2.

HazMat Table Column 8B & 8C, Packaging Lead Acid Batteries – 49 CFR §173.159

(d) The following non-specification packagings are authorized for batteries packed without other materials provided all requirements of paragraph (a) of this section, and for transportation by aircraft, paragraph (b) of this section are met:

(1) Electric storage batteries are firmly secured to skids or pallets capable of withstanding the shocks normally incident to transportation are authorized for transportation by rail, highway, or vessel. The height of the completed unit must not exceed 1 1/2 times the width of the skid or pallet. The unit must be capable of withstanding, without damage, a superimposed weight equal to two times the weight of the unit or, if the weight of the unit exceeds 907 kg (2,000 pounds), a superimposed weight of 1814 kg (4,000 pounds). Battery terminals must not be relied upon to support any part of the superimposed weight and must not short out if a conductive material is placed in direct contact with them.

(2) Electric storage batteries weighing 225 kg (500 pounds) or more, consisting of carriers' equipment, may be shipped by rail when mounted on suitable skids. Such shipments may not be offered in interchange service.

(3) One to three batteries not over 11.3 kg (25 pounds) each, packed in strong outer boxes. The maximum authorized gross weight is 34 kg (75 pounds).

(4) Not more than four batteries not over 7 kg (15 pounds) each, packed in strong outer fiberboard or wooden boxes. The maximum authorized gross weight is 30 kg (65 pounds).

(5) Not more than five batteries not over 4.5 kg (10 pounds) each, packed in strong outer fiberboard or wooden boxes. The maximum authorized gross weight is 30 kg (65 pounds).

(6) Single batteries not exceeding 34 kg (75 pounds) each, packed in 5-sided slip covers or in completely closed fiberboard boxes. Slip covers and boxes must be of solid or double-faced corrugated fiberboard of at least 91 kg (200 pounds) Mullen test strength. The slip cover or fiberboard box must fit snugly and provide inside top clearance of at least 1.3 cm (0.5 inch) above battery terminals and filler caps with reinforcement in place. Assembled for shipment, the bottom edges of the slipcover must come to within 2.5 cm (1 inch) of the bottom of the battery. The completed package (battery and box or slip cover) must be capable of withstanding a top-to-bottom compression test of at least 225 kg (500 pounds) without damage to battery terminal caps, cell covers or filler caps.

(7) Single batteries exceeding 34 kg (75 pounds) each may be packed in completely closed fiberboard boxes. Boxes must be of double-wall corrugated fiberboard of at least 181 kg (400 pounds) test, or solid fiberboard testing at least 181 kg (400 pounds); a box may have hand holes in its ends provided that the hand holes will not materially weaken the box. Sides and ends of the box must have cushioning between the battery and walls of the box; combined thickness of cushioning material and walls of the box must not be less than 1.3 cm (0.5 inch); and cushioning must be excelsior pads, corrugated fiberboard, or other suitable cushioning material. The bottom of the battery must be protected by a minimum of one excelsior pad or by a double-wall corrugated fiberboard pad. The top of the battery must be protected by a wood frame, corrugated trays or scored sheets of corrugated fiberboard having minimum test of 91 kg (200 pounds), or other equally effective cushioning material. Top protection must bear evenly on connectors and/or edges of the battery cover to facilitate stacking of batteries. No more than one battery may be placed in one box. The maximum authorized gross weight is 91 kg (200 pounds).

(e) When transported by highway or rail, electric storage batteries containing electrolyte, acid, or alkaline corrosive battery fluid and electric storage batteries packed with electrolyte, acid, or alkaline corrosive battery fluid, are not subject to any other requirements of this subchapter, if all of the following are met:

(1) No other hazardous materials may be transported in the same vehicle;

HazMat Table Column 8B & 8C, Packaging Lead Acid Batteries – 49 CFR §173.159

- (2) The batteries must be loaded or braced so as to prevent damage and short circuits in transit;
 - (3) Any other material loaded in the same vehicle must be blocked, braced, or otherwise secured to prevent contact with or damage to the batteries. In addition, batteries on pallets, must be stacked to not cause damage to another pallet in transportation;
 - (4) Except for the purpose of consolidating shipments of batteries for recycling, the transport vehicle may not carry material shipped by any person other than the shipper of the batteries; and
 - (5) Shipments made under this paragraph are subject to the incident reporting requirements in § 171.15.
- (f) Batteries can be considered as non-spillable provided they are capable of withstanding the following two tests, without leakage of battery fluid from the battery:
- (1) Vibration test. The battery must be rigidly clamped to the platform of a vibration machine, and a simple harmonic motion having an amplitude of 0.8 mm (0.03 inches) with a 1.6 mm (0.063 inches) maximum total excursion must be applied. The frequency must be varied at the rate of 1 Hz/min between the limits of 10 Hz to 55 Hz. The entire range of frequencies and return must be traversed in 95 ±5 minutes for each mounting position (direction of vibrator) of the battery. The battery must be tested in three mutually perpendicular positions (to include testing with fill openings and vents, if any, in an inverted position) for equal time periods.
 - (2) Pressure differential test. Following the vibration test, the battery must be stored for six hours at 24 °C ±4 °C (75 °F ±7 °F) while subjected to a pressure differential of at least 88 kPa (13 psig). The battery must be tested in three mutually perpendicular positions (to include testing with fill openings and vents, if any, in an inverted position) for at least six hours in each position.
- (g) Electrolyte, acid or alkaline corrosive battery fluid, packed with batteries wet or dry, must be packed in one of the following specification packagings:
- (1) In 4C1, 4C2, 4D, or 4F wooden boxes with inner receptacles of glass, not over 4.0 L (1 gallon) each with not over 8.0 L (2 gallons) total in each outside container. Inside containers must be well-cushioned and separated from batteries by a strong solid wooden partition. The completed package must conform to Packing Group III requirements.
 - (2) Electrolyte, acid, or alkaline corrosive battery fluid included with electric storage batteries and filling kits may be packed in strong rigid outer packagings when shipments are made by, for, or to the Departments of the Army, Navy, or Air Force of the United States. Packagings must conform to military specifications. The electrolyte, acid, or alkaline corrosive battery fluid must be packed in polyethylene bottles of not over 1.0 L (0.3 gallon) capacity each. Not more than 24 bottles, securely separated from electric storage batteries and kits, may be offered for transportation or transported in each package.
 - (3) In 4G fiberboard boxes with not more than 12 inside packagings of polyethylene or other material resistant to the lading, each not over 2.0 L (0.5 gallon) capacity each. Completed packages must conform to Packing Group III requirements. Inner packagings must be adequately separated from the storage battery. The maximum authorized gross weight is 29 kg (64 pounds). These packages are not authorized for transportation by aircraft.
- (h)
- (1) Dry batteries or battery charger devices may be packaged in 4G fiberboard boxes with inner receptacles containing battery fluid. Completed packages must conform to the Packing Group III performance level. Not more than 12 inner receptacles may be packed in one outer box. The maximum authorized gross weight for the completed package is 34 kg (75 pounds).
 - (2) Battery fluid, acid (UN2796) may be packaged in a UN6HG2 composite packaging further packed in a UN4G fiberboard box with a dry storage battery. The UN6HG2 composite packaging may not

HazMat Table Column 8B & 8C, Packaging Lead Acid Batteries – 49 CFR §173.159

exceed 8.0 liters in capacity. Completed packages must conform to the Packing Group III performance level. The maximum authorized gross weight for the completed package is 37.0 kg (82.0 lbs).

(i) When approved by the Associate Administrator, electric storage batteries, containing electrolyte or corrosive battery fluid in a separate reservoir from which fluid is injected into the battery cells by a power device cartridge assembled with the battery, and which meet the criteria of paragraph (f) are not subject to any other requirements of this subchapter.

(j) Nickel cadmium batteries containing liquid potassium hydroxide solution. Nickel-cadmium batteries that contain no more than 10 ml of liquid potassium hydroxide solution (UN1814) in each battery are not subject to the requirements of this subchapter under the following conditions:

- (1) Each battery must be sealed in a heat sealed bag, packaged to prevent short circuits, and placed in the center of an outer packaging surrounded with a foam-in-place packaging material;
- (2) The completed package must meet the Packing Group II performance level;
- (3) The gross weight of the package may not exceed 15.2 kg (33.4 pounds); and
- (4) The cumulative amount of potassium hydroxide solution in all of the batteries in each package may not exceed 4 ounces (0.11 kg).

(k) Damaged wet electric storage batteries.

(1) Damaged batteries incapable of retaining battery fluid inside the outer casing during transportation may be transported by highway or rail provided the batteries are transported in non-bulk packaging, meet the requirements of paragraph (a) of this section, and are prepared for transport under one or more of the following conditions:

- (i) Drain the battery of fluid to eliminate the potential for leakage during transportation;
- (ii) Individually pack the battery in a leak proof intermediate package with sufficient compatible absorbent material capable of absorbing the release of any electrolyte and place the intermediate packaging in a leakproof outer packaging that conforms to the general packaging requirements of subpart B of this part;
- (iii) Pack the battery in a salvage packaging in accordance with the provisions of § 173.3(c); or
- (iv) When packaged with other batteries or materials (e.g., on pallets or non-skid rails) and secured to prevent movement during transport, pack the battery in leakproof packaging to prevent leakage of battery fluid from the packaging under conditions normally incident to transportation.

(2) Shipment of damaged batteries in accordance with this paragraph is eligible for exception under paragraph (e) of this section.

[74 FR 2257, Jan. 14, 2009, as amended at 81 FR 3673, Jan. 21, 2016; 81 FR 18540, Mar. 31, 2016; 81 FR 35541, June 2, 2016]

HazMat Table Column 7, Special Provisions – 49 CFR §173.102, SP 130

130 “Batteries, dry, sealed, n.o.s.” commonly referred to as dry batteries, are hermetically sealed and generally utilize metals (other than lead) and/or carbon as electrodes. These batteries are typically used for portable power applications. The rechargeable (and some non-rechargeable) types have gelled alkaline electrolytes (rather than acidic) making it difficult for them to generate hydrogen or oxygen when overcharged and therefore, differentiating them from non-spillable batteries. Dry batteries specifically covered by another entry in the §172.101 Table must be transported in accordance with the requirements applicable to that entry. For example, nickel-metal hydride batteries transported by vessel in certain quantities are covered by another entry (see Batteries, nickel-metal hydride, UN3496). Dry batteries not specifically covered by another entry in the §172.101 Table are covered by this entry (*i.e.*, Batteries, dry, sealed, n.o.s.) and are not subject to requirements of this subchapter except for the following:

(a) *Incident reporting.* For transportation by aircraft, a telephone report in accordance with §171.15(a) is required if a fire, violent rupture, explosion or dangerous evolution of heat (*i.e.*, an amount of heat sufficient to be dangerous to packaging or personal safety to include charring of packaging, melting of packaging, scorching of packaging, or other evidence) occurs as a direct result of a dry battery. For all modes of transportation, a written report submitted, retained, and updated in accordance with §171.16 is required if a fire, violent rupture, explosion or dangerous evolution of heat occurs as a direct result of a dry battery or battery-powered device.

(b) *Preparation for transport.* Batteries and battery-powered device(s) containing batteries must be prepared and packaged for transport in a manner to prevent:

(1) A dangerous evolution of heat;

(2) Short circuits, including but not limited to the following methods:

(i) Packaging each battery or each battery-powered device when practicable, in fully enclosed inner packagings made of non-conductive material;

(ii) Separating or packaging batteries in a manner to prevent contact with other batteries, devices or conductive materials (*e.g.*, metal) in the packagings; or

(iii) Ensuring exposed terminals or connectors are protected with non-conductive caps, non-conductive tape, or by other appropriate means; and

(3) Damage to terminals. If not impact resistant, the outer packaging should not be used as the sole means of protecting the battery terminals from damage or short circuiting. Batteries must be securely cushioned and packed to prevent shifting which could loosen terminal caps or reorient the terminals to produce short circuits. Batteries contained in devices must be securely installed. Terminal protection methods include but are not limited to the following:

(i) Securely attaching covers of sufficient strength to protect the terminals;

(ii) Packaging the battery in a rigid plastic packaging; or

(iii) Constructing the battery with terminals that are recessed or otherwise protected so that the terminals will not be subjected to damage if the package is dropped.

(c) *Additional air transport requirements.* For a battery whose voltage (electrical potential) exceeds 9 volts—

(1) When contained in a device, the device must be packaged in a manner that prevents unintentional activation or must have an independent means of preventing unintentional activation (*e.g.*, packaging restricts access to activation switch, switch caps or locks, recessed switches, trigger locks, temperature sensitive circuit breakers, *etc.*); and

HazMat Table Column 7, Special Provisions – 49 CFR §173.102, SP 130

(2) An indication of compliance with this special provision must be provided by marking each package with the words “not restricted” or by including the words “not restricted” on a transport document such as an air waybill accompanying the shipment.

(d) *Used or spent battery exception.* Used or spent dry batteries of both non-rechargeable and rechargeable designs, with a marked rating up to 9-volt that are combined in the same package and transported by highway or rail for recycling, reconditioning, or disposal are not subject to this special provision or any other requirement of the HMR. Note that batteries utilizing different chemistries (*i.e.*, those battery chemistries specifically covered by another entry in the §172.101 Table) as well as dry batteries with a marked rating greater than 9-volt may not be combined with used or spent batteries in the same package. Note also that this exception does not apply to batteries that have been reconditioned for reuse.

HazMat Table Column 8A, Packaging Exceptions Lead Acid Batteries – 49 CFR §173.159a

§173.159a Exceptions for non-spillable batteries.

(a) Exceptions for hazardous materials shipments in the following paragraphs are permitted only if this section is referenced for the specific hazardous material in the §172.101 table or in a packaging section in this part.

(b) Non-spillable batteries offered for transportation or transported in accordance with this section are subject to the incident reporting requirements. For transportation by aircraft, a telephone report in accordance with §171.15(a) is required if a fire, violent rupture, explosion or dangerous evolution of heat (i.e., an amount of heat sufficient to be dangerous to packaging or personal safety to include charring of packaging, melting of packaging, scorching of packaging, or other evidence) occurs as a direct result of a non-spillable battery. For all modes of transportation, a written report in accordance with §171.16(a) is required if a fire, violent rupture, explosion or dangerous evolution of heat occurs as a direct result of a non-spillable battery.

(c) Non-spillable batteries are excepted from the packaging requirements of §173.159 under the following conditions:

(1) Non-spillable batteries must be securely packed in strong outer packagings or secured to skids or pallets capable of withstanding the shocks normally incident to transportation. The batteries must meet the requirements of §173.159(a), be loaded or braced so as to prevent damage and short circuits in transit, and any other material loaded in the same vehicle must be blocked, braced, or otherwise secured to prevent contact with or damage to the batteries. A non-spillable battery which is an integral part of and necessary for the operation of mechanical or electronic equipment must be securely fastened in the battery holder on the equipment.

(2) The battery and outer packaging must be plainly and durably marked “NON-SPILLABLE” or “NON-SPILLABLE BATTERY.” The requirement to mark the outer package does not apply when the battery is installed in a piece of equipment that is transported unpackaged.

(d) Non-spillable batteries are excepted from all other requirements of this subchapter when offered for transportation and transported in accordance with paragraph (c) of this section and the following:

(1) At a temperature of 55 °C (131 °F), the battery must not contain any unabsorbed free-flowing liquid, and must be designed so that electrolyte will not flow from a ruptured or cracked case; and

(2) For transport by aircraft, when contained in a battery-powered device, equipment or vehicle must be prepared and packaged for transport in a manner to prevent unintentional activation in conformance with §173.159(b)(2) of this Subpart.

(3) For transport by aircraft, must be transported as cargo and may not be carried onboard an aircraft by passengers or crewmembers in carry-on baggage, checked baggage, or on their person unless specifically excepted by §175.10.

[74 FR 2258, Jan. 14, 2009, as amended at 75 FR 72, Jan. 4, 2010; 77 FR 60942, Oct. 5, 2012; 78 FR 1085, Jan. 7, 2013; 78 FR 15328, Mar. 11, 2013]

HazMat Table Column 8, Packaging Lithium Cells & Batteries– 49 CFR §173.185

§173.185 Lithium cells and batteries.

As used in this section, *consignment* means one or more packages of hazardous materials accepted by an operator from one shipper at one time and at one address, receipted for in one lot and moving to one consignee at one destination address. *Equipment* means the device or apparatus for which the lithium cells or batteries will provide electrical power for its operation. *Lithium cell(s) or battery(ies)* includes both lithium metal and lithium ion chemistries. *Medical device* means an instrument, apparatus, implement, machine, contrivance, implant, or in vitro reagent, including any component, part, or accessory thereof, which is intended for use in the diagnosis of disease or other conditions, or in the cure, mitigation, treatment, or prevention of disease, of a person.

(a) *Classification.*

(1) Each lithium cell or battery must be of the type proven to meet the criteria in part III, sub-section 38.3 of the UN Manual of Tests and Criteria (IBR; see §171.7 of this subchapter). Lithium cells and batteries are subject to these tests regardless of whether the cells used to construct the battery are of a tested type.

(i) Cells and batteries manufactured according to a type meeting the requirements of sub-section 38.3 of the UN Manual of Tests and Criteria, Revision 3, Amendment 1 or any subsequent revision and amendment applicable at the date of the type testing may continue to be transported, unless otherwise provided in this subchapter.

(ii) Cell and battery types only meeting the requirements of the UN Manual of Tests and Criteria, Revision 3, are no longer valid. However, cells and batteries manufactured in conformity with such types before July 2003 may continue to be transported if all other applicable requirements are fulfilled.

(2) Each person who manufactures lithium cells or batteries must create a record of satisfactory completion of the testing required by this paragraph prior to offering the lithium cell or battery for transport and must:

(i) Maintain this record for as long as that design is offered for transportation and for one year thereafter; and

(ii) Make this record available to an authorized representative of the Federal, state or local government upon request.

(3) Except for cells or batteries meeting the requirements of paragraph (c) of this section, each lithium cell or battery must:

(i) Incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport;

(ii) Be equipped with means of preventing external short circuits; and

(iii) Be equipped with an means of preventing dangerous reverse current flow (e.g., diodes or fuses) if a battery contains cells, or a series of cells that are connected in parallel.

(b) *Packaging.* (1) Each package offered for transportation containing lithium cells or batteries, including lithium cells or batteries packed with, or contained in, equipment, must meet all applicable requirements of subpart B of this part.

(2) Lithium cells or batteries, including lithium cells or batteries packed with, or contained in, equipment, must be packaged in a manner to prevent:

(i) Short circuits;

(ii) Movement within the outer package; and

(iii) Accidental activation of the equipment.

HazMat Table Column 8, Packaging Lithium Cells & Batteries– 49 CFR §173.185

(3) For packages containing lithium cells or batteries offered for transportation:

(i) The lithium cells or batteries must be placed in non-metallic inner packagings that completely enclose the cells or batteries, and separate the cells or batteries from contact with equipment, other devices, or conductive materials (e.g., metal) in the packaging.

(ii) The inner packagings containing lithium cells or batteries must be placed in one of the following packagings meeting the requirements of part 178, subparts L and M, of this subchapter at the Packing Group II level:

(A) Metal (4A, 4B, 4N), wooden (4C1, 4C2, 4D, 4F), fiberboard (4G), or solid plastic (4H1, 4H2) box;

(B) Metal (1A2, 1B2, 1N2), plywood (1D), fiber (1G), or plastic (1H2) drum;

(C) Metal (3A2, 3B2) or plastic (3H2) jerrican.

(iii) When packed with equipment, lithium cells or batteries must:

(A) Be placed in inner packagings that completely enclose the cell or battery, then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance requirements as specified in paragraph (b)(3)(ii) of this section; or

(B) Be placed in inner packagings that completely enclose the cell or battery, then placed with equipment in a package that meets the Packing Group II performance requirements as specified in paragraph (b)(3)(ii) of this section.

(4) When lithium cells or batteries are contained in equipment:

(i) The outer packaging, when used, must be constructed of suitable material of adequate strength and design in relation to the capacity and intended use of the packaging, unless the lithium cells or batteries are afforded equivalent protection by the equipment in which they are contained;

(ii) Equipment must be secured against movement within the outer packaging and be packed so as to prevent accidental operation during transport; and

(iii) Any spare lithium cells or batteries packed with the equipment must be packaged in accordance with paragraph (b)(3) of this section.

(5) Lithium batteries that weigh 12 kg (26.5 pounds) or more and have a strong, impact-resistant outer casing and assemblies of such batteries, may be packed in strong outer packagings; in protective enclosures (for example, in fully enclosed or wooden slatted crates); or on pallets or other handling devices, instead of packages meeting the UN performance packaging requirements in paragraphs (b)(3)(ii) and (b)(3)(iii) of this section. Batteries or battery assemblies must be secured to prevent inadvertent movement, and the terminals may not support the weight of other superimposed elements. Batteries or battery assemblies packaged in accordance with this paragraph are not permitted for transportation by passenger-carrying aircraft, and may be transported by cargo aircraft only if approved by the Associate Administrator.

(6) Except for transportation by aircraft, the following rigid large packagings are authorized for a single battery, including for a battery contained in equipment, meeting provisions in paragraphs (b)(1) and (2) of this section and the requirements of part 178, subparts P and Q, of this subchapter at the Packing Group II level:

(i) Metal (50A, 50B, 50N);

(ii) Rigid plastic (50H);

(iii) Wooden (50C, 50D, 50F);

(iv) Rigid fiberboard (50G).

HazMat Table Column 8, Packaging Lithium Cells & Batteries— 49 CFR §173.185

(c) *Exceptions for smaller cells or batteries.* Other than as specifically stated below, a package containing lithium cells or batteries, or lithium cells or batteries packed with, or contained in, equipment, that meets the conditions of this paragraph is excepted from the requirements in subparts C through H of part 172 of this subchapter and the UN performance packaging requirements in paragraphs (b)(3)(ii) and (iii) of this section under the following conditions and limitations.

(1) *Size limits.*

(i) The Watt-hour (Wh) rating may not exceed 20 Wh for a lithium ion cell or 100 Wh for a lithium ion battery. After December 31, 2015, each lithium ion battery subject to this provision must be marked with the Watt-hour rating on the outside case.

(ii) The lithium content may not exceed 1 g for a lithium metal cell or 2 g for a lithium metal battery.

(iii) Except when lithium cells or batteries are packed with or contained in equipment in quantities not exceeding 5 kg net weight, the outer package that contains lithium cells or batteries must be appropriately marked: "PRIMARY LITHIUM BATTERIES—FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT", "LITHIUM METAL BATTERIES—FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT", "LITHIUM ION BATTERIES—FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT" or labeled with a "CARGO AIRCRAFT ONLY" label specified in §172.448 of this subchapter.

(iv) For transportation by highway or rail only, the lithium content of the cell and battery may be increased to 5 g for a lithium metal cell or 25 g for a lithium metal battery and 60 Wh for a lithium ion cell or 300 Wh for a lithium ion battery provided the outer package is marked: "LITHIUM BATTERIES—FORBIDDEN FOR TRANSPORT ABOARD AIRCRAFT AND VESSEL."

(v) The marking specified in paragraphs (c)(1)(iii) and (iv) of this section must have a background of contrasting color, and the letters in the marking must be:

(A) At least 6 mm (0.25 inch) in height on packages having a gross weight of 30 kg (66 pounds) or less, except that smaller font may be used as necessary when package dimensions so require.

(B) At least 12 mm (0.5 inch) in height on packages having a gross weight of more than 30 kg (66 pounds).

(vi) Except when lithium cells or batteries are packed with, or contained in, equipment, each package must not exceed 30 kg (66 pounds) gross weight.

(2) *Packaging.* Each package must be rigid unless the cell or battery is contained in equipment and is afforded equivalent protection by the equipment in which it is contained. Except when lithium cells or batteries are contained in equipment, each package of lithium cells or batteries, or the completed package when packed with equipment must be capable of withstanding a 1.2 meter drop test, in any orientation, without damage to the cells or batteries contained in the package, without shifting of the contents that would allow battery-to-battery (or cell-to-cell) contact, and without release of the contents of the package.

(3) *Hazard communication.* Each package must display the lithium battery mark except when a package contains button cell batteries installed in equipment (including circuit boards), or no more than four lithium cells or two lithium batteries contained in equipment, where there are not more than two packages in the consignment.

(i) The mark must indicate the UN number, 'UN3090' for lithium metal cells or batteries or 'UN 3480' for lithium ion cells or batteries. Where the lithium cells or batteries are contained in, or packed with, equipment, the UN number 'UN3091' or 'UN 3481' as appropriate must be indicated. Where a package contains lithium cells or batteries assigned to different UN numbers, all applicable UN numbers must be indicated on one or more marks. The package must be of

HazMat Table Column 8, Packaging Lithium Cells & Batteries– 49 CFR §173.185

such size that there is adequate space to affix the mark on one side without the mark being folded.



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(A) The mark must be in the form of a rectangle with hatched edging. The mark must be not less than 120 mm (4.7 inches) wide by 110 mm (4.3 inches) high and the minimum width of the hatching must be 5 mm (0.2 inches) except markings of 105 mm (4.1 inches) wide by 74 mm (2.9 inches) high may be used on a package containing lithium batteries when the package is too small for the larger mark;

(B) The symbols and letters must be black on white or suitable contrasting background and the hatching must be red;

(C) The “*” must be replaced by the appropriate UN number(s) and the “**” must be replaced by a telephone number for additional information; and

(D) Where dimensions are not specified, all features shall be in approximate proportion to those shown.

(ii) For transportation by highway, rail or vessel, the provisions in 49 CFR 173.185(c)(3) (revised as of October 1, 2016) for marking packages, including the exceptions from marking, may continue to be used until December 31, 2018. For transportation by aircraft, the provisions for the lithium battery handling marking in 49 CFR 173.185(c)(3)(ii) (revised as of October 1, 2016) may continue to be used until December 31, 2018.

(4) *Air transportation.*

(i) For transportation by aircraft, lithium cells and batteries may not exceed the limits in the following table. The limits on the maximum number of batteries and maximum net quantity of batteries in the following table may not be combined in the same package:

HazMat Table Column 8, Packaging Lithium Cells & Batteries– 49 CFR §173.185

Contents	Lithium metal cells and/or batteries with a lithium content not more than 0.3 g	Lithium metal cells with a lithium content more than 0.3 g but not more than 1g	Lithium metal batteries with a lithium content more than 0.3 g but not more than 2 g	Lithium ion cells and/or batteries with a Watt-hour rating not more than 2.7 Wh	Lithium ion cells with a Watt-hour rating more than 2.7 Wh but not more than 20 Wh	Lithium ion batteries with a Watt-hour rating more than 2.7 Wh but not more than 100 Wh
Maximum number of cells/batteries per package	No Limit	8 cells	2 batteries	No Limit	8 cells	2 batteries.
Maximum net quantity (mass) per package	2.5 kg	n/a	n/a	2.5 kg	n/a	n/a.

(ii) Not more than one package prepared in accordance with this paragraph (c)(4) may be placed into an overpack. When a package displays the “CARGO AIRCRAFT ONLY” label, the paragraph (c)(1)(iii) mark, or the paragraph (c)(3)(i) lithium battery mark and is placed in an overpack, the appropriate label or mark must either be clearly visible through the overpack, or the label or mark must also be affixed on the outside of the overpack, and the overpack must be marked with the word “OVERPACK”.

(iii) A shipper is not permitted to offer for transport more than one package prepared in accordance with the provisions of this paragraph in any single consignment.

(iv) Each shipment with packages required to display the paragraph (c)(3)(i) lithium battery mark must include an indication on the air waybill of compliance with this paragraph (c)(4) (or the applicable ICAO Technical Instructions Packing Instruction), when an air waybill is used.

(v) Packages and overpacks of lithium batteries prepared in accordance with this paragraph (c)(4) must be offered to the operator separately from cargo which is not subject to the requirements of this subchapter and must not be loaded into a unit load device before being offered to the operator.

(vi) For lithium batteries packed with, or contained in, equipment, the number of batteries in each package is limited to the minimum number required to power the piece of equipment, plus two spares, and the total net quantity (mass) of the lithium cells or batteries in the completed package must not exceed 5 kg.

(vii) Each person who prepares a package for transport containing lithium cells or batteries, including cells or batteries packed with, or contained in, equipment in accordance with the conditions and limitations of this paragraph (c)(4), must receive instruction on these conditions and limitations, corresponding to their functions.

(5) For transportation by aircraft, a package that exceeds the number or quantity (mass) limits in the table shown in paragraph (c)(4)(i) of this section, the overpack limit described in paragraph (c)(4)(ii) of this section, or the consignment limit described in paragraph (c)(4)(iii) of this section is subject to all applicable requirements of this subchapter, except that a package containing no more than 2.5 kg lithium metal cells or batteries or 10 kg lithium ion cells or batteries is not subject to the UN performance packaging requirements in paragraph (b)(3)(ii) of this section when the package

HazMat Table Column 8, Packaging Lithium Cells & Batteries– 49 CFR §173.185

displays both the lithium battery mark in paragraph (c)(3)(i) and the Class 9 label. This paragraph does not apply to batteries or cells packed with or contained in equipment.

(d) *Lithium cells or batteries shipped for disposal or recycling.* A lithium cell or battery, including a lithium cell or battery contained in equipment, that is transported by motor vehicle to a permitted storage facility or disposal site, or for purposes of recycling, is excepted from the testing and record keeping requirements of paragraph (a) and the specification packaging requirements of paragraph (b)(3) of this section, when packed in a strong outer packaging conforming to the requirements of §§173.24 and 173.24a. A lithium cell or battery that meets the size, packaging, and hazard communication conditions in paragraph (c)(1)-(3) of this section is excepted from subparts C through H of part 172 of this subchapter.

(e) *Low production runs and prototypes.* Low production runs (*i.e.*, annual production runs consisting of not more than 100 lithium cells or batteries), or prototype lithium cells or batteries, including equipment transported for purposes of testing, are excepted from the testing and record keeping requirements of paragraph (a) of this section, provided:

(1) Except as provided in paragraph (e)(4) of this section, each cell or battery is individually packed in a non-metallic inner packaging, inside an outer packaging, and is surrounded by cushioning material that is non-combustible and non-conductive or contained in equipment. Equipment must be constructed or packaged in a manner as to prevent accidental operation during transport;

(2) Appropriate measures shall be taken to minimize the effects of vibration and shocks and prevent movement of the cells or batteries within the package that may lead to damage and a dangerous condition during transport. Cushioning material that is non-combustible and non-conductive may be used to meet this requirement;

(3) The lithium cells or batteries are packed in inner packagings or contained in equipment. The inner packaging or equipment is placed in one of the following outer packagings that meet the requirements of part 178, subparts L and M, of this subchapter at the Packing Group I level. Cells and batteries, including equipment of different sizes, shapes or masses must be placed into an outer packaging of a tested design type listed in this section provided the total gross mass of the package does not exceed the gross mass for which the design type has been tested. A cell or battery with a net mass of more than 30 kg is limited to one cell or battery per outer packaging;

(i) Metal (4A, 4B, 4N), wooden (4C1, 4C2, 4D, 4F), or solid plastic (4H2) box;

(ii) Metal (1A2, 1B2, 1N2), plywood (1D), or plastic (1H2) drum.

(4) Lithium batteries, including lithium batteries contained in equipment, that weigh 12 kg (26.5 pounds) or more and have a strong, impact-resistant outer casing or assemblies of such batteries, may be packed in strong outer packagings, in protective enclosures (for example, in fully enclosed or wooden slatted crates), or on pallets or other handling devices, instead of packages meeting the UN performance packaging requirements in paragraphs (b)(3)(ii) and (iii) of this section. The battery or battery assembly must be secured to prevent inadvertent movement, and the terminals may not support the weight of other superimposed elements;

(5) Irrespective of the limit specified in column (9B) of the §172.101 Hazardous Materials Table, the battery or battery assembly prepared for transport in accordance with this paragraph may have a mass exceeding 35 kg gross weight when transported by cargo aircraft;

(6) Batteries or battery assemblies packaged in accordance with this paragraph are not permitted for transportation by passenger-carrying aircraft, and may be transported by cargo aircraft only if approved by the Associate Administrator prior to transportation; and

(7) Shipping papers must include the following notation “Transport in accordance with §173.185(e).”

HazMat Table Column 8, Packaging Lithium Cells & Batteries– 49 CFR §173.185

(f) *Damaged, defective, or recalled cells or batteries.* Lithium cells or batteries, that have been damaged or identified by the manufacturer as being defective for safety reasons, that have the potential of producing a dangerous evolution of heat, fire, or short circuit (e.g., those being returned to the manufacturer for safety reasons) may be transported by highway, rail or vessel only, and must be packaged as follows:

- (1) Each cell or battery must be placed in individual, non-metallic inner packaging that completely encloses the cell or battery;
- (2) The inner packaging must be surrounded by cushioning material that is non-combustible, non-conductive, and absorbent; and
- (3) Each inner packaging must be individually placed in one of the following packagings meeting the applicable requirements of part 178, subparts L, M, P and Q of this subchapter at the Packing Group I level:
 - (i) Metal (4A, 4B, 4N), wooden (4C1, 4C2, 4D, 4F), or solid plastic (4H2) box;
 - (ii) Metal (1A2, 1B2, 1N2), plywood (1D), or plastic (1H2) drum; or
 - (iii) For a single battery or for a single battery contained in equipment, the following rigid large packagings are authorized:
 - (A) Metal (50A, 50B, 50N);
 - (B) Rigid plastic (50H);
 - (C) Plywood (50D); and
- (4) The outer package must be marked with an indication that the package contains a “Damaged/defective lithium ion battery” and/or “Damaged/defective lithium metal battery” as appropriate. The marking required by this paragraph (f)(4) must be in characters at least 12 mm (0.47 inches) high.

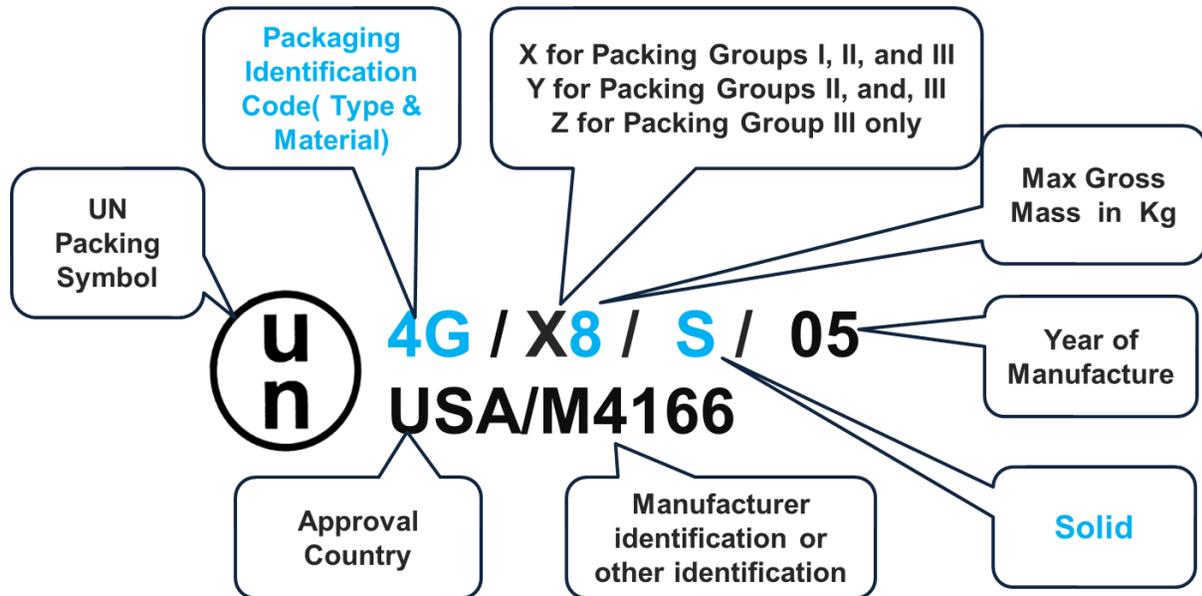
(g) *Limited exceptions to restrictions on air transportation of medical device batteries.* Irrespective of the quantity limitations described in column 9A of the §172.101 Hazardous Materials Table of this subchapter, up to two replacement lithium cells or batteries specifically used for a medical device as defined in this section may be transported as cargo on a passenger aircraft. Packages containing these cells or batteries are not subject to the marking requirement in paragraph (c)(1)(iii) of this section or the “CARGO AIRCRAFT ONLY” label required by §172.402(c) of this subchapter and may be transported as cargo on a passenger aircraft when approved by the Associate Administrator and provided the following conditions are met:

- (1) The intended destination of the cells or batteries is not serviced daily by cargo aircraft if a cell or battery is required for medically necessary care; and
- (2) Lithium ion cells or batteries for medical devices are excepted from the state of charge limitations in §172.102, special provision A100, of this subchapter, provided each cell or battery is:
 - (i) Individually packed in an inner packaging that completely encloses the cell or battery;
 - (ii) Placed in a rigid outer packaging; and
 - (iii) Protected to prevent short circuits.

(h) *Approval.* A lithium cell or battery that does not conform to the provisions of this subchapter may be transported only under conditions approved by the Associate Administrator.

[80 FR 72924, Nov. 23, 2015, as amended at 82 FR 15881, Mar. 30, 2017; 84 FR 8028, Mar. 6, 2019]

UN Packaging Identification Codes



Type of Container

- 1 = Drum
- 2 = Wooden Barrel
- 3 = Jerrican
- 4 = Box
- 5 = Bag
- 6 = Composite Packaging
- 7 = Pressure Receptacle

Material of Construction

- A = Steel
- B = Aluminum
- C = Natural Wood
- D = Plywood
- F = Reconstituted Wood
- G = Fiberboard
- H = Plastic
- L = Textile
- M = Paper, Multi-Wall
- N = Metal other than Steel or Aluminum
- P = Glass, Porcelain, or Stoneware

Container Packaging Head or Material Wall Type

For Drums:

- 1 - Closed Head (Non-Removable Head)
- 2 - Open Head (Removable Head)

For Bags:

- 5M1 - Multiwall
- 5M2 - Multiwalled, Water-Resistant

Non-Bulk Packaging Codes

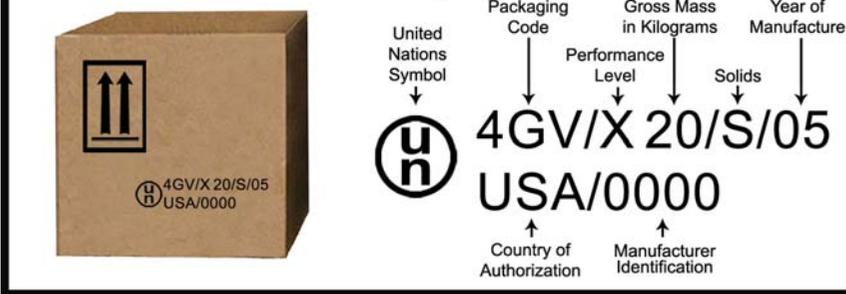
§§178.504 - 178.521

1A1 Steel drum, non-removable head	4A Steel box
1A2 Steel drum, removable head	4B Aluminum box
1B1 Aluminum drum, non-removable head	4C1 Wood box, ordinary
1B2 Aluminum drum, removable head	4C2 Wood box, sift-proof walls
1D Plywood drum	4D Plywood box
1G Fiber drum	4F Reconstituted wood box
1H1 Plastic drum, non-removable head	4G Fiberboard box
1H2 Plastic drum, removable head	4H1 Plastic box, expanded
1N1 Metal drum, non-removable head	4H2 Plastic box, solid
1N2 Metal drum, removable head	5H1 Woven plastic bag, unlined or non-coated
2C1 Wooden barrel, bung type	5H2 Woven plastic bag, sift-proof
2C2 Wooden barrel, slack type, removable head	5H3 Woven plastic bag, water-resistant
3A1 Steel jerrican, non-removable head	5H4 Plastic film bag
3A2 Steel jerrican, removable head	5L1 Textile bag, unlined or non-coated
3B1 Aluminum jerrican, non-removable head	5L2 Textile bag, sift-proof
3B2 Aluminum jerrican, removable head	5L3 Textile bag, water-resistant
3H1 Plastic jerrican, non-removable head	5M1 Paper bag, multi-wall
3H2 Plastic jerrican, removable head	5M2 Paper bag, multi-wall water-resistant

§§178.522 and 178.523

6HA1 Plastic receptacle within a protective steel drum
6HA2 Plastic receptacle within a protective steel crate or box
6HB1 Plastic receptacle within a protective aluminum drum
6HB2 Plastic receptacle within a protective aluminum crate or box
6HC Plastic receptacle within a protective wooden box
6HD1 Plastic receptacle within a protective plywood drum
6HD2 Plastic receptacle within a protective plywood box
6HG1 Plastic receptacle within a protective fiber drum
6HG2 Plastic receptacle within a protective fiberboard box
6HH1 Plastic receptacle within a protective plastic drum
6HH2 Plastic receptacle within a protective plastic box
6PA1 Glass, porcelain, or stoneware receptacles within a protective steel drum
6PA2 Glass, porcelain, or stoneware receptacles within a protective steel crate or box
6PB1 Glass, porcelain, or stoneware receptacles within a protective aluminum drum
6PB2 Glass, porcelain, or stoneware receptacles within a protective aluminum crate or box
6PC Glass, porcelain, or stoneware receptacles within a protective wooden box
6PD1 Glass, porcelain, or stoneware receptacles within a protective plywood drum
6PD2 Glass, porcelain, or stoneware receptacles within a protective wickerwork hamper
6PG1 Glass, porcelain, or stoneware receptacles within a protective fiber drum
6PG2 Glass, porcelain, or stoneware receptacles within a protective fiberboard box
6PH1 Glass, porcelain, or stoneware receptacles within a protective expanded plastic packaging
6PH2 Glass, porcelain, or stoneware receptacles within a protective solid plastic packaging

Combination Packaging



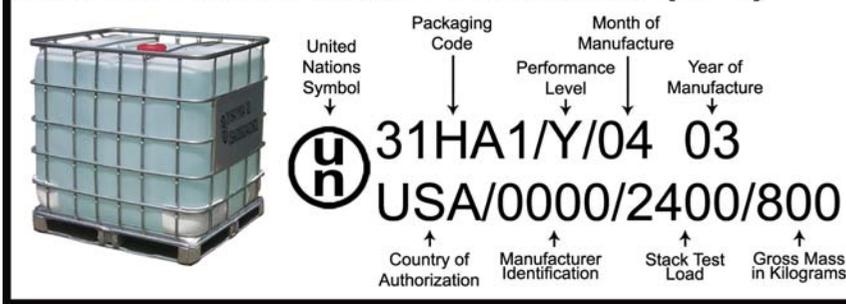
Single, Combination, or Composite Packaging - Solids



Single or Composite Packaging - Liquids



Intermediate Bulk Containers (IBC)



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.

Country of Authorization: Country designation code indicates where the package is manufactured and marked.

Manufacturer Identification: Name and address or authorized symbol of packaging manufacturer or certifying agency.

Minimum Thickness: For metal or plastic drums, jerricans or the outer packaging of composite packaging intended for reuse or reconditioning.

R: Reconditioned packaging.

L: Reconditioned packaging having successfully passed a leakproofness test. This test is not required for inner packaging of combination packaging.

Note: Additional marking requirements for Reconditioned packaging are found in §178.503.

Additional Requirements for Intermediate Bulk Containers (IBC)

Month and Year: For IBCs, the month and year of manufacture.

Stacking Test Load: For IBCs, the stacked test load in kilograms. A number "0" shows that the IBC is not designed for stacking.

Note: Standards and codes for IBCs are found in §178.702 - 178.710

Required Tests for Non-Bulk Packaging

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.



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

DOT CHART 17

Hazardous Materials Markings, Labeling and Placarding Guide

Refer to 49 CFR, Part 172:

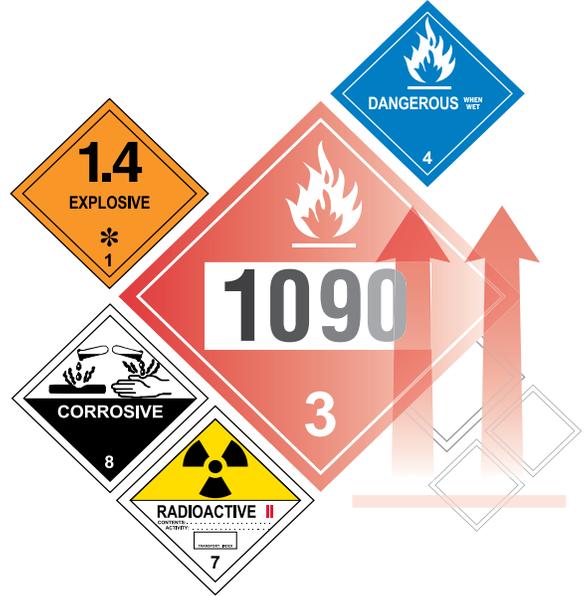
Marking - Subpart D

Labeling - Subpart E

Placarding - Subpart F



Scan the QR code
to download a copy



NOTE: This document is for general guidance only and should not be used to determine compliance with 49 CFR, Parts 100-185.

HAZARDOUS MATERIALS MARKINGS

Package Orientation
(Red or Black)



§172.312(a)

Keep Away from Heat



§172.317

Overpack Mark



§173.25(a)(4)

Fumigant Marking



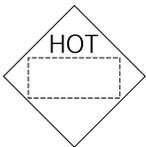
§172.302(g) and §173.9

Material Poisonous by Inhalation



§172.313(a)

Elevated Temperature Material



§172.325

UN ID Number Mark



§§172.332 and §172.336

Biological Substances, Category B



§173.199 (a)(5)

Lithium Battery Handling Mark



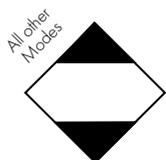
§173.185

Marine Pollutant



§172.322

Limited Quantity



§172.315



Biohazard Mark



§172.323

Petroleum Sour Crude Oil



§172.327

Excepted Quantity



§173.4a(g)

General Guidelines on Use of Warning Labels and Placards

LABELS

See 49 CFR, Part 172, Subpart E, for complete labeling regulations.

- The Hazardous Materials Table [§172.101, Col. 6] identifies the proper label(s) for the hazardous material listed.
- Any person who offers a hazardous material for transportation **MUST** label the package, if required [§172.400(a)].
- Labels may be affixed to packages when not required by regulations, provided each label represents a hazard of the material contained in the package [§172.401].
- For labeling mixed or consolidated packages, see §172.404.
- The appropriate hazard class or division number must be displayed in the lower corner of a primary and subsidiary hazard label [§172.402(b)].
- For classes 1,2,3,4,5,6, and 8, text indicating a hazard (e.g., "CORROSIVE") is **NOT** required on a primary or subsidiary label. The label must otherwise conform to Subpart E of Part 172 [§172.405].
- Labels must be printed on or affixed to the surface of the package near the proper shipping name marking [§172.406(a)].
- When primary and subsidiary labels are required, they must be displayed next to each other [§172.406(c)].
- For a package containing a Division 6.1, PG III material, the POISON label specified in §172.430 may be modified to display the text PG III instead of POISON or TOXIC. Also see §172.313(d) [§172.405(c)].
- The ORGANIC PEROXIDE label (§172.427) indicates that organic peroxides are highly flammable. The color of the border must be black and the color of the flame may be black or white (see §172.407(d)(2)(iii)).

PLACARDS

See 49 CFR, Part 172, Subpart F, for complete placarding regulations.

- Each person who offers for transportation or transports any hazardous material subject to the Hazardous Materials Regulations must comply with all applicable requirements of Subpart F [§172.500].
- Placards may be displayed for a hazardous material, even when not required, if the placarding otherwise conforms to the requirements of Subpart F of Part 172 [§172.502(c)].
- For other than Class 7 or the DANGEROUS placard, text indicating a hazard (e.g., "FLAMMABLE") is not required. Text may be omitted from the OXYGEN placard only if the specific ID number is displayed on the placard [§172.519(b)(3)].
- For a placard corresponding to the primary or subsidiary hazard class of a material, the hazard class or division number must be displayed in the lower corner of the placard [§172.519(b)(4)].
- Except as otherwise provided, any bulk packaging, freight container, unit load device, transport vehicle or rail car containing any quantity of material listed in Table 1 must be placarded [§172.504].
- When the aggregate gross weight of all hazardous materials in non-bulk packages covered in Table 2 is less than 454 kg (1,001 lbs.), no placard is required on a transport vehicle or freight container when transported by highway or rail [§172.504(c)].
- Notes: See §172.504(f)(10) for placarding Division 6.1, PG III materials.
- Placarded loads require registration with USDOT. See §107.601 for registration regulations.

PLACARDING TABLES

[§172.504(e)]

TABLE 1

Category of material (Hazard Class or division number and additional description, as appropriate)	Placard name
1.1.....	EXPLOSIVES 1.1
1.2.....	EXPLOSIVES 1.2
1.3.....	EXPLOSIVES 1.3
2.3.....	POISON GAS
4.3.....	DANGEROUS WHEN WET
5.2 (Organic peroxide, Type B, liquid or solid, temperature controlled).....	ORGANIC PEROXIDE
6.1 (Materials poisonous by inhalation (see §171.8)).....	POISON INHALATION HAZARD
7 (Radioactive Yellow III label only).....	RADIOACTIVE ¹

¹ RADIOACTIVE placards are also required for: all shipments of unpackaged LSA-I material or SCO-I; all shipments required by §§173.427, 173.441, and 173.457 of this subchapter to be operated under exclusive use; and all closed vehicles used in accordance with §173.443(d).

TABLE 2

Category of material (Hazard Class or division number and additional description, as appropriate)	Placard name
1.4.....	EXPLOSIVES 1.4
1.5.....	EXPLOSIVES 1.5
1.6.....	EXPLOSIVES 1.6
2.1.....	FLAMMABLE GAS
2.2.....	NON-FLAMMABLE GAS
3.....	FLAMMABLE
Combustible Liquid.....	COMBUSTIBLE
4.1.....	FLAMMABLE SOLID
4.2.....	SPONTANEOUSLY COMBUSTIBLE
5.1.....	OXIDIZER
5.2 (Other than organic peroxide, Type B, liquid or solid, temperature controlled).....	ORGANIC PEROXIDE
6.1 (Other than materials poisonous by inhalation).....	POISON
6.2.....	(None)
8.....	CORROSIVE
9.....	Class 9 (See §172.504(f)(9))

IDENTIFICATION NUMBER DISPLAYS

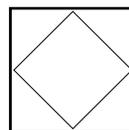


§172.332, 172.332(c)(4)

* Appropriate placard must be used with orange panel or white square-on-point configuration.

** For a COMBUSTIBLE placard used to display an identification number, the entire background below the white background for the identification number must be white during transportation by rail and may be white during transportation by highway.

IDENTIFICATION NUMBER MARKINGS ON ORANGE PANELS, WHITE SQUARES-ON-POINT, OR APPROPRIATE PLACARDS MUST BE DISPLAYED ON: (1) Tank Cars, Cargo Tanks, Portable Tanks, and other Bulk Packagings; (2) Transport vehicles or freight containers containing 4,000 kg (8,820 lbs.) in non-bulk packages of only a single hazardous material having the same proper shipping name and identification number loaded at one facility and transport vehicle contains no other material, hazardous or otherwise; and (3) transport vehicles or freight containers containing 1,000 kg (2,205 lbs.) of non-bulk packages of materials poisonous by inhalation in Hazard Zone A or B. See §§172.301(a)(3), 172.313(c), 172.326, 172.328, 172.330, and 172.331.



§172.527

Square white background required for placard for highway- route-controlled quantity radioactive material and for rail shipment of certain explosives and poisons, and for flammable gas in a DOT 113 tank car (§172.507 and §172.510).

For additional information contact the Hazardous Materials Info Center
1-800-HMR-4922 (1-800-467-4922)

E-mail: infocntr@dot.gov <http://phmsa.dot.gov>

This Chart is available on line at the following link:

<https://www.phmsa.dot.gov/training/hazmat/publications>



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



CHART 17 Now Available AS FREE MOBILE APP



PHH50-0190-1121

Hazardous Materials Warning Labels

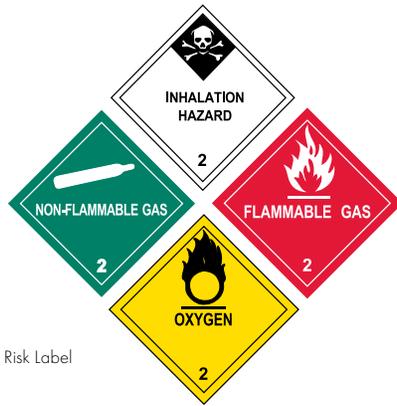
Actual label size: at least 100 mm (3.9 inches) on all sides

CLASS 1 Explosives:
Divisions 1.1, 1.2, 1.3, 1.4, 1.5, 1.6



§172.411

CLASS 2 Gases:
Divisions 2.1, 2.2, 2.3



§172.405(b), §172.415, §172.416, §172.417

CLASS 3 Flammable Liquid



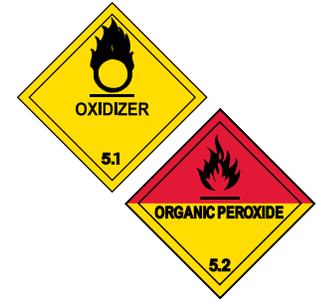
§172.419

CLASS 4 Flammable Solid, Spontaneously Combustible, and Dangerous When Wet:
Divisions 4.1, 4.2, 4.3



§172.420, §172.422, §172.423

CLASS 5 Oxidizer, Organic Peroxide: Divisions 5.1 and 5.2



§172.426, §172.427

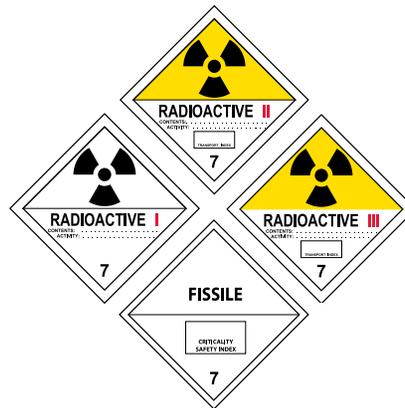
* Replace with compatibility group letter.
** Replace with division number and compatibility group letter.

CLASS 6 Poison (Toxic), Poison Inhalation Hazard, Infectious Substance: Divisions 6.1 and 6.2



§172.323, §172.405(c), §172.429, §172.430, §172.432

CLASS 7 Radioactive



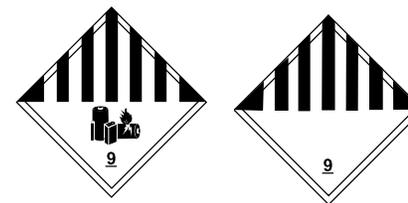
§172.436, §172.438, §172.440, §172.441

CLASS 8 Corrosive



§172.442

CLASS 9 Miscellaneous Hazardous Material



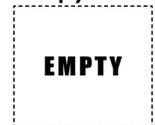
§§172.446, §172.447

Cargo Aircraft Only



§172.448

Empty Label



§172.450

For Regulated Medical Waste (RMW), an Infectious Substance label is not required on an outer packaging if the OSHA Biohazard marking is used as prescribed in 29 CFR 1910.1030(g) (see § 173.134(c)). A bulk package of RMW must display a BIOHAZARD marking (see § 172.323(a)).

Hazardous Materials Warning Placards

Actual placard size: at least 250 mm (9.84 inches) on all sides

CLASS 1 Explosives



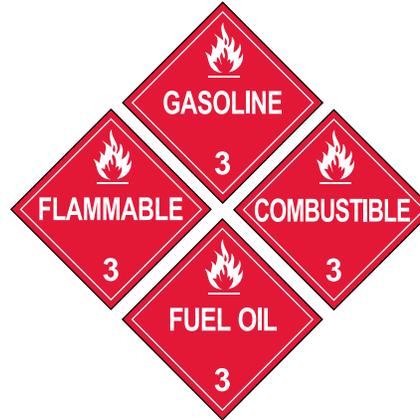
* For Divisions 1.1, 1.2, or 1.3, enter division number and compatibility group letter, when required; placard any quantity. For Divisions 1.4, 1.5, and 1.6, enter compatibility group letter, when required; placard 454 kg (1,001 lbs) or more.

CLASS 2 Gases



For NON-FLAMMABLE GAS, OXYGEN (compressed gas or refrigerated liquid), and FLAMMABLE GAS, placard 454 kg (1,001 lbs) or more gross weight. For POISON GAS (Division 2.3), placard any quantity.

CLASS 3 Flammable Liquid and Combustible Liquid



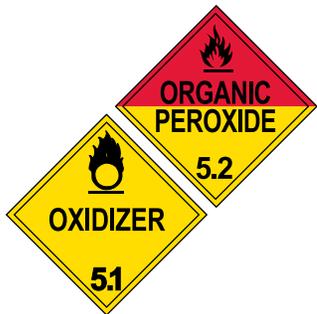
For FLAMMABLE placard 454 kg (1,001 lbs) or more. GASOLINE may be used in place of FLAMMABLE placard displayed on a cargo tank or portable tank transporting gasoline by highway. Placard combustible liquid transported in bulk. See §172.504(f)(2) for use of FLAMMABLE placard in place of COMBUSTIBLE. FUEL OIL may be used in place of COMBUSTIBLE on a cargo or portable tank transporting fuel oil not classed as a flammable liquid by highway.

CLASS 4 Flammable Solid, Spontaneously Combustible, and Dangerous When Wet



For FLAMMABLE SOLID and SPONTANEOUSLY COMBUSTIBLE, placard 454 kg (1,001 lbs) or more. For DANGEROUS WHEN WET (Division 4.3), placard any quantity.

CLASS 5 Oxidizer & Organic Peroxide



For OXIDIZER (Division 5.1) and ORGANIC PEROXIDE (Division 5.2 - other than TYPE B, temperature controlled), placard 454 kg (1,001 lbs) or more. For ORGANIC PEROXIDE (Division 5.2), Type B, temperature controlled, placard any quantity.

CLASS 6 Poison (Toxic) and Poison Inhalation Hazard



For POISON (PGI or PGII, other than inhalation hazard) and POISON (PGIII), placard 454 kg (1,001 lbs) or more. For POISON-INHALATION HAZARD (Division 6.1), inhalation hazard only, placard any quantity.

CLASS 7 Radioactive



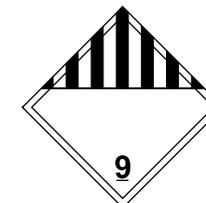
Placard all shipments that contain a package labeled as Radioactive Yellow-III; all shipments of unpackaged LSA-I material or SCO-I; all shipments required by §§173.427, 173.441, and 173.457 of this subchapter to be operated under exclusive use; and all closed vehicles used in accordance with §173.443(d).

CLASS 8 Corrosive



For CORROSIVE, placard 454 kg (1,001 lbs) or more.

CLASS 9 Miscellaneous



Not required for domestic transportation. A bulk packaging containing a Class 9 material must be marked with the appropriate ID number displayed on a Class 9 placard, an orange panel, or a white square-on-point display.

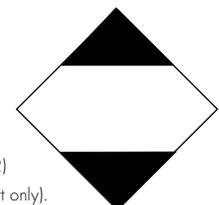
Dangerous



A freight container, unit load device, transport vehicle, or rail car which contains non-bulk packages with two or more categories of hazardous materials that require different placards specified in Table 2 §172.504(e) may be placarded with DANGEROUS placards instead of the specific placards required for each of the materials in Table 2. However, when 1,000 kg (2,205 lbs) or more of one category of material is loaded at one loading facility, the placard specified in Table 2 must be applied.

Limited Quantity Marking

§172.315(a)(2)
(Vessel transport only).





Non - Negotiable Bill of Lading

Mailing Address
 PO Box 24348
 Seattle, WA 98124

Toll Free Customer Service
 Seattle (Central/SE Alaska) 1-800-326-8346
 Seattle (Western AK/Hawaii) 1-800-426-3113
 Ketchikan 1-800-809-7660
 Juneau 1-800-585-6102

PRO No.

FREIGHT BILL PRO NUMBER
 (CARRIER USE ONLY)

Date Received:	Voyage No:	Bkng #/Conf Code:	Origin:	Destination:	Container No:	Seal#:	Byd Carrier:
----------------	------------	-------------------	---------	--------------	---------------	--------	--------------

SHIPPER		CONSIGNEE		BILL TO	
Name		Name		Name	
Street Address		Street Address		Street Address	
City, State		City, State		City, State	
Ref No	Phone	Ref No	Phone	Ref No	Phone

Processor/Supplier:

All goods shall have an agreed released value of \$500 per package/cfu, unless Shipper declares and Carrier accepts a higher released value directly below. An additional charge may be applicable to any such declaration. Shipper and Carrier's signatures on this bill shall constitute acceptance of the declaration. DECLARED VALUE \$ _____	It is understood and agreed all household goods/personal effects will be released at \$.10/lb. INITIAL _____	FREIGHT CHARGES: COLLECT PREPAID OTHER (COD's not accepted)
---	--	---

LOAD TYPE Palletized: Hand Stacked: Mixed or other (please describe): _____

No. of Pieces	Kind of Package	HM* X	Description provided by Shipper <i>*(For Hazmat - UN/NA Number, Proper Shipping Name, Hazardous Classification, and Packing Group)</i>	Net Weight	Gross Weight
TOTAL PIECES				TOTAL WEIGHT	

In the event of hazardous goods the Shipper's signature on this bill certifies that the above named materials are properly classified, described, packaged, marked, labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation (49 C.F.R. 172.204).

Shipper must identify in writing prior to shipment any perishable, temperature controlled, keep from freezing, chilled or frozen goods. Carrier shall not be responsible for freezing down or reducing the core temperature of goods.	Refrigerated Temp Loads: Requested Temp ____ F ____ C Temp at Receiving: ____ F ____ C Date _____ Time _____	RECEIVED \$ _____ <i>To apply in prepayment of charges on the property described hereon</i> Cash/MC/VISA/Check# _____
SHIPPER (SIGNATURE REQUIRED)		CARRIER
PER	DATE	PER DATE



Non - Negotiable Bill of Lading

PRO No.

FREIGHT BILL PRO NUMBER
(CARRIER USE ONLY)

Mailing Address
PO Box 24348
Seattle, WA 98124

Toll Free Customer Service
Seattle (Central/SE Alaska) 1-800-326-8346
Seattle (Western AK/Hawaii) 1-800-426-3113
Ketchikan 1-800-809-7660
Juneau 1-800-585-6102

Date Received:	Voyage No: W9003	Bkng #/Conf Code: IZ40	Origin: Big Islang	Destination: Seattle	Container No: NSIU263724	Seal#:	Byd Carrier:
----------------	---------------------	---------------------------	-----------------------	-------------------------	-----------------------------	--------	--------------

SHIPPER		CONSIGNEE		BILL TO	
Name Big Island Consortium	Street Address P.O. Box 120	Name Super Recycler	Street Address 1212 Oggie Boogie Ave	Name Big Island Consortium	Street Address P.O. Box 120
City, State Big Island, AK 99561	Ref No Jim Bob Barstow	City, State Seattle, WA 98124	Ref No Big Cheese	City, State Big Island, AK 99561	Ref No Jim Bob Barstow
Phone (907) 555-8316		Phone (206) 443-5442		Phone (907) 555-8316	

Processor/Supplier:

<p>All goods shall have an agreed released value of \$500 per package/cfu, unless Shipper declares and Carrier accepts a higher released value directly below. An additional charge may be applicable to any such declaration. Shipper and Carrier's signatures on this bill shall constitute acceptance of the declaration.</p> <p>DECLARED VALUE \$ _____</p>	<p>It is understood and agreed all household goods/personal effects will be released at \$.10/lb.</p> <p>INITIAL _____</p>	<p>FREIGHT CHARGES:</p> <p>COLLECT <input type="checkbox"/></p> <p>PREPAID <input type="checkbox"/></p> <p>OTHER <input type="checkbox"/></p> <p>(COD's not accepted)</p>
--	---	--

LOAD TYPE Palletized: Hand Stacked: Mixed or other (please describe): _____

No. of Pieces	Kind of Package	HM* X	Description provided by Shipper <i>*(For Hazmat - UN/NA Number, Proper Shipping Name, Hazardous Classification, and Packing Group)</i>	Net Weight	Gross Weight	
1	Tote	X	UN2794, Batteries, Wet, Filled with Acid, 8		4,000	
2	Pallet	X	UN2794, Batteries, Wet, Filled with Acid, 8		3,000	
3	Pallet		Scrap Electronics for Recycling		1,500	
<div style="border: 2px solid black; padding: 10px; color: red; font-weight: bold;"> <p>For Hazardous Materials [or Dangerous Goods] Incident Spill, Leak, Fire, Exposure, or Accident Call CHEMTREC 1-800-424-9300 / +1 703-527-3887 CCN: 846602</p> </div>						
6	TOTAL PIECES			TOTAL WEIGHT	0	8,500

In the event of hazardous goods the Shipper's signature on this bill certifies that the above named materials are properly classified, described, packaged, marked, labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation (49 C.F.R. 172.204).

<p>Shipper must identify in writing prior to shipment any perishable, temperature controlled, keep from freezing, chilled or frozen goods. Carrier shall not be responsible for freezing down or reducing the core temperature of goods.</p>	<p>Refrigerated Temp Loads:</p> <p>Requested Temp _____ F _____ C</p> <p>Temp at Receiving: _____ F _____ C</p> <p>Date _____ Time _____</p>	<p>RECEIVED \$ _____</p> <p><i>To apply in prepayment of charges on the property described hereon</i></p> <p>Cash/MC/VISA/Check# _____</p>
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SHIPPER (SIGNATURE REQUIRED)	CARRIER
PER Jim Bob Barstow	PER
DATE 05/29/19	DATE



SHIPPER'S DECLARATION FOR DANGEROUS GOODS

Shipper Acme Backhaul Co. 2112 Broad Rd. Smalltown, AK 99551 Jim Jimmerson 907-555-9492	Air Waybill No. Page 1 of 1 Pages Shipper's Reference No. (optional)
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Consignee We'll Take It, LLC. 8249 Interesting Pl. Bigcity, AK 99100 Steve Steelson 907-555-3307	
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Two completed and signed copies of this Declaration must be handed to the operator.

TRANSPORT DETAILS This shipment is within the limitations prescribed for: (delete non-applicable)		Airport of Departure (optional): Smalltown, AK	WARNING Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties.			
<table border="1"> <tr> <td>PASSENGER AND CARGO AIRCRAFT</td> <td>XXXX</td> </tr> </table>	PASSENGER AND CARGO AIRCRAFT	XXXX		Airport of Destination (optional): Bigcity	Shipment type: <i>(delete non-applicable)</i> <table border="1"> <tr> <td>NON-RADIOACTIVE</td> <td>RADIOACTIVE</td> </tr> </table>	NON-RADIOACTIVE
PASSENGER AND CARGO AIRCRAFT	XXXX					
NON-RADIOACTIVE	RADIOACTIVE					

NATURE AND QUANTITY OF DANGEROUS GOODS

Dangerous Goods Identification						
UN or ID No.	Proper Shipping Name	Class or Division (subsidiary hazard)	Packing Group	Quantity and Type of Packing	Packing Inst.	Authorization
UN1078	Refrigerant gases, n.o.s. (Refrigerant gas R134a and Refrigerant gas R12)	2.2		1 Cylinder - 21 lbs	200	

Additional Handling Information **ERG - 126**

For Hazardous Materials [or Dangerous Goods] Incident, Spill, Leak, Fire, Exposure, or Accident Call CHEMTREC
1-800-424-9300 / +1 703-527-3887 CCN: 555666

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. I declare that all of the applicable air transport requirements have been met.	Name of Signatory Jim Jimmerson Date 03/10/2020 Signature (See warning above) <i>Jim Jimmerson</i>
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SHIPPER'S DECLARATION FOR DANGEROUS GOODS



Shipper	Air Waybill No. Page of Pages Shipper's Reference No. (optional)
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Consignee	
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Two completed and signed copies of this Declaration must be handed to the operator.

<p>TRANSPORT DETAILS</p> <p>This shipment is within the limitations prescribed for:</p> <p>(delete non-applicable)</p> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%; text-align: center; padding: 2px;">PASSENGERS AND CARGO AIRCRAFT</td> <td style="width:50%; text-align: center; padding: 2px;">CARGO AIRCRAFT ONLY</td> </tr> </table> <p>Airport of Departure (optional):</p> <p>Airport of Destination (optional):</p>	PASSENGERS AND CARGO AIRCRAFT	CARGO AIRCRAFT ONLY	<p>WARNING</p> <p>Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties.</p> <hr/> <p>Shipment type: <i>(delete non-applicable)</i></p> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%; text-align: center;">NON-RADIOACTIVE</td> <td style="width:50%; text-align: center;">RADIOACTIVE</td> </tr> </table>	NON-RADIOACTIVE	RADIOACTIVE
PASSENGERS AND CARGO AIRCRAFT	CARGO AIRCRAFT ONLY				
NON-RADIOACTIVE	RADIOACTIVE				

NATURE AND QUANTITY OF DANGEROUS GOODS

Dangerous Goods Identification				Quantity and Type of Packing	Packing Inst.	Authorization
UN or ID No.	Proper Shipping Name	Class or Division (subsidiary hazard)	Packing Group			

Additional Handling Information

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. I declare that all of the applicable air transport requirements have been met.	Name of Signatory Date Signature (See warning above)
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DOT HazMat Security Plan & In-Depth Security Requirements

Do I Need a Security Plan?

In most situations, communities backhauling hazardous materials will not be required to have a security plan (and be required to have “*In-Depth Security Training*” for employees). However, it is important to be aware of when a security plan and in-depth security training is required.

If your facility offers for transportation or transport hazardous materials in quantities greater than indicated in the table below, then your facility must develop and implement a security plan.

Hazard Class/Division	Type	Threshold Quantity
Division 1.1, 1.2, & 1.3	Explosives	Any quantity
Division 1.4, 1.5, & 1.6	Explosives	Any quantity requiring placarding (see – 49 CFR §172 Subpart F)
Division 2.1	Flammable Gases	Large bulk quantity*
Division 2.2	Nonflammable Gases	Large bulk quantity* with subsidiary hazard of Division 5.1 Oxidizer
Division 2.3	Poisonous Inhalation Hazard (PIH)	Any quantity
Class 3 & Division 4.1	Desensitized Explosives	454 kg (1,001 pounds) or greater in a single transport vehicle or freight container
Class 3	Flammable Liquids	Large bulk quantity* in Packing Group I or II
Division 4.2	Spontaneously Combustible	Large bulk quantity* in Packing Group I or II
Division 4.3	Dangerous When Wet	Any quantity
Division 5.1	Oxidizers	Large bulk quantity* in Packing Groups I & II
Division 5.2	Organic Peroxides	Any quantity of organic peroxide, Type B, liquid or solid, temperature controlled
Division 6.1	Poisonous Materials Other than PIH	Large bulk quantity* in Packing Groups I, II, & III
Class 8	Corrosive Materials	Large bulk quantity* in Packing Group I
Class 9	Miscellaneous Hazardous Materials	Not subject

* **Large Bulk Quantity** – A quantity in a single packaging such as a cargo tank motor vehicle, portable tank, or other bulk container that is greater than 1) Solids - 3,000 kg. (6,614 lbs.) or 2) Liquids/Gases - 3,000 liters (792 gal.)

It is important to note, regulations are subject to change and the above table does not contain every situation requiring a security plan. Please refer to the current federal regulations if there is any uncertainty regarding if your situation would require a security plan [49 CFR §172 Subpart I](#).

My Organization is Required to Have a Security Plan...What do I do Next?

Any organization that is required to have a security plan must ensure that anyone who handles, performs a regulated function related to, or implements the security plan, receives **in-depth security training**. In-depth security training must include the organization’s security objectives, organizational security structure, specific security procedures, specific security duties & responsibilities for each employee, and specific actions to be taken by each employee in the event of a security breach.

Further information, guidance, resources and contact information regarding developing security plans and providing in-depth security training (among other HazMat topics) can be found on the DOT PHMSA website:

- DOT PHMSA Outreach and Engagement – www.phmsa.dot.gov/training/hazmat/hazardous-materials-outreach-engagement.
- DOT HazMat Training Requirements – www.phmsa.dot.gov/training/hazmat/hazmat-transportation-training-requirements.
- DOT Security Requirements Brochure – <https://www.phmsa.dot.gov/training/hazmat/security-requirements-brochure-english>.