



REQUIREMENTS FOR THE ROAD TRANSPORTATION OF CLASS 2 DANGEROUS GOODS IN BULK

TD 01/19/E

(Revision of TD 01/14/E)

Disclaimer

All technical publications of MEGA, including codes of practice, safety procedures and any other technical information contained in such publications were obtained from sources believed to be reliable and are based on technical information and experience currently available to MEGA and others at the date of their issuance.

Where MEGA recommends reference to use of its publications by its members, such reference to or use MEGA's publications by its members or third parties are purely voluntary and not binding.

MEGA or its members make no guarantee of the results and assume no liability or responsibility in connection with the reference to or use of information or suggestions contained in MEGA's publications.

MEGA has no control whatsoever on, performance or non-performance, misinterpretation, proper or improper use of any information or suggestions contained in MEGA's publications by any person or entity (including MEGA members), and MEGA expressly disclaims any liability in connection obtain the latest edition.

© MEGA 2019 – MEGA grants permission to reproduce this publication provided that MEGA is acknowledged as the source.

TABLE OF CONTENTS

1. FOREWORD	4
2. SCOPE	4
3. DISCLAIMER	4
4. INTRODUCTION	4
4.1. UN Recommendations	4
4.2. Transportation of dangerous goods by road – Key Points	4
5. DANGEROUS GOODS CLASSIFICATION	5
5.1. Hazard Class Definitions	5
5.2. Hazard Class Label Specifications	7
6. PROPER SHIPPING NAME	7
7. MARKINGS, LABELS AND PLACARDS	7
7.1. Responsibility	7
7.2. When are they needed?	7
7.3. What information is required on HAZCHEM Panels ?	7
7.4. UN Numbers	8
7.5. HAZCHEM / Emergency Action Code (EAC)	8
7.6. HAZCHEM Panel Placement	10
8. LANGUAGE	10
9. TRANSPORT DOCUMENTATION	11
10. EMERGENCY INSTRUCTIONS IN WRITING	11
10.1. TREM Card details	11

1. FOREWORD

'Dangerous Goods' refers to items that are potentially dangerous during transportation. They include a wide range of solids, liquids and gases that have explosive, flammable, toxic (poisonous), infectious, radioactive, corrosive or environmentally hazardous (eco toxic) properties. Dangerous goods have special transport requirements to eliminate or minimize the risk of injuring people or damaging property and the environment.

This guideline is targeted towards road transport workers who prepare, ship, load or transport dangerous goods by road – and those who supervise them.

The objective of this guideline is to understand the nature of dangerous goods, their potential for causing incidents and accidents and how they should be dealt with.

2. SCOPE

This guideline deals primarily with the transport requirements of Industrial Gas products in the Middle East. This includes but is not limited to, the transport of Gas Cylinders, Dewars, Cryogenic Liquids in Road Tankers and Portable Tanks.

3. DISCLAIMER

This guide is an overview and is not intended as a substitute for the formal acts, regulations, rules, codes and standards to which it refers.

4. INTRODUCTION

4.1. UN Recommendations

A wide range of requirements apply when transporting dangerous goods. The most significant is the United Nations Recommendations on the Transport of Dangerous Goods – Model Regulations (the UN Recommendations). These recommendations aim to eliminate or minimize risks, promote safety and facilitate the transport of dangerous goods. UN Recommendations take into account land; sea and air transport and form the basis for uniform national and international regulations. The UN Recommendations are updated every two years.

The term 'Dangerous Goods' is used internationally to describe the goods covered by the UN Recommendations. These goods are divided into nine classes based on their hazardous properties. This is covered in depth in section 5.

4.2. Transportation of dangerous goods by road – Key Points

The following general procedures apply to the transportation of dangerous goods by road:

1. Classify the goods.
2. Identify the Proper Shipping Name.
3. Mark and label the goods, usually with their UN number and Proper Shipping Name, Class label and Subsidiary Risk label (if required), plus any additional marks required .
4. Provide dangerous goods declaration stating the UN number, Proper Shipping Name, Class, and the number and kind of shipment.
5. The consignor must advise of any special requirements for the safe carriage of the goods. The rules also require loaders and carriers to implement any special requirements indicated as 'additional information'.

5. DANGEROUS GOODS CLASSIFICATION

The transport hazards that Dangerous Goods pose are grouped into nine classes, which may be subdivided into divisions and are identified through a system of diamond shaped labels. Different colours and symbols, such as a flame for flammables or skull and crossbones for poisons, identify the dangers associated with the product. The colours of each diamond in a way has reference to its hazard i.e.: Flammable = red because fire and heat are generally of red colour, Explosive = orange, because mixing red (flammable) with yellow (oxidising agent) creates orange. Non Flammable Non Toxic Gas = green. The class number is displayed at the bottom of each diamond shaped label.

5.1. Hazard Class Definitions

- **Class 1: Explosives**

- Explosive substances and articles, and pyrotechnic devices, for example, ammunition and fireworks.



- **Class 2: Compressed Gases**

- **Sub-Class 2.1 - Flammable Gas**

- Gases which ignite on contact with an ignition source, such as acetylene and hydrogen .



- **Sub-Class 2.2 Non-flammable, Non-poisonous Gas**

- Gases which are neither flammable nor poisonous. Includes cryogenic gases/liquids (temperatures of below -100°C) used for cryopreservation and rocket fuels, such as nitrogen, argon and neon.



- **Sub-Class 2.3 Poisonous Gas**

- Gases liable to cause death or serious injury to human health if inhaled; examples are fluorine, chlorine, and hydrogen cyanide.



- **Class 3: Flammable Liquids**

- Examples are petrol and commercial alcohol.



- **Class 4: Flammable Solids**

- **Sub-Class 4.1: Flammable Solids**

- **Sub-Class 4.2: Spontaneously Combustible**

- **Sub-Class 4.3: Dangerous when wet**

- Solid substances that emit a flammable gas when wet or react with water, such as sodium , potassium and calcium carbide.



- **Class 5: Oxidizers**

- **Sub-Class 5.1: Oxidizers**

- An Oxidizer is a material that may, generally by yielding oxygen, cause or enhance the combustion of other materials, such as oxygen.



- **Sub-Class 5.2: Organic Peroxides**

- Are thermally unstable substances that may undergo heat generating self-accelerating decomposition. These substances are sensitive to impact or friction, or may create a dangerous reaction when in contact with other substances. These substances may be explosive and burn rapidly.
 - Examples are fertilizers and pool chemicals.



- **Class 6: Toxic (Poisonous) and Infectious Substances**

- **Sub-Class 6.1: Toxic Substances**

- Those substances that are liable to cause death or injury if swallowed inhaled or absorbed through skin.
 - Examples are pesticides and mercury.



- **Sub-Class 6.2: Infectious Substances**

- Those known to contain or reasonably expect to contain, pathogens such as Medical Waste.



- **Class 7: Radioactive Materials**

- Radioactive substances comprise substances or a combination of substances which emit ionizing radiation.



- **Class 8: Corrosives**

- Corrosive substances can dissolve organic tissue or severely corrode certain metals.
 - Examples are hydrochloric acid or sulphuric acid.



- **Class 9: Miscellaneous**

- A material which presents a hazard during transportation but which does not meet the definition of any other hazard class.
 - Examples are asbestos and dry ice.



5.2. Hazard Class Label Specifications

A hazard label shall:

- a. Be not less than 250 mm by 250 mm and have a line 12.5 mm inside the edge and running parallel with it.
- b. Correspond to the label required for the dangerous goods in question with respect to colour and symbol.
- c. Display the numbers prescribed for the dangerous goods in question for the corresponding label, in digits not less than 25 mm high.

6. PROPER SHIPPING NAME

The proper shipping name, as defined in the Dangerous Goods Regulations, shall be used to describe the goods on shipping documents.

7. MARKINGS, LABELS AND PLACARDS

Placards are used to alert the public to the potential dangers of hazardous materials in a freight container, cargo, tank or portable tank. They also guide emergency personnel in their response to accidents involving hazardous materials.

7.1. Responsibility

Placarding is the process of placing on the tank or container the Hazard Diamonds, UN Numbers, Emergency Action Code, Emergency Contact Details and any other placards required by regulations.

In general, the shipper is responsible for providing the appropriate placards for a shipment of hazardous materials and the driver is responsible for replacing placards that become lost or damaged during a trip.

Placards follow size, color and design specifications for easy identification of hazardous materials. They can be made of plastic, metal or other materials that meet or exceed "tagboard" durability specifications.

7.2. When are they needed?

Placarding requirements must be met when transporting Dangerous Goods by any means. Placards should be applied prior to loading the Dangerous Goods.

7.3. What information is required on HAZCHEM Panels ?

As per the placard template below, the following is a list of information to be displayed:

1. The Correct Technical Name of the dangerous goods in letters not less than 50 mm high.
2. The UN Number for the dangerous goods in letters not less than 100 mm high.
3. The HAZCHEM Emergency Action Code for the dangerous goods in letters not less than 100 mm high. (required for marking Bulk Containers only)
4. The name and telephone numbers of the Emergency Services to be contacted in the event of fire or any other accident in letters and numerals not less than 50 mm high and the name and telephone of the consignor of the dangerous/hazardous goods or of some other person from whom expert information and advice can be obtained concerning the measure that should be taken in the event of an emergency.
5. The Hazard Class Label of the dangerous goods in a size of not less than 250 mm square.

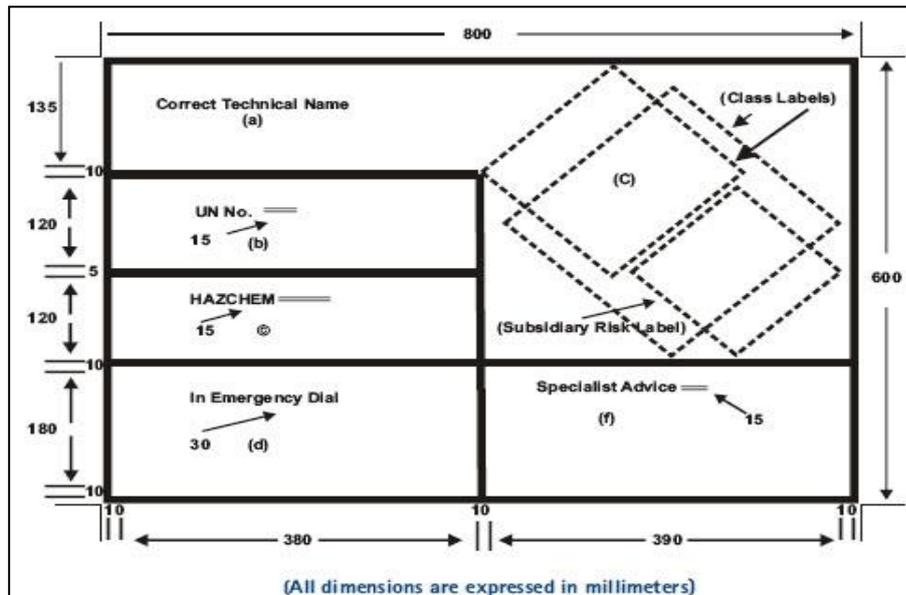


Figure 1: Placard Panel Template Layout with Sizes

7.4. **UN Numbers**

The most common Dangerous Goods are assigned a UN number, a four digit code which identifies it internationally. Less common substances are transported under generic codes such as "UN1993: flammable liquid, not otherwise specified".

7.5. **HAZCHEM / Emergency Action Code (EAC)**

The EAC is a three character code displayed on all dangerous goods classed carriers, and provides a quick assessment to first responders and emergency responders (i.e. civil defense and police) of what actions to take should the carrier carrying such goods become involved in an incident (traffic collision, for example). EAC's are characterized by a single number (1 to 4) and either one or two letters (depending on the hazard).

1st Character

This number is indicative of what type of fire suppressant should be used to suppress a fire from igniting or extinguish a fire caused by the Dangerous Goods. The system is designed to rank fire suppression methods in order of usability. For example a chemical marked with Fog can be attacked with Foam or Dry Agents but not with Jets. The "Dry Agent" method must be used for chemicals that have an undesirable reaction with water and must not be allowed to come in contact with water, therefore Dry Agent is the highest ranking suppression method as all of the other methods use water.

Number	Extinguisher Category
1	Jets
2	Fogs
3	Foam
4	Dry Agent

2nd Character

Each EAC contains at least one letter, which determines which category the chemical falls under, and which also highlights the violence of the chemical (i.e. likelihood to spontaneously combust, explode etc), what personal protective equipment to use while working around the chemical and what action to take when disposing of the chemical.

Each category is assigned a letter to determine what actions are required when handling, containing and disposing of the chemical in question.

There are distinct 'major categories' which are commonly denoted by a black letter on a white background. Four subcategories exist which specifically deal with what type of personal protective equipment responders must wear when handling the emergency, denoted by a white letter on a black background.

Category	Violence	Protection	Substance Control
P	V	Full	Dilute
R			
S	V	BA	
		BA for fire only	
T		BA	
		BA for fire only	
W	V	Full	Contain
X			
Y	V	BA	
		BA for fire only	
Z		BA	
		BA for fire only	
E	Consider Evacuation		

V – Violent. This means that the chemical can be violently or explosively reactive either with the atmosphere or water, or both.

Protection is divided up into 3 categories of personal protective equipment (PPE):

Full – Full personal protective equipment provisions must be used around and in contact with the chemical, which will usually include a portable breathing apparatus and water tight and chemical proof suit.

BA – Breathing Apparatus, specifies that a portable breathing apparatus must be used at all times in and around the chemical. Denoted as a black letter on a white background.

BA for fire only - specifies that a breathing apparatus is not necessary for short exposure periods to the chemical but is required if the chemical is on alight. *BA for fire only* is denoted within the emergency action code as a white letter on a black background.

Substance control specifies what to do with the chemical in the event of a spill, either dilute or contain. **Dilute** means that the chemical may be washed down the drain with large quantities of water. **Contain** requires that the spillage must not come in contact with drains or water courses.

In the event of a chemical incident, the EAC may specify that an evacuation may be necessary as the chemical poses a public hazard which may extend beyond the immediate vicinity.

If evacuation is not possible, advice to stay indoors and secure all points of ventilation may be necessary.

This condition is denoted by an **E** at the end of any emergency action code. It is an optional letter, depending on the nature of the chemical.

Table 1 Common Industrial Gases – UN Numbers, Hazard Classification and EAC

SN.	Hazardous Material Description & Shipping Name	Nature of Material	Sub-Class	Subsidiary Hazard	UN #	HAZCHEM/EAC Code
1	Acetylene	Dissolved	2.1	-	UN 1001	2SE
2	Hydrogen	Compressed	2.1	-	UN 1049	2SE
3	Argon	Compressed	2.2	-	UN 1006	2T
4	Argon	Refrigerated Liquid	2.2	-	UN 1951	2T
5	Carbon Dioxide		2.2	-	UN 1013	2T
6	Carbon Dioxide	Refrigerated Liquid	2.2	-	UN 2187	2T
7	Carbon Dioxide	Solid (Dry Ice)	9	-	UN 1845	2T
8	Helium	Compressed	2.2	-	UN 1046	2T
9	Helium	Refrigerated Liquid	2.2	-	UN 1963	2T
10	Nitrogen	Compressed	2.2	-	UN 1066	2T
11	Nitrogen	Refrigerated Liquid	2.2	-	UN 1977	2T
12	Nitrous Oxide	Compressed	2.2	5.1	UN 1070	2P
13	Nitrous Oxide	Refrigerated Liquid	2.2	5.1	UN 2201	2P
14	Oxygen	Compressed	2.2	5.1	UN 1072	2S
15	Oxygen	Refrigerated Liquid	2.2	5.1	UN 1073	2P

7.6. **HAZCHEM Panel Placement**

- Panels must be displayed on the rear and each side of the vehicle.
- Panels shall be displayed on a background of contrasting colour, or shall have either a dotted or solid outer boundary line.
- Panels must match the hazard of the cargo and be removed from any vehicle not carrying hazardous materials.
- Panels must be at least 3 inches from any other markings on the vehicle.
- Panels must be clearly visible and maintained throughout the trip.

8. LANGUAGE

MEGA recommends that English shall be the main language used on the placards, labels and transport documents. Arabic is optional, but suggested for additional clarity for local responders.

9. TRANSPORT DOCUMENTATION

The key requirements are that the documentation contains the following:

- The UN Number
- Proper Shipping Name
- Class (with subsidiary hazard, if any, in brackets)
- Packing Group (where assigned)
- Total quantity of each item of different UN Number
- Name/Address of Consignor
- Name/Address of Consignee(s)
- Declaration relating to any special agreement, where applicable
- Reference to the MSDS of the dangerous goods to be transported

10. EMERGENCY INSTRUCTIONS IN WRITING

The consignor of a vehicle carrying dangerous goods should provide the driver with details of the hazards associated with their dangerous goods loads and instructions on emergency action to take if an accident occurs. These instructions are recommended to be in the form of an international Transport Emergency Card, known as a TREM card.

10.1 TREM Card details

- Name of Substance, colour, odour
- Nature of Danger, Personal Protection, Intervention Equipment
- General Actions by the Driver
- Additional and/or special actions by the Driver
- Fire (information for the driver in case of fire), First Aid and Supplementary information for Emergency Services

APPENDIX A

Bibliography

1. 49 Code of Federal Regulations (CFR) Chapter 100-177, Pipeline and Hazardous Material Safety Administration, US Department of Transport (DOT).
2. ADR 22 Chapter 5.4.
3. BOC guidelines for gas cylinders safety.
4. Dangerous Goods Emergency Action List, 2011.