



# Information Sources

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Hazardous Materials Advisor

# Aim

By the end of the session learners will have an understanding of the common information sources available to first responders & those in the role of an HMA

## Objectives

- Various Information Sources
- Structure
- Content & use
- Importance of triangulation



# AGENDA

TRANSPORTATION

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SUPPLY

---

ERG

---

CAMEO CHEMICALS

---

INTERNATIONAL CHEMICAL SAFETY CARDS

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CHEMDATA

# Regulations – Supply & Transport

Global Harmonised System (GHS)

UN Recommendations on TDG

EU CLP

Japan



IMO/IMDG



ICAO/IATA



RID



ADN

US

China



ADR

# Transport Symbols



Explosives



Non-Flammable Gas  
Non-Toxic Gas



Flammable Gas



Toxic Gas



Flammable Liquid



Dangerous  
when wet



Flammable Solid



Spontaneously  
Combustible

# Transport Symbols



Oxidizer



Organic Peroxide



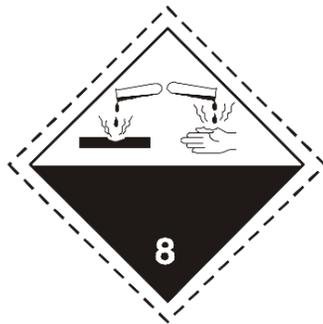
Toxic



Infectious  
Substances



Radioactive



Corrosive

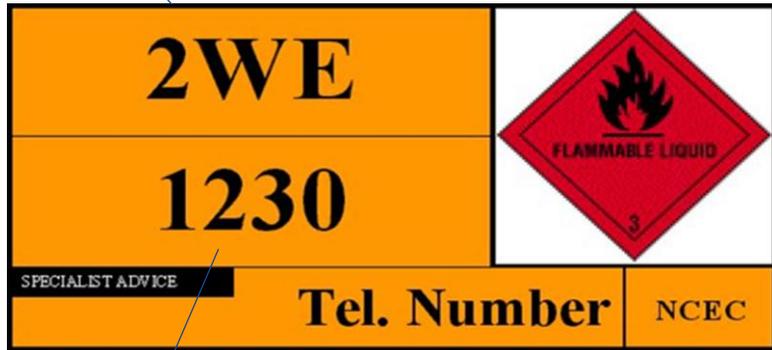


Miscellaneous

# Transport – Hazchem and HIN

Emergency Action Code (EAC)

Hazard Identification Number

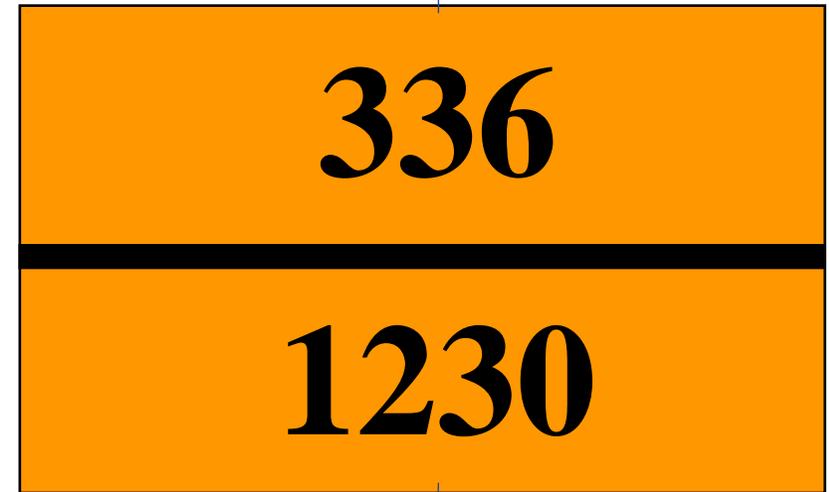


Hazard Warning Diamond

Supplier's Company Logo

UN Number

Emergency Telephone Number



UN Number

# Emergency Action Code & HIN

<b>1</b>	COARSE SPRAY		<b>3</b>	FOAM
<b>2</b>	FINE SPRAY		<b>4</b>	DRY AGENT
<b>P</b>	<b>V</b>	Liquid Tight Chemical Suits		DILUTE SPILLAGE
<b>R</b>				
<b>S</b>	<b>V</b>	Breathing Apparatus & Fire Kit		
<b>T</b>				
<b>W</b>	<b>V</b>	Liquid Tight Chemical Suits		CONTAIN SPILLAGE
<b>X</b>				
<b>Y</b>	<b>V</b>	Breathing Apparatus & Fire Kit		
<b>Z</b>				
<b>E</b>	PUBLIC SAFETY HAZARD			

1st Figure: Primary Hazard		2nd & 3rd Figures: Secondary Hazard	
2	Gas	0	No meaning
3	Flammable liquid	1	Explosive
4	Flammable solid	2	Gas given off
5	Oxidising substance or organic peroxide	3	Flammable
6	Toxic	5	Oxidising
8	Corrosive	6	Toxic
		8	Corrosive
		9	Explosion from spontaneous decomposition

**X33**  
**1088**

**UN Identification Number**

X means no water

# Dangerous Goods Notes & Waste Transfer Notes

## DGNs

- Haulier's documentation
- Where its come from, where its going, what it is, how much etc.
- NO hazard information
- Requirement under ADR
  - Bill of Lading (IATA/IMDG)

## Waste Transfer Note

- Waste transfer notes (WTNs) are documents that track the movement of waste from one party to another



**DANGEROUS GOODS NOTE**

1 Customs reference/status

Booking number

3 Exporter's reference

Forwarder's reference

6 DSHA Notification (in accordance with DSHA Regulations (as amended)) given by:

Shipper

Cargo agent

Transport operator

Issuing office

7 International

8

9

**Duty of care: waste transfer note** Keep this page and copy it for future use. Please write as clearly as possible.

**Section A – Description of waste**

A1 Description of the waste being transferred  
\_\_\_\_\_  
\_\_\_\_\_

List of Waste Regulations code(s)  
\_\_\_\_\_

A2 How is the waste contained?  
Loose  Sacks  Skip  Drum   
Other  \_\_\_\_\_

A3 How much waste? For example, number of sacks, weight  
\_\_\_\_\_

**Section B – Current holder of the waste – Transferor**

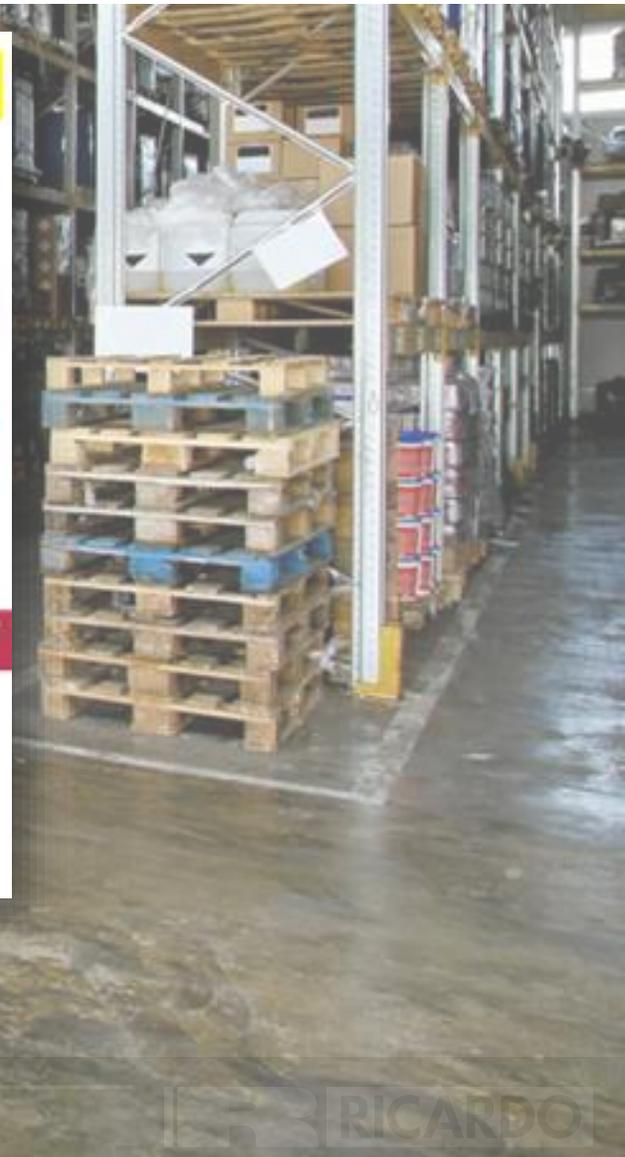
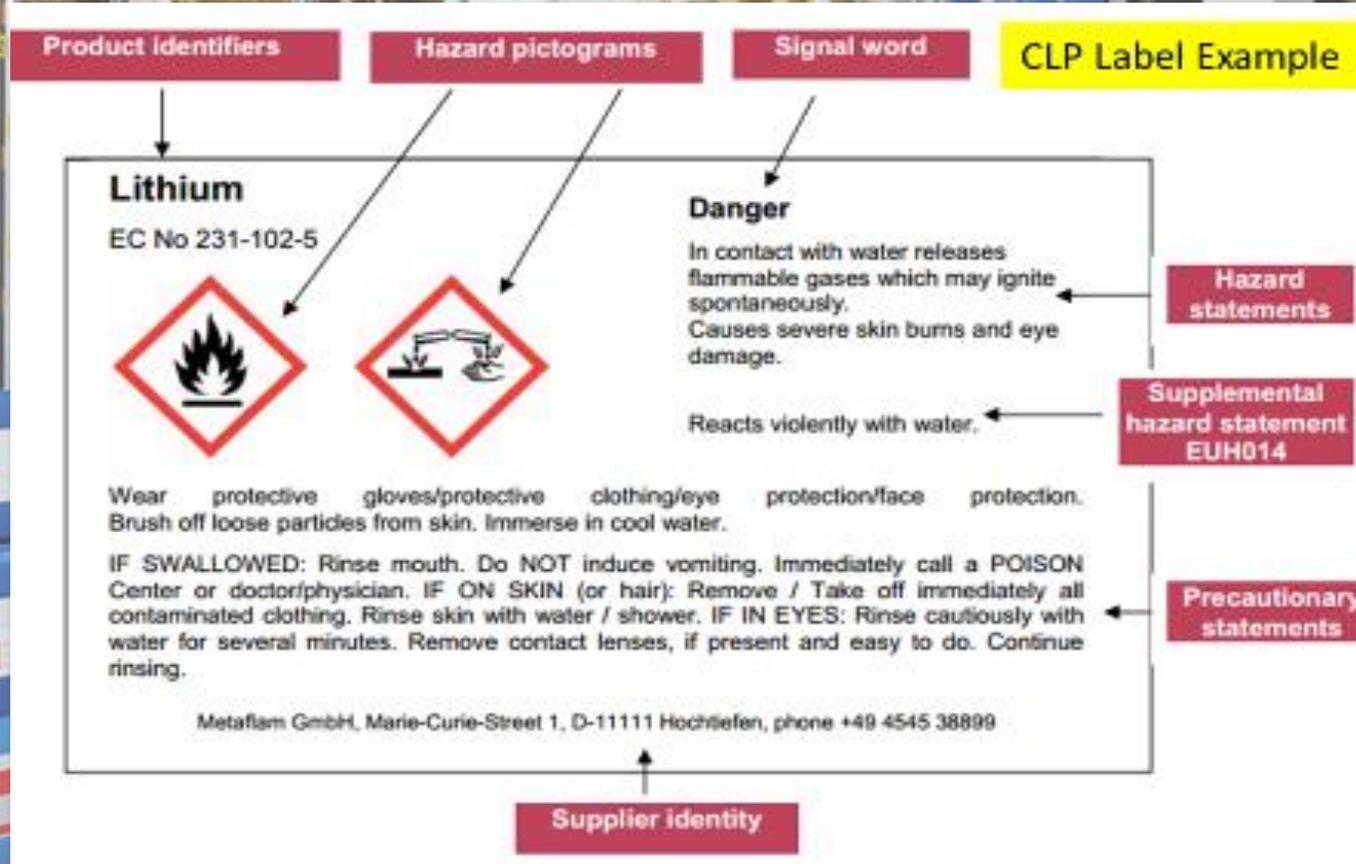
By signing in Section D below I confirm that I have fulfilled my duty to apply the waste hierarchy as required by Regulation 12 of the Waste (England and Wales) Regulations 2011 Yes

B1 Full name  
\_\_\_\_\_

Company name and address  
\_\_\_\_\_

B3 Are you:  
The producer of the waste?   
The importer of the waste?

# Supply



# GHS Symbols



Explosive



Flammable  
Pyrophoric



Compressed Gas  
Liquefied Gas



Oxidizing



Corrosive  
Corrosive to metals



Toxic



Harmful  
Irritant  
Skin Sensitizer



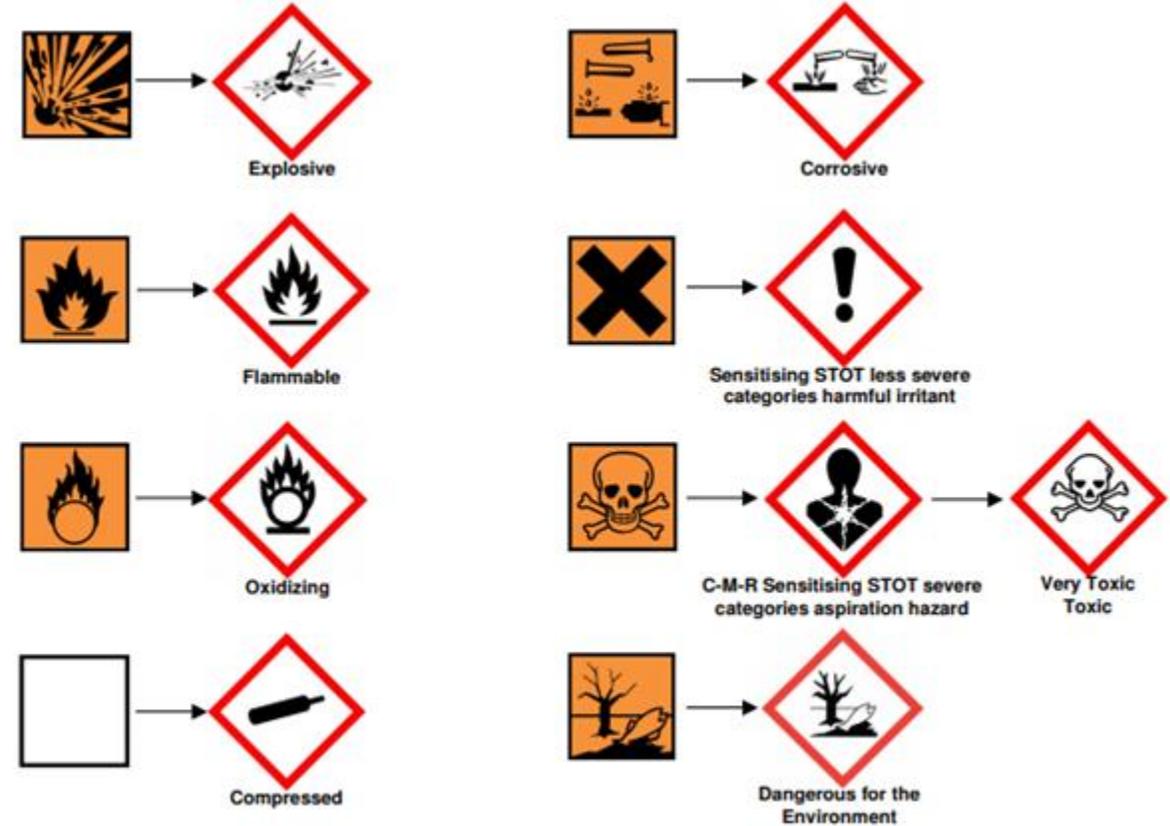
Environment Hazard



Respiratory Sensitizer  
Aspiration Hazard  
Reproductive Toxin  
Carcinogen  
Mutagenic

# Legacy

- EU implementation of GHS came into force on 1st June 2015 under the Classification, Labelling and Packaging (CLP) regulation.
- Governed by the European Chemical Agency (ECHA)



# Safety Data Sheets

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16 sections detailing supplier information, emergency contacts, material properties, hazards, disposal advice and toxicological / ecological data

Strict, regulated format

Designed for guidance on controlled use and initial response / first aid

## Negatives

- Incomplete or outdated information
- Limited scope of use (minimum health and safety requirements)
- Not peer reviewed – ‘competent’ author
- Lack of information on mixtures or reactions
- Units of properties not always Standardised International Units (SIU)

# Emergency Response Guidebook

A guidebook intended for use by first responders during the initial phase of a transportation incident involving hazardous materials/dangerous goods

# 2024

## EMERGENCY RESPONSE GUIDEBOOK



## CAMEO Chemicals

Acetone

Sodium Bicarbonate

Hydrochloric Acid (solution)

Sugar (Sucrose)

Nitric Acid, Red Fuming



# Emergency Response Guidebook (ERG)



White pages identify container type and hazard markings



Yellow pages identify by UN number



Blue pages identify by alphabetical order

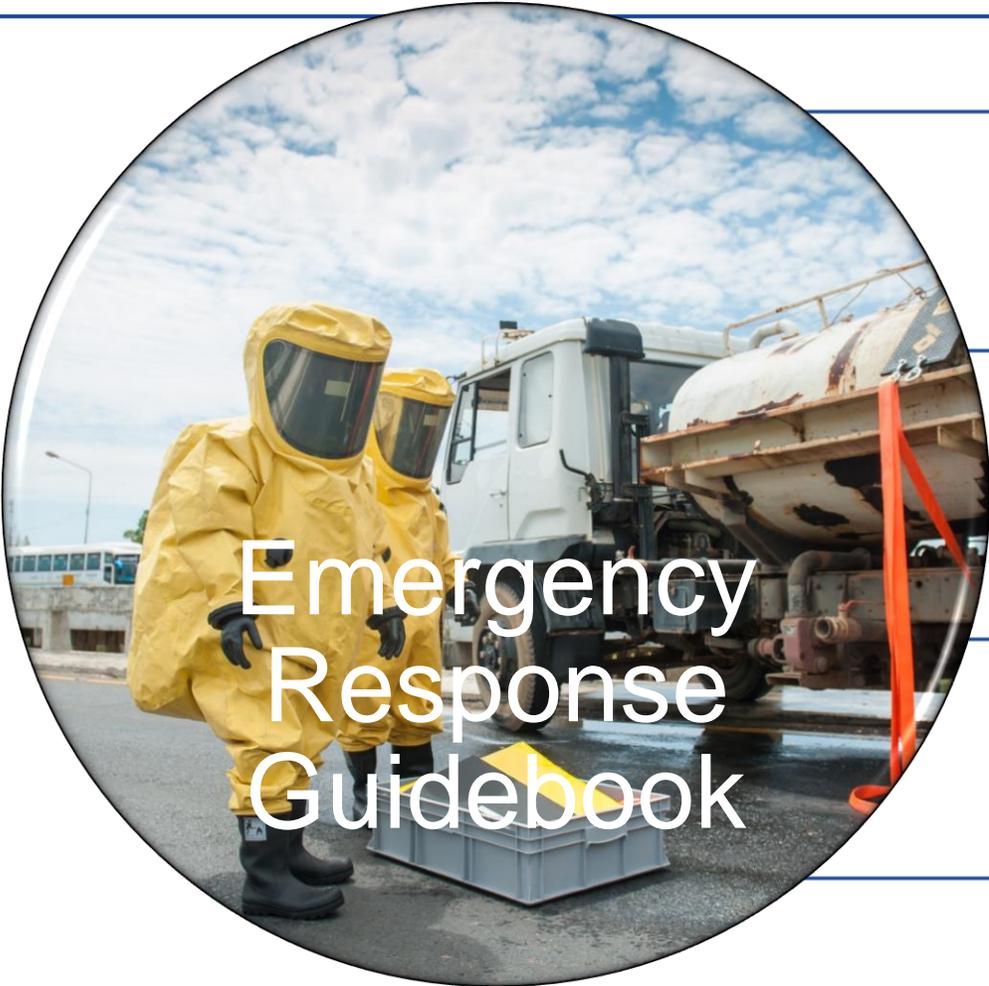


Orange 'guide pages' provide emergency response guidelines



Green pages provide tables for isolation distances for toxic by inhalation (TIH) and water reactives

# Introduction



Transportation



Initial Advice



Generic



Defensive

# Structure of ERG

## GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELING OF CHEMICALS (GHS) (May be found on means of containment during transport)

The Globally Harmonized System of Classification and Labeling of Chemicals (GHS) is an international guideline published by the United Nations. The GHS aims to harmonize the classification and labeling systems for all sectors involved in the life cycle of a chemical (production, storage, transport, workplace use, consumer use and presence in the environment).

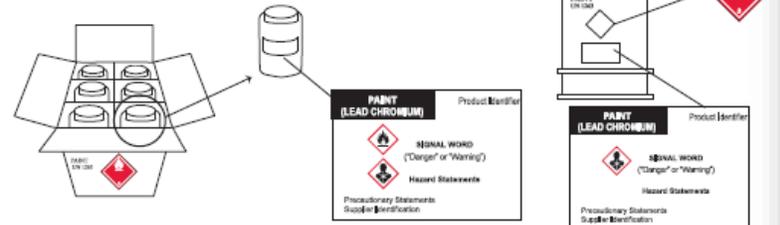
The GHS has nine symbols used to convey specific physical, health and environmental hazard information. These symbols are part of a pictogram that is diamond shaped and includes the GHS symbol in black on a white background with a red frame. The pictogram is part of the GHS label, which also includes the following information:

- Signal word
- Hazard statement
- Precautionary statements
- Product identifier
- Supplier identification

GHS pictograms are similar in shape to transport labels; however, transport labels have backgrounds of different colors.

The elements of the GHS that address signal words and hazard statements are not expected to be adopted in the transport sector. For substances and mixtures covered by the UN Recommendations on the Transport of Dangerous Goods, Model Regulations, the transport labels for physical hazards will have precedence. In transport, a GHS pictogram for the same (or lesser) hazard as the one reflected by the transport label or placard should not be present, but it could exist on the package.

### Examples of GHS labeling:



**Outer Packaging:** Box with flammable liquid transport label

**Inner Packaging:** Plastic bottle with GHS hazard warning label

**Single Packaging:** 200 L (55 US gallons) drum with a flammable liquid transport label combined with GHS hazard warning label

In some cases, such as on drums or international bulk containers (IBCs), which must address information for all sectors, the GHS label may be found in addition to the required transport labels and placards. Both types of labels (GHS and transport) will differ in a way that will make them easy to identify during an emergency.

GHS Pictograms	Physical hazards	GHS Pictograms	Health and Environmental hazards
	Explosive; Self-reactive; Organic peroxide		Skin corrosion; Serious eye damage
	Flammable; Pyrophoric; Self-reactive; Organic peroxide; Self-heating; Emits flammable gases when in contact with water		Acute toxicity (harmful); Skin sensitizer; Irritant (skin and eye); Narcotic effect; Respiratory tract irritant; Hazardous to ozone layer (environment)
	Oxidizer		Respiratory sensitizer; Mutagen; Carcinogen; Reproductive toxicity; Target organ toxicity; Aspiration hazard
	Gas under pressure		Hazardous to aquatic environment
	Corrosive to metals		Acute toxicity (fatal or toxic)

## HAZARD IDENTIFICATION NUMBERS DISPLAYED ON SOME INTERMODAL CONTAINERS

Hazard identification numbers, utilized under European and some South American regulations, may be found in the top half of an orange panel on some intermodal bulk containers. The 4-digit ID number is in the bottom half of the orange panel.



The hazard identification number in the top half of the orange panel consists of two or three digits. In general, the digits indicate the following hazards:

- 2 - Emission of gas due to pressure or chemical reaction
- 3 - Flammability of liquids (vapors) and gases or self-heating liquid
- 4 - Flammability of solids or self-heating solid
- 5 - Oxidizing (fire-intensifying) effect
- 6 - Toxicity or risk of infection
- 7 - Radioactivity
- 8 - Corrosivity
- 9 - Risk of spontaneous violent reaction

**NOTE:** The risk of spontaneous violent reaction within the meaning of digit 9 includes the possibility, due to the nature of a substance, of a risk of explosion, disintegration and polymerization reaction followed by the release of considerable heat or flammable and/or toxic gases.

- Doubling of a digit indicates an intensification of that particular hazard (i.e., 33, 66, 88).
- Where the hazard associated with a substance can be adequately indicated by a single digit, the digit is followed by a zero (i.e., 30, 40, 50).
- A hazard identification number prefixed by the letter "X" indicates that the substance will react dangerously with water (i.e., X88).

# Yellow Page

ID Guide No. Name of Material

1757 154	Chromic fluoride, solution
1758 137	Chromium oxychloride
1759 154	Corrosive solid, n.o.s.
1759 154	Ferrous chloride, solid
1760 154	Chemical kit
1760 154	Compounds, cleaning liquid (corrosive)
1760 154	Compounds, tree or weed killing, liquid (corrosive)
1760 154	Corrosive liquid, n.o.s.
1760 154	Ferrous chloride, solution
1761 154	Cupriethylenediamine, solution
1762 156	Cyclohexenyltrichlorosilane
1763 156	Cyclohexyltrichlorosilane
1764 153	Dichloroacetic acid
1765 156	Dichloroacetyl chloride
1766 156	Dichlorophenyltrichlorosilane
1767 155	Diethyldichlorosilane
1768 154	Difluorophosphoric acid, anhydrous
1769 156	Diphenyldichlorosilane
1770 153	Diphenylmethyl bromide
1771 156	Dodecyltrichlorosilane
1773 157	Ferric chloride, anhydrous
1774 154	Fire extinguisher charges, corrosive liquid

## UN 1836 | Guide 137 Thionyl Chloride

1777 137	Fluorosulphonic acid
1778 154	Fluosilicic acid
1778 154	Hydrofluorosilicic acid

ID Guide No. Name of Material

1779 153	Formic acid
1779 153	Formic acid, with more than 85% acid
1780 156	Fumaryl chloride
1781 156	Hexadecyltrichlorosilane
1782 154	Hexafluorophosphoric acid
1783 153	Hexamethylenediamine, solution
1784 156	Hexyltrichlorosilane
1786 157	Hydrofluoric acid and Sulfuric acid mixture
1786 157	Hydrofluoric acid and Sulphuric acid mixture
1786 157	Sulfuric acid and Hydrofluoric acid mixture
1786 157	Sulphuric acid and Hydrofluoric acid mixture
1787 154	Hydriodic acid
1788 154	Hydrobromic acid
1789 157	Hydrochloric acid
1789 157	Muriatic acid
1790 157	Hydrofluoric acid
1791 154	Hypochlorite solution
1791 154	Sodium hypochlorite
1792 157	Iodine monochloride, solid
1793 153	Isopropyl acid phosphate
1794 154	Lead sulfate, with more than

1796 157	Nitrating acid mixture with more than 50% nitric acid
1798 157	Aqua regia
1798 157	Nitrohydrochloric acid

ID Guide No. Name of Material

1799 156	Nonyltrichlorosilane
1800 156	Octadecyltrichlorosilane
1801 156	Octyltrichlorosilane
1802 157	Perchloric acid, with not more than 50% acid
1803 153	Phenolsulfonic acid, liquid
1803 153	Phenolsulphonic acid, liquid
1804 156	Phenyltrichlorosilane
1805 154	Phosphoric acid, solution
1806 137	Phosphorus pentachloride
1807 137	Phosphorus pentoxide
1808 137	Phosphorus tribromide
1809 137	Phosphorus trichloride
1810 137	Phosphorus oxychloride
1811 154	Potassium hydrogen difluoride, solid
1812 154	Potassium fluoride, solid
1813 154	Caustic potash, solid
1813 154	Potassium hydroxide, solid
1814 154	Caustic potash, solution
1814 154	Potassium hydroxide, solution
1815 132	Propionyl chloride
1816 155	Propyltrichlorosilane
1817 137	Pyrosulfuryl chloride
1817 137	Pyrosulphuryl chloride
1818 157	Silicon tetrachloride

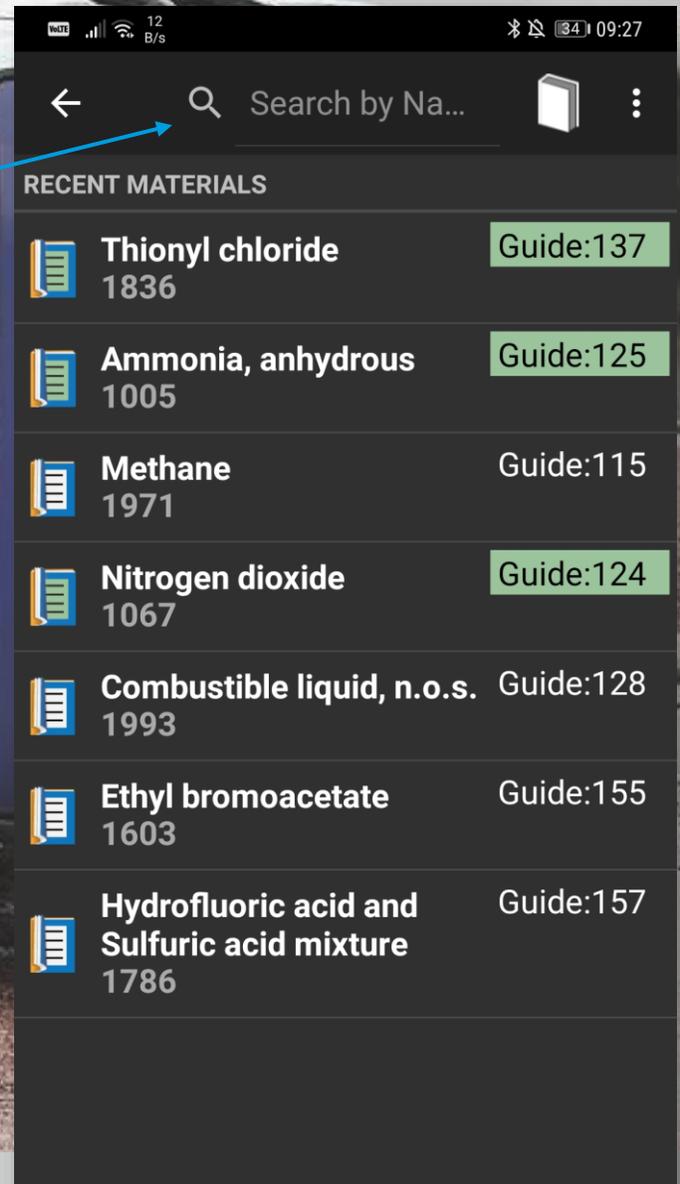
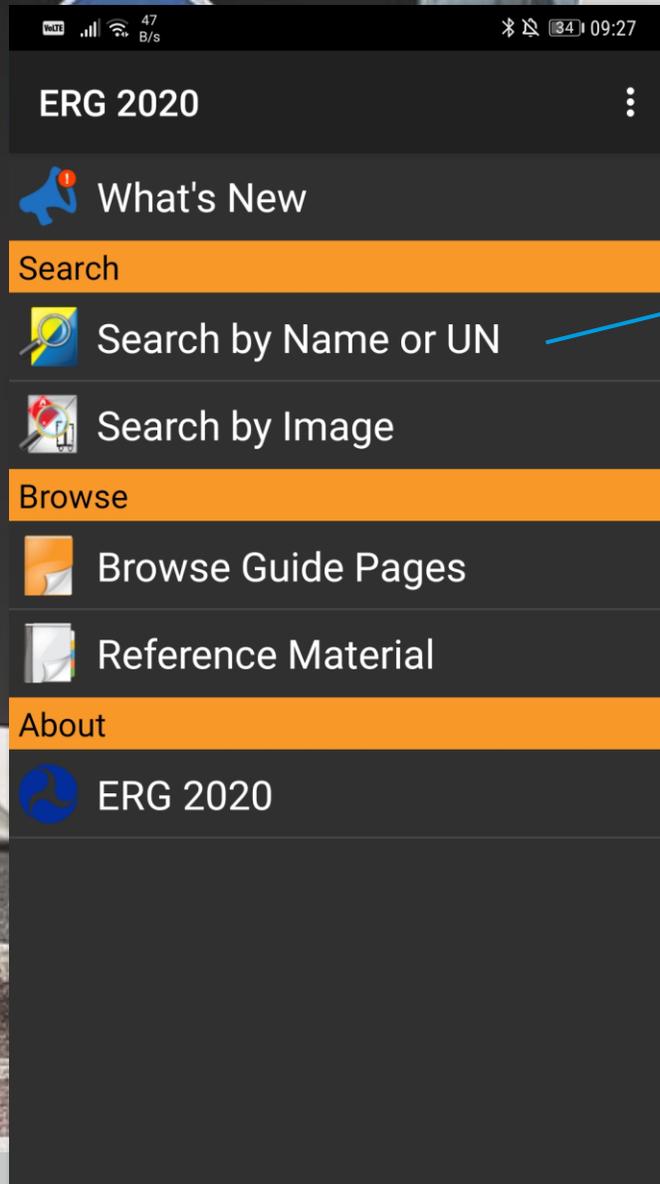
1819 154	Sodium aluminate, solution
1823 154	Caustic soda, solid
1823 154	Sodium hydroxide, solid
1824 154	Caustic soda, solution
1824 154	Sodium hydroxide, solution
1825 157	Sodium monoxide

ID Guide No. Name of Material

1826 157	Nitrating acid mixture, spent, with more than 50% nitric acid
1826 157	Nitrating acid mixture, spent, with not more than 50% nitric acid
1827 137	Stannic chloride, anhydrous
1827 137	Tin tetrachloride
1828 137	Sulfur chlorides
1828 137	Sulphur chlorides
1829 137	Sulfur trioxide, stabilized
1829 137	Sulphur trioxide, stabilized
1830 137	Sulfuric acid
1830 137	Sulfuric acid, with more than 51% acid
1830 137	Sulphuric acid
1830 137	Sulphuric acid, with more than 51% acid
1831 137	Sulfuric acid, fuming
1831 137	Sulphuric acid, fuming
1832 137	Sulfuric acid, spent
1832 137	Sulphuric acid, spent
1833 154	Sulfurous acid
1833 154	Sulphurous acid
1834 137	Sulfuryl chloride
1834 137	Sulphuryl chloride
1835 153	Tetramethylammonium hydroxide, solid
1836 137	Thionyl chloride
1837 157	Thiophosphoryl chloride
1838 137	Titanium tetrachloride
1839 153	Trichloroacetic acid
1840 154	Zinc chloride, solution
1841 171	Acetaldehyde ammonia



# Android & IOS



# Orange Guide Pages

## GUIDE SUBSTANCES - WATER-REACTIVE - CORROSIVE

137

### POTENTIAL HAZARDS

#### HEALTH

- CORROSIVE and/or TOXIC; inhalation, ingestion or contact (skin, eyes) with vapors, dusts or substance may cause severe injury, burns or death.
- Fire will produce irritating, corrosive and/or toxic gases.
- Reaction with water may generate much heat that will increase the concentration of fumes in the air.
- Contact with molten substance may cause severe burns to skin and eyes.
- Runoff from fire control or dilution water may cause environmental contamination.

#### FIRE OR EXPLOSION

- EXCEPT FOR ACETIC ANHYDRIDE (UN1715), THAT IS FLAMMABLE, some of these materials may burn, but none ignite readily.
- May ignite combustibles (wood, paper, oil, clothing, etc.).
- Substance will react with water (some violently), releasing corrosive and/or toxic gases and runoff.
- Flammable/toxic gases may accumulate in confined areas (basement, tanks, hopper/tank cars, etc.).
- Contact with metals may evolve flammable hydrogen gas.
- Containers may explode when heated or if contaminated with water.
- Substance may be transported in a molten form.

#### PUBLIC SAFETY

- CALL 911. Then call emergency response telephone number on shipping paper. If shipping paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.
- Keep unauthorized personnel away.
- Stay upwind, uphill and/or upstream.
- Ventilate closed spaces before entering, but only if properly trained and equipped.

#### PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer when there is NO RISK OF FIRE.
- Structural firefighters' protective clothing provides thermal protection but only limited chemical protection.

#### EVACUATION

##### Immediate precautionary measure

- Isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.

##### Spill

- For highlighted materials: see Table 1 - Initial Isolation and Protective Action Distances.
- For non-highlighted materials: increase the immediate precautionary measure distance, in the downwind direction, as necessary.

##### Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.



In Canada, an Emergency Response Assistance Plan (ERAP) may be required for this product. Please consult the shipping paper and/or the ERAP Program Section (page 390).

## SUBSTANCES - WATER-REACTIVE - CORROSIVE GUIDE

137

### EMERGENCY RESPONSE

#### FIRE

- When material is not involved in fire, do not use water on material itself.

##### Small Fire

- Dry chemical or CO<sub>2</sub>.
- If it can be done safely, move undamaged containers away from the area around the fire.

##### Large Fire

- Flood fire area with large quantities of water, while knocking down vapors with water fog. If insufficient water supply, responders should withdraw.

##### Fire Involving Tanks or Car/Trailer Loads

- Cool containers with flooding quantities of water until well after fire is out.
- Do not get water inside containers.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.

#### SPILL OR LEAK

- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Stop leak if you can do it without risk.
- Use water spray to reduce vapors; do not put water directly on leak, spill area or inside container.
- Keep combustibles (wood, paper, oil, etc.) away from spilled material.

##### Small Spill

- Cover with DRY earth, DRY sand or other non-combustible material followed with plastic sheet to minimize spreading or contact with rain.
- Use clean, non-sparking tools to collect material and place it into loosely covered plastic containers for later disposal.
- Prevent entry into waterways, sewers, basements or confined areas.

#### FIRST AID

- Call 911 or emergency medical service.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.
- Move victim to fresh air if it can be done safely.
- Give artificial respiration if victim is not breathing.
- Do not perform mouth-to-mouth resuscitation if victim ingested or inhaled the substance; wash face and mouth before giving artificial respiration. Use a pocket mask equipped with a one-way valve or other proper respiratory medical device.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- For minor skin contact, avoid spreading material on unaffected skin.
- Removal of solidified molten material from skin requires medical assistance.
- Keep victim calm and warm.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.

Shipping paper. If shipping paper on the inside back cover.

equipped.

the manufacturer when there is

only limited chemical protection

for liquids and at least 25 meters

ation Distances.

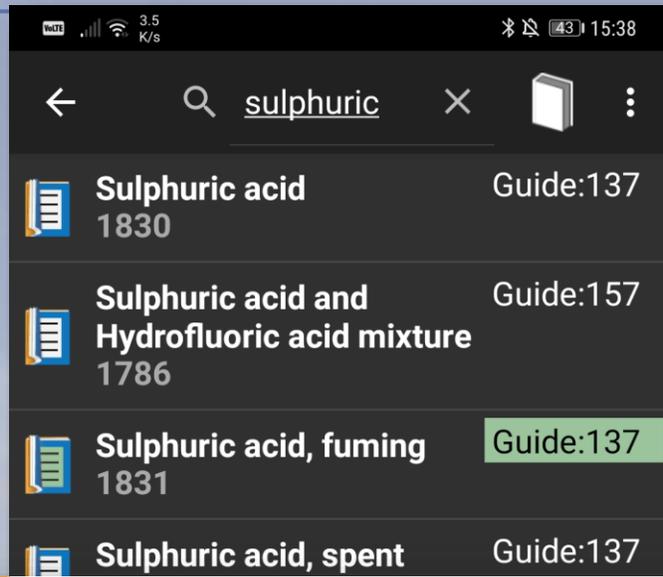
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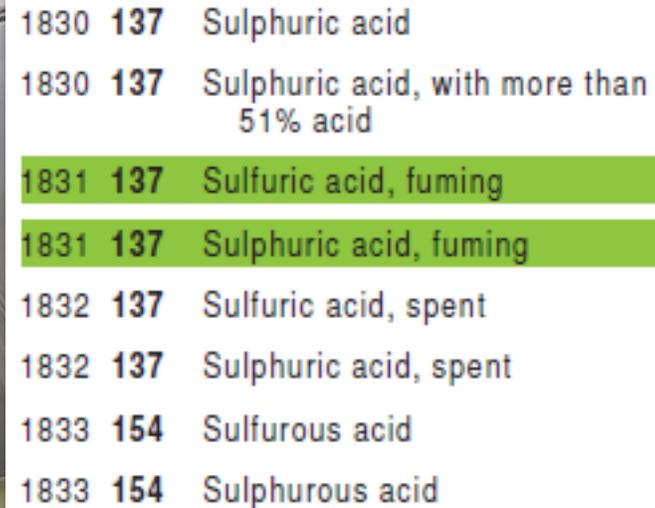
may be required for this product.

ction (page 390).

# Orange Guide Pages



Search Term	Guide Number
Sulphuric acid 1830	Guide:137
Sulphuric acid and Hydrofluoric acid mixture 1786	Guide:157
Sulphuric acid, fuming 1831	Guide:137
Sulphuric acid, spent	Guide:137



1830	137	Sulphuric acid
1830	137	Sulphuric acid, with more than 51% acid
1831	137	Sulfuric acid, fuming
1831	137	Sulphuric acid, fuming
1832	137	Sulfuric acid, spent
1832	137	Sulphuric acid, spent
1833	154	Sulfurous acid
1833	154	Sulphurous acid

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# Orange Guide Pages



UN 1836

Thionyl chloride

Guide Page Initial Isolation and Protective Action Distanc...

**GUIDE 137**  
**Substances - Water-Reactive - Corrosive**

**POTENTIAL HAZARDS**

**HEALTH**

- CORROSIVE and/or TOXIC; inhalation, ingestion or contact (skin, eyes) with vapors, dusts or substance may cause severe injury, burns or death.
- Fire will produce irritating, corrosive and/or toxic gases.
- Reaction with water may generate much heat that will increase the concentration of fumes in the air.
- Contact with molten substance may cause severe burns to skin and eyes.
- Runoff from fire control or dilution water may cause environmental contamination.

**FIRE OR EXPLOSION**

- **EXCEPT FOR ACETIC ANHYDRIDE (UN1715), THAT IS FLAMMABLE**, some of these materials may burn, but none ignite readily.
- May ignite combustibles (wood, paper, oil, clothing, etc.).
- Substance will react with water (some violently), releasing corrosive and/or toxic gases and runoff.
- Flammable/toxic gases may accumulate in

UN 1836

Thionyl chloride

Guide Page Initial Isolation and Protective Action Distanc...

**SMALL SPILLS - (From a small package or small leak from a large package)**

ID	MATERIAL	First ISOLATE in all Directions	Then PROTECT Downwind
1836	Thionyl chloride (when spilled on land)	30 m	<b>DAY</b> 0.1 km
			<b>NIGHT</b> 0.2 km
1836	Thionyl chloride (when spilled in water)	100 m	<b>DAY</b> 0.9 km
			<b>NIGHT</b> 2.9 km

**TIH Gas(es) Produced when spilled in water** Hydrogen chloride (HCl)  
Sulfur dioxide (SO<sub>2</sub>)

**LARGE SPILLS - (From a large package or many small packages)**

ID	MATERIAL	First ISOLATE in all Directions	Then PROTECT Downwind
1836	Thionyl chloride (when spilled on land)	30 m	<b>DAY</b> 0.3 km
			<b>NIGHT</b> 0.5 km
1836	Thionyl chloride (when spilled in	800 m	<b>DAY</b> 0.5 km
			<b>NIGHT</b> 0.5 km

# Green Pages

TABLE2 - WATER-REACTIVE MATERIALS WHICH PRODUCE TOXIC GASES

Materials Which Produce Large Amounts of Toxic-by-Inhalation (TIH)  
(PIH in the US) Gas(es) When Spilled in Water

ID No.	Guide No.	Name of Material	TIH Gas(es) Produced
1777	137	Fluorosulfonic acid	HF
1777	137	Fluorosulphonic acid	HF
1781	156	Hexadecyltrichlorosilane	HCl
1784	156	Hexyltrichlorosilane	HCl
1799	156	Nonyltrichlorosilane	HCl
1800	156	Octadecyltrichlorosilane	HCl
1801	156	Octyltrichlorosilane	HCl
1804	156	Phenyltrichlorosilane	HCl
1806	137	Phosphorus pentachloride	POCl <sub>3</sub>
1808	137	Phosphorus tribromide	POBr <sub>3</sub>
1809	137	Phosphorus trichloride	POCl <sub>3</sub>
1810	137	Phosphorus oxychloride	POCl <sub>3</sub>
1815	132	Propionyl chloride	HCl
1816	155	Propyltrichlorosilane	HCl
1818	157	Silicon tetrachloride	SiCl <sub>4</sub>
1828	137	Sulfur chlorides	S <sub>2</sub> Cl <sub>2</sub>
1828	137	Sulphur chlorides	S <sub>2</sub> Cl <sub>2</sub>
1834	137	Sulfuryl chloride	SO <sub>2</sub> Cl <sub>2</sub>
1834	137	Sulphuryl chloride	SO <sub>2</sub> Cl <sub>2</sub>
1836	137	Thionyl chloride	SOCl <sub>2</sub>
1836	137	Thionyl chloride	SOCl <sub>2</sub>
1838	137	Titanium tetrachloride	TiCl <sub>4</sub>
1838	137	Titanium tetrachloride	TiCl <sub>4</sub>
1859	125	Silicon tetrafluoride	SiF <sub>4</sub>
1859	125	Silicon tetrafluoride, compressed	SiF <sub>4</sub>
1892	151	Ethylchloroarsine	AsH <sub>3</sub>
1898	156	Acetyl iodide	HI
1898	156	Acetyl iodide	HI
1911	119	Diborane	B <sub>2</sub> H <sub>6</sub>
1911	119	Diborane, compressed	B <sub>2</sub> H <sub>6</sub>
1911	119	Diborane mixtures	B <sub>2</sub> H <sub>6</sub>

Chemical Symbols for TIH (PIH in the US) Gases:

Br <sub>2</sub>	Bromine	HF	Hydrogen fluoride
Cl <sub>2</sub>	Chlorine	HI	Hydrogen iodide
HBr	Hydrogen bromide	H <sub>2</sub> S	Hydrogen sulfide
HCl	Hydrogen chloride	H <sub>2</sub> S	Hydrogen sulphide
HCN	Hydrogen cyanide	NH <sub>3</sub>	Ammonia

Use this list only when material is spilled in water

TABLE 1

TABLE 1 - INITIAL ISOLATION AND PROTECTIVE ACTION DISTANCES

ID No.	Guide No.	NAME OF MATERIAL	SMALL SPILLS (From a small package or small leak from a large package)				First ISOLATE in all Directions Meters (Feet)
			First ISOLATE in all Directions Meters (Feet)	Then PROTECT persons Downwind during		First ISOLATE in all Directions Meters (Feet)	
				DAY Kilometers (Miles)	NIGHT Kilometers (Miles)		
1810	137	Phosphorus oxychloride (when spilled on land)	30 m (100 ft)	0.3 km (0.2 mi)	0.6 km (0.4 mi)	100 m (300 ft)	
1834	137	Sulfuryl chloride (when spilled on land)	30 m (100 ft)	0.2 km (0.1 mi)	0.4 km (0.3 mi)	60 m (200 ft)	
1834	137	Sulfuryl chloride (when spilled in water)	30 m (100 ft)	0.1 km (0.1 mi)	0.1 km (0.1 mi)	30 m (100 ft)	
1834	137	Sulphuryl chloride (when spilled on land)	30 m (100 ft)	0.2 km (0.1 mi)	0.4 km (0.3 mi)	60 m (200 ft)	
1834	137	Sulphuryl chloride (when spilled in water)	30 m (100 ft)	0.1 km (0.1 mi)	0.1 km (0.1 mi)	30 m (100 ft)	
1836	137	Thionyl chloride (when spilled on land)	30 m (100 ft)	0.1 km (0.1 mi)	0.2 km (0.2 mi)	30 m (100 ft)	
1836	137	Thionyl chloride (when spilled in water)	100 m (300 ft)	0.9 km (0.6 mi)	2.9 km (1.8 mi)	800 m (2500 ft)	
1838	137	Titanium tetrachloride (when spilled on land)	30 m (100 ft)	0.1 km (0.1 mi)	0.2 km (0.1 mi)	30 m (100 ft)	
1838	137	Titanium tetrachloride (when spilled in water)	30 m (100 ft)	0.1 km (0.1 mi)	0.1 km (0.1 mi)	60 m (200 ft)	
1859	125	Silicon tetrafluoride	30 m (100 ft)	0.2 km (0.1 mi)	0.8 km (0.5 mi)	100 m (300 ft)	
1859	125	Silicon tetrafluoride, compressed	30 m (100 ft)	0.2 km (0.1 mi)	0.8 km (0.5 mi)	100 m (300 ft)	
1892	151	Ethylchloroarsine	150 m (500 ft)	1.5 km (0.9 mi)	2.1 km (1.3 mi)	400 m (1250 ft)	
1898	156	Acetyl iodide (when spilled in water)	30 m (100 ft)	0.1 km (0.1 mi)	0.1 km (0.1 mi)	30 m (100 ft)	
1911	119	Diborane	60 m (200 ft)	0.3 km (0.2 mi)	1.2 km (0.7 mi)	300 m (1000 ft)	
1911	119	Diborane, compressed	60 m (200 ft)	0.3 km (0.2 mi)	1.2 km (0.7 mi)	300 m (1000 ft)	
1911	119	Diborane mixtures	60 m (200 ft)	0.3 km (0.2 mi)	1.2 km (0.7 mi)	300 m (1000 ft)	

"+" means distance can be larger in certain atmospheric conditions

TABLE 3 - INITIAL ISOLATION AND PROTECTIVE ACTION DISTANCES FOR LARGE SPILLS FOR DIFFERENT QUANTITIES OF SIX COMMON TIH (PIH in the US) GASES

TRANSPORT CONTAINER	First ISOLATE in all Directions Meters (Feet)	Then PROTECT persons Downwind during					
		DAY			NIGHT		
		Low wind (< 6 mph = < 10 km/h)	Moderate wind (6-12 mph = 10 - 20 km/h)	High wind (> 12 mph = > 20 km/h)	Low wind (< 6 mph = < 10 km/h)	Moderate wind (6-12 mph = 10 - 20 km/h)	High wind (> 12 mph = > 20 km/h)
		km (Miles)	km (Miles)	km (Miles)	km (Miles)	km (Miles)	km (Miles)
<b>UN1005 Ammonia, anhydrous: Large Spills</b>							
Rail tank car	300 (1000)	1.9 (1.2)	1.5 (0.9)	1.1 (0.6)	4.5 (2.8)	2.5 (1.5)	1.4 (0.9)
Highway tank truck or trailer	150 (500)	0.9 (0.6)	0.5 (0.3)	0.4 (0.3)	2.0 (1.3)	0.8 (0.5)	0.6 (0.4)
Agricultural nurse tank	60 (200)	0.5 (0.3)	0.3 (0.2)	0.3 (0.2)	1.4 (0.9)	0.3 (0.2)	0.3 (0.2)
Multiple small cylinders	30 (100)	0.3 (0.2)	0.2 (0.1)	0.1 (0.1)	0.7 (0.5)	0.3 (0.2)	0.2 (0.1)
<b>UN1017 Chlorine: Large Spills</b>							
Rail tank car	1000 (3000)	10.1 (6.3)	6.8 (4.2)	5.3 (3.3)	11+ (7+)	9.2 (5.7)	6.9 (4.3)
Highway tank truck or trailer	600 (2000)	5.8 (3.6)	3.4 (2.1)	2.9 (1.8)	6.7 (4.3)	5.0 (3.1)	4.1 (2.5)
Multiple ton cylinders	300 (1000)	2.1 (1.3)	1.3 (0.8)	1.0 (0.6)	4.0 (2.5)	2.4 (1.5)	1.3 (0.8)
Multiple small cylinders or single ton cylinder	150 (500)	1.5 (0.9)	0.8 (0.5)	0.5 (0.3)	2.9 (1.8)	1.3 (0.8)	0.6 (0.4)

TABLE 3

"+" means distance can be larger in certain atmospheric conditions

# Green Pages – Table

Page 308

TABLE 1 - INITIAL ISOLATION AND PROTECTIVE ACTION DISTANCES

ID No.	Guide	NAME OF MATERIAL	SMALL SPILLS (From a small package or small leak from a large package)				LARGE SPILLS (From a large package or from many small packages)			
			First ISOLATE in all Directions Meters (Feet)	Then PROTECT persons Downwind during		First ISOLATE in all Directions Meters (Feet)	Then PROTECT persons Downwind during			
				DAY Kilometers (Miles)	NIGHT Kilometers (Miles)		DAY Kilometers (Miles)	NIGHT Kilometers (Miles)		
1810	137	Phosphorus oxychloride (when spilled on land)	30 m (100 ft)	0.3 km (0.2 mi)	0.6 km (0.4 mi)	100 m (300 ft)	1.0 km (0.7 mi)	1.9 km (1.2 mi)		
1834	137	Sulfuryl chloride (when spilled on land)	30 m (100 ft)	0.2 km (0.1 mi)	0.4 km (0.3 mi)	60 m (200 ft)	0.8 km (0.5 mi)	1.5 km (0.9 mi)		
1834	137	Sulfuryl chloride (when spilled in water)	30 m (100 ft)	0.1 km (0.1 mi)	0.1 km (0.1 mi)	30 m (100 ft)	0.4 km (0.3 mi)	1.6 km (1.0 mi)		
1834	137	Sulphuryl chloride (when spilled on land)	30 m (100 ft)	0.2 km (0.1 mi)	0.4 km (0.3 mi)	60 m (200 ft)	0.8 km (0.5 mi)	1.5 km (0.9 mi)		
1834	137	Sulphuryl chloride (when spilled in water)	30 m (100 ft)	0.1 km (0.1 mi)	0.1 km (0.1 mi)	30 m (100 ft)	0.4 km (0.3 mi)	1.6 km (1.0 mi)		
1836	137	Thionyl chloride (when spilled on land)	30 m (100 ft)	0.1 km (0.1 mi)	0.2 km (0.2 mi)	30 m (100 ft)	0.3 km (0.2 mi)	0.5 km (0.3 mi)		
1836	137	Thionyl chloride (when spilled in water)	100 m (300 ft)	0.9 km (0.6 mi)	2.9 km (1.8 mi)	800 m (2500 ft)	9.7 km (6.0 mi)	11.0+ km (7.0+ mi)		
1838	137	Titanium tetrachloride (when spilled on land)	30 m (100 ft)	0.1 km (0.1 mi)	0.2 km (0.1 mi)	30 m (100 ft)	0.3 km (0.2 mi)	0.5 km (0.3 mi)		
1838	137	Titanium tetrachloride (when spilled in water)	30 m (100 ft)	0.1 km (0.1 mi)	0.1 km (0.1 mi)	60 m (200 ft)	0.5 km (0.3 mi)	1.7 km (1.0 mi)		
1859	125	Silicon tetrafluoride	30 m (100 ft)	0.2 km (0.1 mi)	0.8 km (0.5 mi)	100 m (300 ft)	0.5 km (0.3 mi)	1.8 km (1.2 mi)		
1859	125	Silicon tetrafluoride, compressed								
1892	151	Ethylchloroarsine	150 m (500 ft)	1.5 km (0.9 mi)	2.1 km (1.3 mi)	400 m (1250 ft)	4.6 km (2.9 mi)	6.4 km (4.0 mi)		
1898	156	Acetyl iodide (when spilled in water)	30 m (100 ft)	0.1 km (0.1 mi)	0.1 km (0.1 mi)	30 m (100 ft)	0.4 km (0.3 mi)	1.1 km (0.7 mi)		

1836	137	Thionyl chloride (when spilled on land)	30 m (100 ft)	0.1 km (0.1 mi)	0.2 km (0.2 mi)	30 m (100 ft)	0.3 km (0.2 mi)	0.5 km (0.3 mi)
1836	137	Thionyl chloride (when spilled in water)	100 m (300 ft)	0.9 km (0.6 mi)	2.9 km (1.8 mi)	800 m (2500 ft)	9.7 km (6.0 mi)	11.0+ km (7.0+ mi)

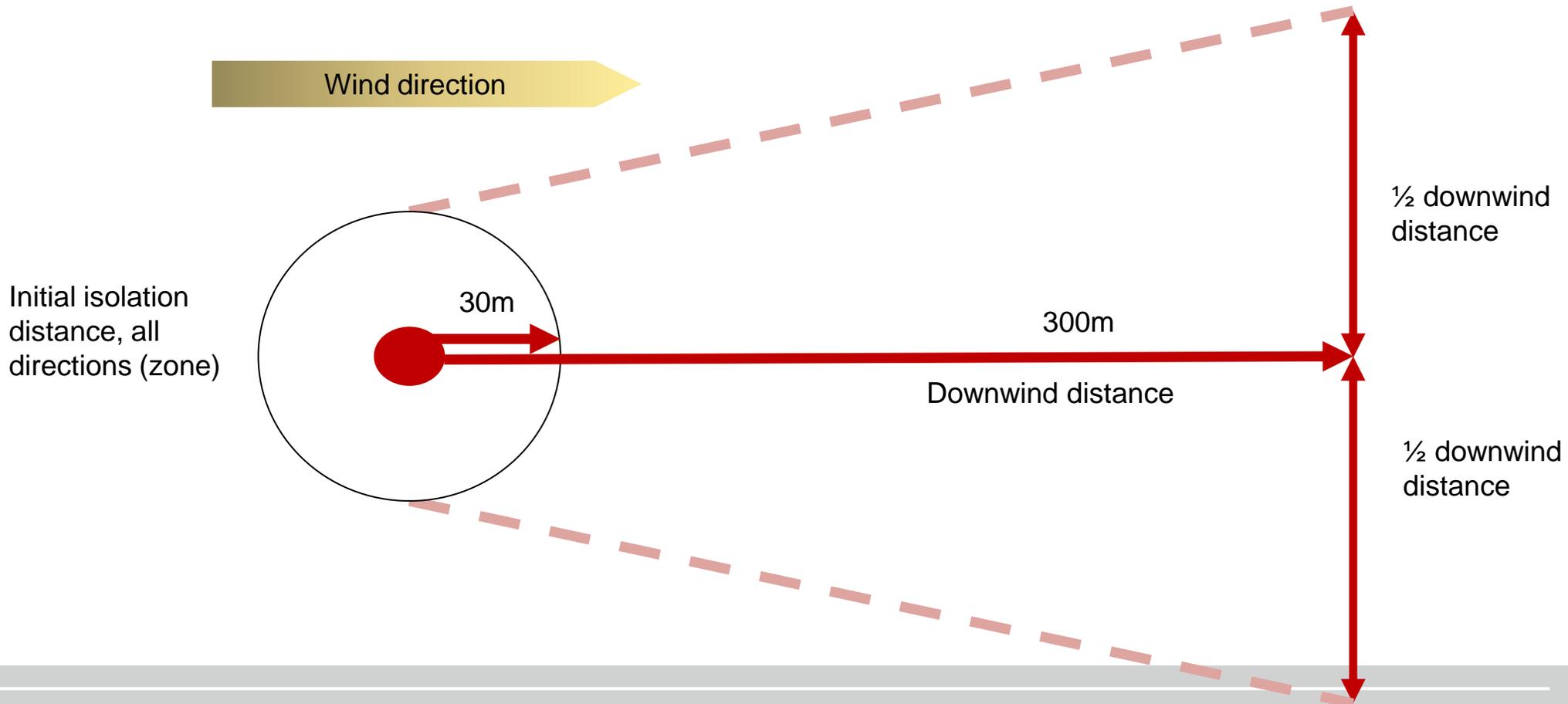
309

"+" means distance can be larger in certain atmospheric conditions

TABLE 1

# Green Pages – Table 1

## Initial isolation and downwind protective action distances Thionyl Chloride – Large spill (on land) – Daytime



# Green Tables - Table 1



UN 1836

Thionyl chloride

Guide Page Initial Isolation and Protective Action Distanc...

**GUIDE 137**  
**Substances - Water-Reactive - Corrosive**

**POTENTIAL HAZARDS**

**HEALTH**

- CORROSIVE and/or TOXIC; inhalation, ingestion or contact (skin, eyes) with vapors, dusts or substance may cause severe injury, burns or death.
- Fire will produce irritating, corrosive and/or toxic gases.
- Reaction with water may generate much heat that will increase the concentration of fumes in the air.
- Contact with molten substance may cause severe burns to skin and eyes.
- Runoff from fire control or dilution water may cause environmental contamination.

**FIRE OR EXPLOSION**

- **EXCEPT FOR ACETIC ANHYDRIDE (UN1715), THAT IS FLAMMABLE**, some of these materials may burn, but none ignite readily.
- May ignite combustibles (wood, paper, oil, clothing, etc.).
- Substance will react with water (some violently), releasing corrosive and/or toxic gases and runoff.
- Flammable/toxic gases may accumulate in

UN 1836

Thionyl chloride

Guide Page Initial Isolation and Protective Action Distanc...

**SMALL SPILLS - (From a small package or small leak from a large package)**

ID	MATERIAL	First ISOLATE in all Directions	Then PROTECT Downwind
1836	Thionyl chloride (when spilled on land)	30 m	<b>DAY</b> 0.1 km
			<b>NIGHT</b> 0.2 km
1836	Thionyl chloride (when spilled in water)	100 m	<b>DAY</b> 0.9 km
			<b>NIGHT</b> 2.9 km

**TIH Gas(es) Produced when spilled in water** Hydrogen chloride (HCl)  
Sulfur dioxide (SO2)

**LARGE SPILLS - (From a large package or many small packages)**

ID	MATERIAL	First ISOLATE in all Directions	Then PROTECT Downwind
1836	Thionyl chloride (when spilled on land)	30 m	<b>DAY</b> 0.3 km
			<b>NIGHT</b> 0.5 km
1836	Thionyl chloride (when spilled in	800 m	<b>DAY</b> 0.5 km
			<b>NIGHT</b> 0.5 km

TABLE2 - WATER-REACTIVE MATERIALS WHICH PRODUCE TOXIC GASES

Materials Which Produce Large Amounts of Toxic-by-Inhalation (TIH)  
(PIH in the US) Gas(es) When Spilled in Water

ID No.	Guide No.	Name of Material	TIH Gas(es) Produced
1777	137	Fluorosulfonic acid	HF
1777	137	Fluorosulphonic acid	HF
1781	156	Hexadecyltrichlorosilane	HCl
1784	156	Hexyltrichlorosilane	HCl
1799	156	Nonyltrichlorosilane	HCl
1800	156	Octadecyltrichlorosilane	HCl
1801	156	Octyltrichlorosilane	HCl
1804	156	Phenyltrichlorosilane	HCl
1806	137	Phosphorus pentachloride	HCl
1808	137	Phosphorus tribromide	HBr
1809	137	Phosphorus trichloride	HCl
1810	137	Phosphorus oxychloride	HCl
1815	132	Propionyl chloride	HCl
1816	155	Propyltrichlorosilane	HCl
1818	157	Silicon tetrachloride	HCl
1828	137	Sulfur chlorides	HCl SO <sub>2</sub> H <sub>2</sub> S
1828	137	Sulphur chlorides	HCl SO <sub>2</sub> H <sub>2</sub> S
1834	137	Sulfuryl chloride	HCl
1834	137	Sulphuryl chloride	HCl
1836	137	Thionyl chloride	HCl SO <sub>2</sub>
1838	137	Titanium tetrachloride	HCl
1898	156	Acetyl iodide	HI
1923	135	Calcium dithionite	H <sub>2</sub> S SO <sub>2</sub>

TABLE 2

# Green Pages – Table 2

107 B/s 09:27

← UN 1836

Thionyl chloride

Initial Isolation and Protective Action Distanc...

SMALL SPILLS - (From a small package or small leak from a large package)			
ID	MATERIAL	First ISOLATE in all Directions	Then PROTECT Downwind
1836	Thionyl chloride (when spilled on land)	30 m	DAY 0.1 km
			NIGHT 0.2 km
1836	Thionyl chloride (when spilled in water)	100 m	DAY 0.9 km
			NIGHT 2.9 km

TIH Gas(es) Produced when spilled in water: Hydrogen chloride (HCl) Sulfur dioxide (SO<sub>2</sub>)

Chemical Symbols for TIH (PIH in the US) Gases:

Br <sub>2</sub>	Bromine	HF	Hydrogen fluoride	NO <sub>2</sub>	Nitrogen dioxide
Cl <sub>2</sub>	Chlorine	HI	Hydrogen iodide	PH <sub>3</sub>	Phosphine
HBr	Hydrogen bromide	H <sub>2</sub> S	Hydrogen sulfide	SO <sub>2</sub>	Sulfur dioxide
HCl	Hydrogen chloride	H <sub>2</sub> S	Hydrogen sulphide	SO <sub>2</sub>	Sulphur dioxide
HCN	Hydrogen cyanide	NH <sub>3</sub>	Ammonia		

# Green Tables – Table 3

- Ammonia, Anhydrous
- Chlorine
- Ethylene Oxide (Ethylene Oxide with Nitrogen)
- Hydrogen Chloride (Refrigerated liquid)
- Hydrogen Fluoride
- Sulphur Dioxide

## HOW TO USE TABLE 3 – INITIAL ISOLATION AND PROTECTIVE ACTION DISTANCES FOR LARGE SPILLS FOR DIFFERENT QUANTITIES OF SIX COMMON TIH (PIH in the US) GASES

Table 3 lists Toxic Inhalation Hazard (TIH) materials that may be more commonly encountered.

The selected materials are:

- UN1005 - Ammonia, anhydrous
- UN1017 - Chlorine
- UN1040 - Ethylene oxide and UN1040 – Ethylene oxide with nitrogen
- UN1050 - Hydrogen chloride, anhydrous and UN2186 - and Hydrogen chloride, refrigerated liquid
- UN1052 - Hydrogen fluoride, anhydrous
- UN1079 - Sulfur dioxide/Sulphur dioxide

The materials are presented in numerical order of ID number and provide Initial Isolation and Protective Action Distances **FOR LARGE SPILLS** (more than 208 liters or 55 US gallons) involving different container types (therefore different volume capacities, see below) for day time and night time situations and different wind speeds.

- Rail tank car: 80 000 kg (176 368 lbs.)
- Highway tank truck or trailer: 20 000 – 25 000 kg (44 092 – 55 115 lbs.)
- Agricultural nurse tank: 3785 L (1000 gallons)
- Small cylinder: 72 L (19 gallons)
- Ton cylinder: 757 - 1135 L (200 - 300 gallons)

### Estimating Wind Speed from Environmental Clues

mph	km/h	Wind Description	Specifications
< 6	< 10	Low wind	Wind felt on face; leaves rustle; ordinary vane moved by wind
6 - 12	10 - 20	Moderate wind	Raises dust, loose paper; small branches are moved
> 12	> 20	High wind	Large branches in motion; whistling heard in telephone wires; umbrellas used with difficulty

(Data taken from the Beaufort Wind Scale has been reworked in order to create 3 categories of wind speed: Low, Moderate and High)

# Green Tables – Table 3

**TABLE 3 - INITIAL ISOLATION AND PROTECTIVE ACTION DISTANCES FOR LARGE SPILLS FOR DIFFERENT QUANTITIES OF SIX COMMON TIH (PIH in the US) GASES**

TRANSPORT CONTAINER	First ISOLATE in all Directions  Meters (Feet)		Then PROTECT persons Downwind during								
			DAY			NIGHT					
			Low wind (< 6 mph = < 10 km/h)	Moderate wind (6-12 mph = 10 - 20 km/h)	High wind (> 12 mph = > 20 km/h)	Low wind (< 6 mph = < 10 km/h)	Moderate wind (6-12 mph = 10 - 20 km/h)	High wind (> 12 mph = > 20 km/h)	Low wind (< 6 mph = < 10 km/h)	Moderate wind (6-12 mph = 10 - 20 km/h)	High wind (> 12 mph = > 20 km/h)
	km (Miles)	km (Miles)	km (Miles)	km (Miles)	km (Miles)	km (Miles)	km (Miles)	km (Miles)	km (Miles)	km (Miles)	
<b>UN1005 Ammonia, anhydrous: Large Spills</b>											
Rail tank car	300 (1000)		1.9 (1.2)	1.5 (0.9)	1.1 (0.6)	4.5 (2.8)	2.5 (1.5)	1.4 (0.9)			
Highway tank truck or trailer	150 (500)		0.9 (0.6)	0.5 (0.3)	0.4 (0.3)	2.0 (1.3)	0.8 (0.5)	0.6 (0.4)			
Agricultural nurse tank	60 (200)		0.5 (0.3)	0.3 (0.2)	0.3 (0.2)	1.4 (0.9)	0.3 (0.2)	0.3 (0.2)			
Multiple small cylinders	30 (100)		0.3 (0.2)	0.2 (0.1)	0.1 (0.1)	0.7 (0.5)	0.3 (0.2)	0.2 (0.1)			
<b>UN1017 Chlorine: Large Spills</b>											
Rail tank car	1000 (3000)		10.1 (6.3)	6.8 (4.2)	5.3 (3.3)	11+ (7+)	9.2 (5.7)	6.9 (4.3)			
Highway tank truck or trailer	600 (2000)		5.8 (3.6)	3.4 (2.1)	2.9 (1.8)	6.7 (4.3)	5.0 (3.1)	4.1 (2.5)			
Multiple ton cylinders	300 (1000)		2.1 (1.3)	1.3 (0.8)	1.0 (0.6)	4.0 (2.5)	2.4 (1.5)	1.3 (0.8)			
Multiple small cylinders or single ton cylinder	150 (500)		1.5 (0.9)	0.8 (0.5)	0.5 (0.3)	2.9 (1.8)	1.3 (0.8)	0.6 (0.4)			

**TABLE 3**

"+" means distance can be larger in certain atmospheric conditions



## Ammonia, anhydrous

Initial Isolation and Protective Action Distanc...

UN1005 Ammonia, anhydrous: Large Spills

[Rail tank car](#)

[Highway tank truck or trailer](#)

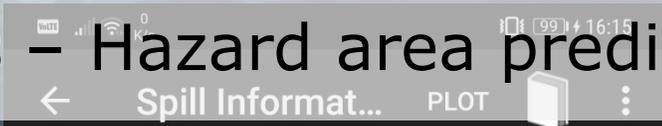
[Agricultural nurse tank](#)

[Multiple small cylinders](#)

<b>Transport Container</b>	Rail tank car	
<b>First ISOLATE in all Directions</b>	300 m	
<b>Then protect downwind</b>		
<b>DAY</b>		
<b>Low Wind (&lt; 10 km/h)</b>	<b>Moderate Wind (10 – 20 km/h)</b>	<b>High Wind (&gt; 20 km/h)</b>
1.9 km	1.5 km	1.1 km
<b>Night</b>		
<b>Low Wind (&lt; 10 km/h)</b>	<b>Moderate Wind (10 – 20 km/h)</b>	<b>High Wind (&gt; 20 km/h)</b>
4.5 km	2.5 km	1.4 km

<b>Transport Container</b>	Highway tank truck or trailer	
<b>First ISOLATE in all Directions</b>	150 m	
<b>Then protect downwind</b>		
<b>DAY</b>		
<b>Low Wind</b>	<b>Moderate Wind</b>	<b>High Wind</b>

# Green Tables – Hazard area prediction



## Thionyl chloride

This tool allows you to visualize protective distances on a map. After setting a location, wind direction, and additional details, view the map by selecting the Plot button.

## Spill Location

51.886208 -2.133003

After plotting, you may touch and hold anywhere on the map to move the plot to a new spill location.

## Wind Direction

W

### SELECT WHERE SPILL OCCURRED

On Land



In Water



## Spill Details

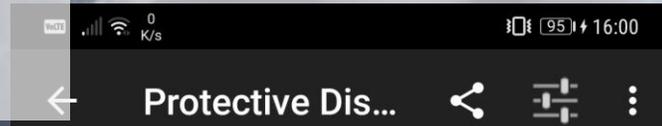
Large

### SELECT TIME OF DAY

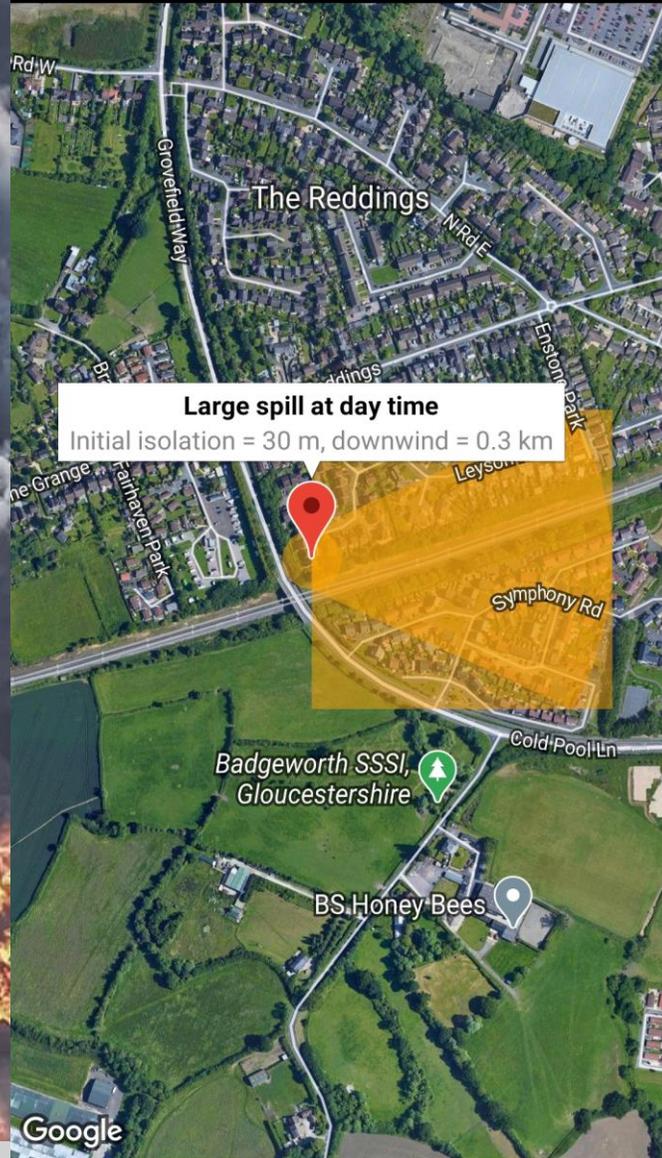
Day



Night



## Thionyl chloride



# White Pages – Last resort

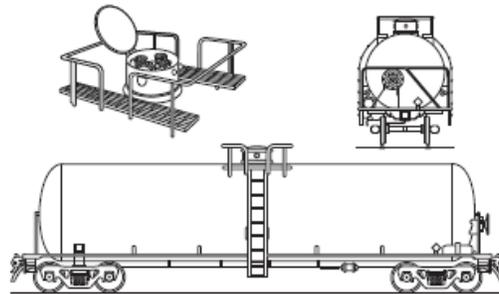
## RAIL CAR IDENTIFICATION CHART

**CAUTION:** Emergency response personnel must be aware that rail tank cars vary widely in construction, fittings and purpose. Tank cars could transport products that may be solids, liquids or gases. The products may be under pressure. It is essential that products be identified by consulting shipping papers or train consist or contacting dispatch centers before emergency response is initiated. The information stenciled on the sides or ends of tank cars, as illustrated below, may be used to identify the product utilizing:

- the commodity name shown;
- the other information shown, especially reporting marks and car number which, when supplied to a dispatch center, will facilitate the identification of the product.

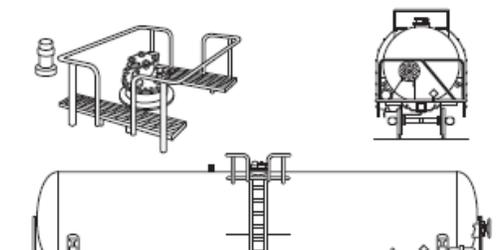
The recommended guides should be considered as last resort if the material cannot be identified by any other means.

### 117 Pressure tank car



- For flammable, non-flammable, toxic and/or liquefied compressed gases
- Protective housing
- No bottom fittings
- Pressures usually above 40 psi

### 131 Non-pressure / low pressure tank car



- Known as **general service tank car**
- For variety of hazardous and non-hazardous materials
- Fittings and valves normally visible at the top of the tank
- Some may have bottom outlet valve
- Pressures usually below 25 psi

## ROAD TRAILER IDENTIFICATION CHART

**CAUTION:** This chart depicts only the most general shapes of road trailers and cargo transport units. Emergency response personnel must be aware that there are many variations of road trailers, not illustrated below, that are used for shipping chemical products. Many intermodal tanks that transport liquids, solids, liquefied compressed gases, and refrigerated liquefied gases have similar silhouettes. The suggested guides are for the most hazardous products that may be transported in these trailer types.

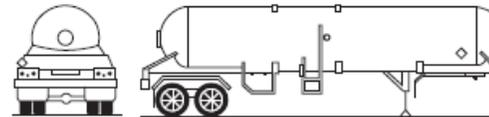
**WARNING:** Road trailers may be jacketed, the cross-section may look different than shown and external ring stiffeners would be invisible.

**NOTE:** An emergency shut-off valve is commonly found at the front of the tank, near the driver door.

The recommended guides should be considered as last resort if the material cannot be identified by any other means.

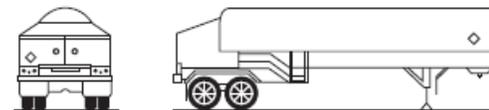
MAWP: Maximum Allowable Working Pressure.

### 117 MC331, TC331, SCT331



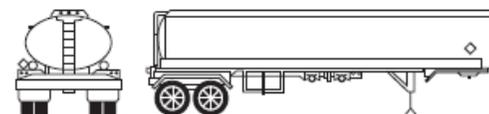
- For liquefied compressed gases (e.g., LPG, ammonia)
- Rounded heads
- Design pressure between 100-500 psi

### 117 MC338, TC338, SCT338, TC341, CGA341



- For refrigerated liquefied gases (cryogenic liquids)
- Similar to a "giant thermo-bottle"
- Fitting compartments located in a cabinet at the rear of the tank
- MAWP between 25-500 psi

### 131 DOT406, TC406, SCT306, MC306, TC306



- For flammable liquids (e.g., gasoline, diesel)
- Elliptical cross-section
- Rollover protection at the top
- Bottom outlet valves
- MAWP between 3-15 psi

# White Pages – Last resort

## GUIDE MIXED LOAD/UNIDENTIFIED CARGO 111

### POTENTIAL HAZARDS

#### FIRE OR EXPLOSION

- May explode from heat, shock, friction or contamination.
- May react violently or explosively on contact with air, water or foam.
- May be ignited by heat, sparks or flames.
- Vapors may travel to source of ignition and flash back.
- Containers may explode when heated.
- Ruptured cylinders may rocket.

#### HEALTH

- Inhalation, ingestion or contact with substance may cause severe injury, infection, disease or death.
- High concentration of gas may cause asphyxiation without warning.
- Contact may cause burns to skin and eyes.
- Fire or contact with water may produce irritating, toxic and/or corrosive gases.
- Runoff from fire control or dilution water may cause environmental contamination.

### PUBLIC SAFETY

- **CALL 911. Then call emergency response telephone number on shipping paper.** If shipping paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.
- Keep unauthorized personnel away.
- Stay upwind, uphill and/or upstream.

#### PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing provides thermal protection **but only limited chemical protection.**

#### EVACUATION

##### Immediate precautionary measure

- Isolate spill or leak area for at least 100 meters (330 feet) in all directions.

##### Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

## MIXED LOAD/UNIDENTIFIED CARGO GUIDE 111

### EMERGENCY RESPONSE

#### FIRE

**CAUTION: Material may react with extinguishing agent.**

##### Small Fire

- Dry chemical, CO<sub>2</sub>, water spray or regular foam.

##### Large Fire

- Water spray, fog or regular foam.
- If it can be done safely, move undamaged containers away from the area around the fire.

##### Fire Involving Tanks

- Cool containers with flooding quantities of water until well after fire is out.
- Do not get water inside containers.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.

#### SPILL OR LEAK

- Do not touch or walk through spilled material.
- ELIMINATE all ignition sources (no smoking, flares, sparks or flames) from immediate area.
- All equipment used when handling the product must be grounded.
- Keep combustibles (wood, paper, oil, etc.) away from spilled material.
- Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.
- Prevent entry into waterways, sewers, basements or confined areas.

##### Small Spill

- Pick up with sand or other non-combustible absorbent material and place into containers for later disposal.

##### Large Spill

- Dike far ahead of liquid spill for later disposal.

#### FIRST AID

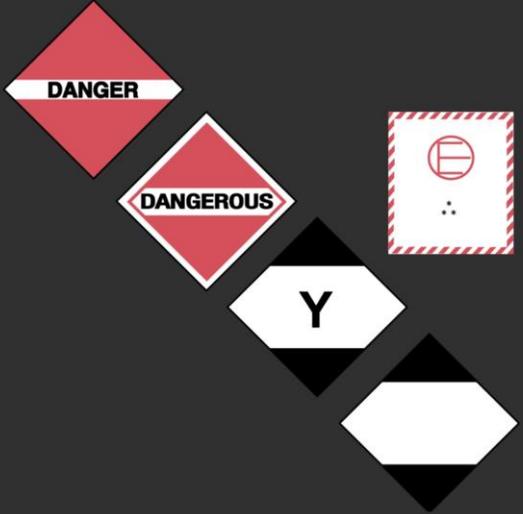
- Call 911 or emergency medical service.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.
- Move victim to fresh air if it can be done safely.
- Give artificial respiration if victim is not breathing.
- **Do not perform mouth-to-mouth resuscitation if victim ingested or inhaled the substance; wash face and mouth before giving artificial respiration. Use a pocket mask equipped with a one-way valve or other proper respiratory medical device.**
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Shower and wash with soap and water.
- Keep victim calm and warm.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.

# White Pages – Last resort

Search by Image

Placard Rail Car

111



Dangerous - Mixed load/unidentified cargo

112



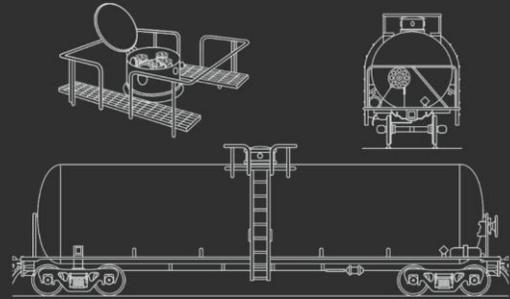
Explosives 1.5

Blasting Agents 1.5

Search by Image

Placard Rail Car Road Trailer

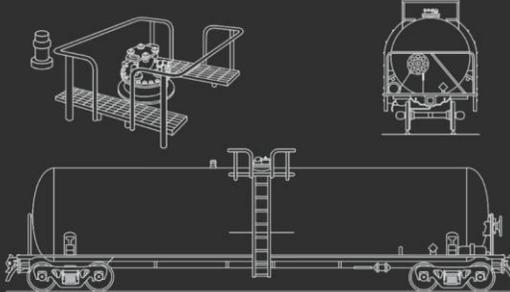
117



**Pressure tank car**

- For flammable, non-flammable, toxic and/or liquefied compressed gases
- Protective housing
- No bottom fittings
- Pressures usually above 40 psi

131



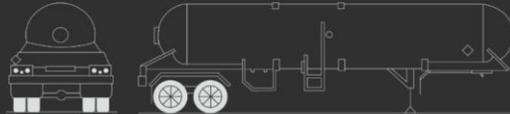
**Non-pressure/low pressure tank car**

- Known as general service tank car
- Consist of headcars and

Search by Image

Rail Car Road Trailer

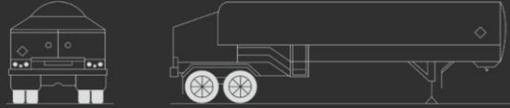
117



**MC331, TC331, SCT331**

- For liquefied compressed gases (e.g., LPG, ammonia)
- Rounded heads
- Design pressure between 100-500 psi

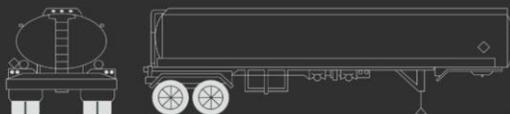
117



**MC338, TC338, SCT338, TC341, CGA341**

- For refrigerated liquefied gases (cryogenic liquids)
- Similar to a "giant thermo-bottle"
- Fitting compartments located in a cabinet at the rear of the tank
- MAWP between 25-500 psi

131



**DOT406, TC406, SCT306, MC306, TC306**

- For flammable liquids (e.g., gasoline, diesel)
- Elliptical cross-section

ERG 2020

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- ERG 2020

# Reference Pages

589 B/s 100% 16:40

← ERG Reference Pages

- How to Use this App
- Hazard Classification
- Protective Distance
- Safety Precautions
- About/Contact

**WARNING:** The data given are approximate and should only be used with extreme caution. These times can vary from situation to situation. LPG tanks have been known to BLEVE within minutes. Therefore, never risk life based on these times.

## BLEVE (USE WITH CAUTION)

Capacity	Diameter	Length	Propane Mass	Minimum time to failure for severe torch	Approximate time to empty for engulfing fire	Fireball radius	Emergency response distance	Minimum evacuation distance	Preferred evacuation distance	Cooling water flow rate	
Litres (Gallons)	Meters (Feet)	Meters (Feet)	Kilograms(Pounds)	Minutes	Minutes	Meters (Feet)	Meters (Feet)	Meters (Feet)	Meters (Feet)	Litres/min	USgal/min
100 (26.4)	0.3 (1)	1.5 (4.9)	40 (88)	4	8	10 (33)	90 (295)	154 (505)	307 (1007)	97	26
400 (106)	0.61 (2)	1.5 (4.9)	160 (353)	4	12	16 (53)	90 (295)	244 (801)	488 (1601)	195	51
2000 (528)	0.96 (3.2)										

## Improvised Explosive Device (IED) SAFE STAND-OFF DISTANCE

Threat Description		Explosives Capacity <sup>1</sup>	Mandatory Evacuation Distance <sup>2</sup>	Shelter-in-Place Zone		Preferred Evacuation Distance <sup>3</sup>	
High Explosives (TNT Equivalent)	Pipe Bomb	5 lbs 2.3 kg	70 ft 21 m	71 - 1,199 ft	22 - 365 m	+1,200 ft	366 m
	Suicide Bomber	20 lbs 9 kg	110 ft 34 m	111 - 1,699 ft	35 - 518 m	+1,700 ft	519 m
	Briefcase/Suitcase	50 lbs 23 kg	150 ft 46 m	151 - 1,849 ft	47 - 563 m	+1,850 ft	564 m
	Car	500 lbs 227 kg	320 ft 98 m	321 - 1,899 ft	99 - 579 m	+1,900 ft	580 m
	SUV/Van	1,000 lbs 454 kg	400 ft 122 m	401 - 2,399 ft	123 - 731 m	+2,400 ft	732 m
	Small Delivery Truck	4,000 lbs 1,814 kg	640 ft 195 m	641 - 3,799 ft	196 - 1,158 m	+3,800 ft	1,159 m
	Container/Water Truck	10,000 lbs 4,536 kg	860 ft 263 m	861 - 5,099 ft	264 - 1,554 m	+5,100 ft	1,555 m
Semi-Trailer	60,000 lbs 27,216 kg	1,570 ft 475 m	1,571 - 9,299 ft	476 - 2,834 m	+9,300 ft	2,835 m	

<sup>1</sup> Based on the maximum amount of material that could reasonably fit into a container or vehicle. Variations possible.

<sup>2</sup> Governed by the ability of an unreinforced building to withstand severe damage or collapse.

<sup>3</sup> Governed by the greater of fragment throw distance or glass breakage/falling glass hazard distance. These distances can be reduced for personnel wearing ballistic protection. Note that the pipe bomb, suicide bomb, and briefcase/suitcase bomb are assumed to have a fragmentation characteristic that requires greater stand-off distances than an equal amount of explosives in a vehicle.



# Chemsafe

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# ChemData

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Any Questions?