Transporting cylinder gases by road
tell me more

A guide to the regulations which implement ADR in Great Britain, as they apply to the transport of gas cylinders by road.
Transporting cylinder gases by road

A guide to the regulations which implement ADR in Great Britain, as they apply to the transport of gas cylinders by road:

• Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 SI No 1348 and

• Carriage of Dangerous Goods and Use of Transportable Pressure Equipment (Amendment) Regulations 2011 SI No 1885

• Carriage of Dangerous Goods: Approved Derogations and Transitional Provisions UK CDG Derogations April 2012

Note: Similar national regulations implement ADR in Northern Ireland:

• The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations (Northern Ireland) 2010 NISR No 160 and

• The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment (Amendment) Regulations (Northern Ireland) 2011 NISR No 365

• Carriage of Dangerous Goods: Approved Derogations and Transitional Provisions UK CDG Derogations April 2012

and for the Republic of Ireland:

• European Communities (Carriage of Dangerous Goods by Road and Use of Transportable Pressure Equipment) regulations 2011 SI No 349

Note: It is not the purpose of this document to identify country-specific differences or derogations from the general implementation of ADR in Great Britain.

Employees of undertakings in these countries may need to seek additional clarification from a qualified DGSA.
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1 Introduction

Industrial gases and cylinders do not pose a great danger to you, the public or the environment, if they are treated with care and respect.

Transporting any goods by road inevitably involves some degree of risk, especially if the goods to be carried are dangerous, e.g. industrial gases. There is also the risk of an incident, which may result in unplanned release of the product, leading to additional risks such as fire or explosion.

Statutory Regulations exist for safety reasons. The purpose of these Regulations is to protect people and the environment. The regulations place legal duties on everyone involved in the transport chain, to understand their role in minimising the risk of incidents and to ensure that effective actions are taken in the event of an incident involving the carriage of dangerous goods.

Internationally the transport of dangerous goods by road is standardised by “ADR”.

ADR is: The European Agreement Concerning the International Carriage of Dangerous goods by Road. ADR is updated every 2 years. At the time of writing this booklet, the current version of ADR is dated 2011.

The purpose of the ADR is to standardise the international carriage of dangerous goods and prevent potential problems caused by the use of different languages. Currently, 47 countries (the “United Nations”) including the UK have agreed to a harmonised way of transporting dangerous goods.

In the UK, the Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations “CDG” implement ADR for all road transport inside the UK (“domestic transport”) as well as the road portion of international shipments.

The main duties are now covered by a single regulation, namely Regulation 5, which permanently implements the current version of ADR, without requiring 2 yearly amendments of the UK regulations.

This booklet summarises the key points of CDG as it applies to the carriage of industrial gases. It is not a comprehensive guide to all of CDG and is intended to complement training in the hazards of gases being carried and training specific to individual roles.

FYI: The purpose of this booklet is to offer a summary of the key points of CDG as it affects those who load, unload or carry industrial gases in cylinders using road vehicles. We hope to answer many of the questions frequently asked by people who transport industrial gas in cylinders by road.

FYI: Please read this booklet carefully. It should help you to identify what legal obligations apply to the carriage that you are about to perform. These obligations can vary, depending upon the product and the amount being carried on your vehicle at a given time.
2 Classification, MSDS and UN numbers

This section is for general information only. You are not required to know the process of classification of the goods; this is done by groups of experts who work on behalf of the United Nations (UN).

What is classification?

The UN classifies all the different types of dangerous goods into 9 classes and uses this classification to provide guidance on the packaging and transport of thousands of substances. Similar substances are grouped together and assigned a “UN number”, which is like an index or look-up code.

All dangerous goods are grouped into categories to make the accurate identification of the hazards quick and easy in the event of an emergency. All of the industrial gases you will be handling for Air Products are already classified and labelled in accordance with the applicable regulations. The full listing of all dangerous goods and their UN numbers is included in ADR or the “Orange Book”.

All of the common cylinder gases that you are likely to transport will be listed. Pure gases are generally listed by the chemical name (Argon, Nitrogen, etc.).

FYI: Trade names of mixtures such as Innomaxx® gas, Alumaxx® gas, Coogar® gas, Weldap® gas, or Apachi® gas are not listed in ADR. You can find the UN number of any substance or mixture, on the cylinder label, on the relevant MSDS and on the Transport Document (“delivery note”) from Air Products.

FYI: You can download the latest MSDS for Air Products’ industrial gases from www.airproducts.com/msds at any time. Please ensure you select “English – United Kingdom” in order to download European format MSDS, instead of US versions!

FYI: The UN number of any substance or mixture is included with key ADR transport information in section 14 of the Material Safety Data Sheet (MSDS).

Class 2 Gases

This booklet is only about UN Class 2 in “packages” or cylinders. It does not address transport of gases or cryogenic fluids in bulk containers or tankers.

The common hazard of UN Class 2 substances is pressure. UN Class 2 includes pressurised (compressed) gases as well as liquefied gases.

It would not be safe to think of all gases as having exactly the same properties, so to take account of the different hazards, Class 2 is sub-divided into three groups (called 2.1, 2.2 and 2.3). Each subdivision has a unique label to indicate the primary hazard. These labels must be used during transport and be mentioned on documentation.
The subdivisions of UN Class 2

<table>
<thead>
<tr>
<th>Subdivision</th>
<th>Title</th>
<th>Primary hazard label</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Flammable gases e.g.: Propane, Butane and Acetylene</td>
<td>![Flammable Gas]</td>
</tr>
<tr>
<td>2.2</td>
<td>Non-flammable, non-toxic gases e.g.: Argon, Nitrogen and Ferromax</td>
<td>![Non Flammable Compressed Gas]</td>
</tr>
<tr>
<td>2.3</td>
<td>Toxic gases e.g.: Chlorine and Ammonia</td>
<td>![Toxic Gas]</td>
</tr>
</tbody>
</table>

A summary of the hazards of each of these sub-divisions is given on the next pages.

**FYI:** A reminder of these key hazards and guidance on the immediate actions to be taken in the event of a leak or other incident is included on the Instructions in Writing (see page 20).

**Class 2.1 Flammable [red hazard diamond]**

e.g.: Propane, Butane, Hydrogen, and Acetylene.

Flammable gases can burn in air!

The MSDS gives precise details of the amount of each gas (flammable range or flammability limits) which must be present in the air for there to be a risk.

For a fire to start, fuel, oxygen and a source of ignition are required. Oxygen is present in the air and a flammable gas is the fuel, so all sources of ignition e.g., flames, hot surfaces or static electricity, must be avoided when storing, handling and transporting flammable gases.

**This means:**

- No smoking
- No naked flames
- Avoid static build-up
- Minimise heat sources
Class 2.2 Non-flammable, non-toxic: Asphyxiants [green label]
e.g. Helium, Nitrogen, Carbon Dioxide, Argon

Asphyxiants may displace the oxygen in the air, and make it impossible for people to breathe or think properly. Without oxygen, a person will become unconscious within a few seconds and be dead within a few minutes.

Most asphyxiants are heavier than air, so in the event of a release they will remain at ground level and be undetectable except by a gas detector (meter). The only indication of the presence of inert gas will be the effects of the lack of oxygen, which can be fatal.

Class 2.2 Non-flammable, non-toxic: Oxidising gases [Green label + yellow label]
e.g. Oxygen

Oxygen is non-flammable and non-toxic, so it is in UN Class 2.2, but as it is also an oxidiser, so it needs two labels.

Oxygen is dangerous because it can start, support and enhance combustion (fires). Materials which will not burn in normal air can ignite and burn in an oxygen-enriched atmosphere. These include steel, tarmac and even “flame retardant” overalls.

Furthermore, less energy (heat) is needed to start a fire when extra oxygen is present, so, as with flammables, all sources of ignition must be avoided.

This means:
• No smoking
• No naked flames
• Minimise heat sources
• Avoid static build-up
• Store oxidants away from any combustible material.

Class 2.3 Toxic Gas [White label]
e.g.: Chlorine and Ammonia

These gases are extremely dangerous and are not normally handled by Agents. These substances can kill by inhalation, swallowing or, in some cases, just by contact with the skin.

It must be clearly understood that gases that have a white “TOXIC” label are extremely hazardous on their own, but many of these gases have multiple hazards, such as being additionally corrosive, flammable or oxidising (e.g. Chlorine).

The hazard posed by these gases cannot be over emphasised.

They can be deadly.

FYI: If a customer requests the transport of a gas, with a white [TOXIC] hazard label, (full or empty), please contact Air Products before undertaking any such task.
3 ADR exemptions

When do the Regulations apply to a journey? To answer this question, it is easiest to look first at when ADR does not apply:

**ADR DOES NOT APPLY at all when;**

The transport is by a customer who collects gas for use for **private use** e.g. at home, a caravanning holiday or leisure use. This is known as the private carriage exemption.

**Ancillary carriage exemption**

ADR does not apply at all when the transport is a secondary activity, e.g. a roofer collecting Propane that he is going to use at the end of his journey, i.e. in connection with his own work. Note: the ancillary carriage exemption is limited to the relevant transport category limits (“1000 points” on the next page). Clearly if someone from a roofing company is re-stocking a depot then the purpose of this journey is to transport the gas, not to use it directly.

**FYI:** More guidance on the UK interpretation of this is available on H.S.E. web site.

**Small load exemption (up to “1000 points” or “ADR-lite”)**

This may apply when the other exemptions above are not applicable.

The driver is at work and part of his role is to deliver dangerous goods, but the amount of dangerous good carried by his vehicle is below a specified load limit, commonly called **“1000 points”** (see next page).

**FYI:** The size, type or maximum gross weight of the vehicle is not relevant!

When the load does not exceed **“1000 points”**, both the vehicle and driver remain ‘out of scope’ of the full requirements of ADR. You can think of this as “ADR-lite”. However the journey is still covered by ADR and these key requirements of ADR do still apply:

- The driver must have received documented training to cover ‘awareness’ of the nature and hazards of the dangerous goods carried.
- An ADR compliant 2kg dry powder fire extinguisher MUST be carried. See page 15.
- The load must be correctly stowed and secured for normal traffic conditions.
- A suitable vehicle must be used.
- Any applicable load segregation requirements must be met.

**Limited Quantities/Excepted Quantities**

You may also hear people mention exemptions under CDG/ADR for Limited Quantities or Excepted Quantities. Generally these exemptions allow the transport of some substances in very small receptacles.

**FYI:** For the purposes of this booklet Air Products does not fill any cylinders that are small enough to be considered as Limited or Excepted Quantities.
4  ADR Transport Categories and load threshold limits ("1000 points rule")

This booklet deals only with the carriage UN Class 2 carried in gas cylinders, so the following table is a very simplified version of a far more complex table that covers all 9 UN Classes of dangerous goods.

<table>
<thead>
<tr>
<th>ADR Transport Category</th>
<th>Type of dangerous goods (Class 2 only)</th>
<th>Vehicle Load Limit kg / litres</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Toxic gases (2.3 with white primary hazard label)</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>Flammable gases (2.1 with red primary hazard label)</td>
<td>333</td>
</tr>
<tr>
<td>3</td>
<td>Asphyxiating and oxidising gases (2.2 with green primary hazard label)</td>
<td>1,000</td>
</tr>
<tr>
<td>4</td>
<td>Empty, uncleaned cylinders</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Note a:</td>
<td>UN 1005 anhydrous ammonia or UN 1017 chlorine ONLY (2.3 with white primary hazard label)</td>
<td>50</td>
</tr>
</tbody>
</table>

The first column identifies the Transport Category. The next column describes the type of Class 2 gases in each Transport Category.

The right hand column shows the threshold (in kilograms / litres) of the various gases that may be carried as “ADR-lite”.
- for compressed gases, the nominal capacity of the cylinder (“water volume”) in litres is used.
- for liquefied gases (such as CO2 or LPG) or dissolved gas (Acetylene) the actual nett mass of product, in kilograms, must be used.

**Single Transport Category loads:**

When carrying gas from just one transport Category, say Hydrogen cylinders, or just Oxygen and CO2 for example, it is simply a question of whether the vehicle load limit thresholds, shown above, are exceeded. Here are some simple examples:
- 100 x 10 litre cylinders of Nitrogen = 1000 litres total load = “ADR-lite” (1000litres or less of Asphyxiant gas, primary label 2.2)
- 102 x 10 litre cylinders of Nitrogen = 1020 litres total load = full scope ADR (more than 1000litres of Asphyxiant gas, primary label 2.2)
- 50 x 10 litre cylinders of Hydrogen = 500 litres total load = full scope ADR (more than 333litres of flammable gas, primary label 2.1)
- 10 x 30 litre cylinders of Hydrogen = 300 litres total load = “ADR-lite” (less than 333litres of flammable gas, primary label 2.1)
Mixed Transport Category loads (or “1000 point rule”)

When carrying gases of different Transport Categories on the same vehicle, we need to add the different types of gases together. We use a “points” system to do this. Each transport category has a multiplication factor, defined in ADR:

- Transport Category 3 (Class 2.2) has no factor; you simply add each cylinder content together
- Transport Category 2 (Class 2.1) has a factor of 3
- Transport Category 1 (Class 2.3) has a factor of 50

Put simply, the total litres/kgs of gases from each Category is multiplied by its factor, they are all then added together to determine whether the 1000 points has been exceeded for that combined Vehicle Load. (This is what we call the “1000 point rule”)

FYI: The easiest way to understand this is to consider that:

- air / nitrogen/oxygen is “normal”
- for the emergency services, flammable gases are 3x worse
- for the emergency services, toxic gases are 50x worse

If you want your deliveries to remain exempt from the full requirements of ADR, you need to ensure that the total product on the vehicle remains at or below 1000 points.

Journeys below 1000 points are “in accordance with 1.1.3.6 of ADR”.

<table>
<thead>
<tr>
<th>ADR Transport Category</th>
<th>Type of dangerous goods (Class 2 only)</th>
<th>Vehicle Load Limit kg/litres</th>
<th>Multiplier for mixed loads</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Toxic gases (2.3 with white primary hazard label)</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>2</td>
<td>Flammable gases (2.1 with red primary hazard label)</td>
<td>333</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Asphyxiating and oxidising gases (2.2 with green primary hazard label)</td>
<td>1,000</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Empty, uncleaned cylinders</td>
<td>Unlimited</td>
<td>-</td>
</tr>
</tbody>
</table>

Note a: UN 1005 anhydrous ammonia or UN 1017 chlorine ONLY (2.3 with white primary hazard label)

Remember:

- for compressed gases, the nominal capacity of the cylinder (“water volume”) in litres is used.
- for liquefied gases (such as CO2 or LPG) or dissolved gas (Acetylene) the actual nett mass of product, in kilograms, must be used.

Some examples are shown on the next page...
<table>
<thead>
<tr>
<th>Product</th>
<th>Cylinder size</th>
<th>Cylinder capacity</th>
<th>ADR points value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class 2.2 Non-flammable, Non-toxic compressed gases</strong> such as; Argon, Astec® gas, Coogar® gas, Hytec™2 gas, Innomaxx® gas, Alumaxx® gas, Nitrogen, Oxygen, Protec™5 gas, Weldap® gas</td>
<td>X10S</td>
<td>10 litres</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>X20S</td>
<td>20 litres</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>X30S</td>
<td>30 litres</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>X47S</td>
<td>47 litres</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>X50S</td>
<td>50 litres</td>
<td>50</td>
</tr>
<tr>
<td><strong>Hydrogen, Hytec™5 gas, Hytec™35 gas and Protec™10 gas</strong> (Class 2.1 flammable, compressed gases)</td>
<td>X10S</td>
<td>10 litres</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>X30S</td>
<td>30 litres</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>X47S</td>
<td>47 litres</td>
<td>141</td>
</tr>
<tr>
<td></td>
<td>X50S</td>
<td>50 litres</td>
<td>150</td>
</tr>
<tr>
<td><strong>Dissolved Acetylene</strong> (Class 2.1 flammable, dissolved gas)</td>
<td>X10S</td>
<td>1.8 kg</td>
<td>5.4</td>
</tr>
<tr>
<td></td>
<td>X30S</td>
<td>6.0 kg</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>X50S</td>
<td>8.7 kg</td>
<td>26.1</td>
</tr>
<tr>
<td></td>
<td>X51S</td>
<td>9.4 kg</td>
<td>28.2</td>
</tr>
<tr>
<td></td>
<td>X58S</td>
<td>9.4 kg</td>
<td>28.2</td>
</tr>
<tr>
<td><strong>Propane, LPG</strong> (Class 2.1 flammable, liquefied gas)</td>
<td>X30S</td>
<td>13 kg</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>X43S</td>
<td>19 kg</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>X108S</td>
<td>47 kg</td>
<td>141</td>
</tr>
<tr>
<td><strong>Carbon dioxide</strong> (Class 2.2 liquefied gas)</td>
<td>X10S</td>
<td>7.2 kg</td>
<td>7.2</td>
</tr>
<tr>
<td></td>
<td>X30S</td>
<td>22.5 kg</td>
<td>22.5</td>
</tr>
<tr>
<td></td>
<td>X47S</td>
<td>34 kg</td>
<td>34</td>
</tr>
<tr>
<td><strong>Chlorine</strong> (Class 2.3 Toxic gas)</td>
<td>X47S</td>
<td>59 kg</td>
<td>1180</td>
</tr>
<tr>
<td><strong>Ammonia, Anhydrous</strong> (Class 2.3 Toxic gas)</td>
<td>X9</td>
<td>4.8 kg</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td>X47</td>
<td>25 kg</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>X108</td>
<td>58.2 kg</td>
<td>1164</td>
</tr>
<tr>
<td><strong>Sulphur dioxide</strong> (Class 2.3 Toxic gas)</td>
<td>X54S</td>
<td>65 kg</td>
<td>3250</td>
</tr>
</tbody>
</table>

**Notes:**

- The weight of Acetylene inside Dissolved Acetylene cylinders is very small. This is because the weight of the porous mass and acetone, used to safely dissolve the Acetylene, are included in the cylinder weight.

- 1 x 47 litre Chlorine cylinder = 59kg x 20 (Note a) = 1180 (just for one cylinder!) = full scope ADR

**FYI:** If you use APDirect® portal then the weights and all necessary transport information are printed on each delivery note.
Here are some mixed loads for you to calculate (answers are on page 33):

A: 16 x 50 litre Oxygen cylinders (1 pack), 5 x 47 litre Heligas cylinders,
B: 3 x 50 litre Hytec5, 4 x 30 litre Hytec35, 2 x 47 litre Protec5, 4 x 30 litre Carbon dioxide
C: 4 x 50 litre Oxygen, 4 x 50 litre Ferromaxx, 4 x 50 litre Hydrogen
D: 4 x 43 litre Propane, 8 x 50 litre Argon, 10 x 10 litre Acetylene

FYI: For the 1000 points rule you ignore the gross weight of the cylinder...but clearly you also need to make sure you do not overload the axle weight/GVW permitted for your vehicle!
5 Orange Plate journeys

Whenever the “points value” of your load is more than 1000 points the full requirements of ADR apply. In particular:

- the driver must have completed formal vocational training – known as the “ADR licence” valid for the classes of goods being carried
- the driver must and carry his ADR licence with him
- all crew members must carry photo-identification (ADR 1.10.4.4)
- the vehicle must display reflectorized “Orange Plates” at the front and rear of the vehicle (ADR 5.3.2.1.1)
- depending upon the gross vehicle weight, additional fire extinguishers must be carried
- tunnel restrictions may apply – depending upon the tunnel and the load
- The “Instructions in Writing” must be carried and readily available in the cab. The crew must inform themselves of the actions to be taken (ADR 5.4.3)
- If carrying goods with danger label 2.3, then an emergency escape mask with a combined gas/dust filter of the A1B1E1K1-P1 or A2B2E2K2-P2 type which is similar to that described in the EN 141 standard is required for each crew member
- ADR Transport document (“delivery note”) must be carried containing all the information prescribed in ADR 5.4.1. **See Note below
- Apart from members of the vehicle crew, no passengers may be carried. (ADR 8.3.1)
- Members of the vehicle crew must know how to use the fire fighting appliances (extinguishers) ADR 8.3.2.
- Engine must be switched off during loading or unloading (ADR 8.3.6)
- Whenever the vehicle is parked, the parking brake or a wheel chock must be used. (ADR 8.3.7)
- Electrical connection cables between motor vehicle and trailer equipped with anti-lock brakes must be connected at all times during carriage. (ADR 8.3.8)

The requirements listed above are NOT required by ADR/CDG for journeys with 1000 points or less (in accordance with ADR 1.1.3.6).

This is not a complete list of ADR duties; it is only intended to highlight the main difference in duties for journeys above 1000 points.

**Note:** ADR actually requires Transport Document (ADR 5.4.1) for international journeys, even below 1000 points. The UK government has approved a derogation stating that this transport document does not need to be carried for domestic (inside United Kingdom) road journeys where the quantity of dangerous goods being carried does not exceed ADR 1.1.3.6. [RO-a-UK-2]

In the next sections the ADR requirements are discussed in a little more detail. Most of the requirements are generally applicable, but:

To highlight additional duties, for the full requirements of ADR for “Orange Plate” journeys are highlighted using this Orange background.
6 The vehicle

ADR regulations do not specify the type of vehicle that may be used for the transport of gas cylinders. There is a basic requirement in ADR and in other road legislation that the vehicle is suitable for its intended purpose and adequately maintained. It must therefore be; roadworthy, well maintained, able to accommodate the gross weight of the load and have appropriate means for securing the load.

Clearly the vehicle needs to be taxed, insured and covered by a valid MOT certificate. Other legislation may mandate; an “Operator’s Licence” (see Appendix 1), use of tachograph and speed limiters.

Open vehicles

Air Products always recommends the use of an open vehicle for the carriage of gas cylinders, particularly when the main purpose of the vehicle is the transport of industrial gases.

Closed vehicle precautions

Enclosed vehicles, including private cars or vans can legally be used to transport gases as long as the load compartment is “adequately ventilated”. It is the employer’s duty to ensure the ventilation is suitable and sufficient, or to use an open vehicle. There is no legal definition of “adequate ventilation”; it depends upon the vehicle internal volume and the load being carried.

Air Products recommends that delivery vehicles should have a gas-tight bulkhead separating the driver’s cab from the load space.

BCGA guidance (CP31) states that “ventilation of closed vehicle spaces where cylinders are carried should have; a minimum of 2% of floor area as ventilation area which is fixed and non adjustable at low level and also a fixed vent, preferably a roof spinner or similar vent at high level.”

ADR 7.5.1.1 CV36 says that if packages are transported in closed vehicles, then the cargo doors should display a warning sign with lettering not less than 25mm high:

Placarding

Strictly “placards” are the large diamond signs seen on bulk vehicles, corresponding to the hazards label of good(s) being carried. These are NOT required for vehicles carrying dangerous goods in packages (i.e. gas cylinders).
Orange Plates

When a vehicle is carrying gas in amounts in excess of the “1000 point” limits explained in section 4 of this booklet, then the vehicle must display reflectorized “Orange Plates” at the front and rear of the vehicle (ADR 5.3.2.1.1).

The Orange Plate must be rectangular with 40cm base and 30cm height, with a black border 15mm wide. The orange colour is specified exactly in ADR. The Orange Plate must be weather resistant and designed not to become detached if engulfed in fire for 15 minutes.

The Orange plates must be clearly visible and remain fixed irrespective of the orientation of the vehicle. If the Orange Plate is fixed to folding or sliding panels, it must be designed and secured so that it does not come loose in the event of impact. This means that the orange plate must not become dislodged, covered up (or uncovered) if the vehicle rolls over in the event of an accident.

Orange plates should be removed or covered when the dangerous goods or residues thereof (ADR 5.3.2.1.6) (i.e. including empty uncleaned cylinders) are not being carried.

The purpose of Orange Plates is to alert the Emergency Services about the presence of Dangerous Goods on a vehicle involved in an accident. Clearly both the emergency services and inspecting authorities will take action if an empty truck or van is found to be displaying orange plates.

Fire extinguishers

All vehicles carrying dangerous goods should carry at least one portable fire extinguisher to fight class A, B, or C type fires. This extinguisher must have a minimum capacity of 2kg dry powder or equivalent.

The fire extinguishers required by ADR are not intended for fighting fires involving the dangerous goods. They are intended and must be suitable for fighting a fire in the engine or the cab of the vehicle.

If the load exceeds 1000 points, then additional fire extinguishing capacity must be carried, depending upon the gross vehicle weight as shown in the table below. This can either be additional to the standard 2kg dry powder mentioned above, or a single larger extinguisher so long as it meets the criteria shown here:

<table>
<thead>
<tr>
<th>Vehicle GW (tonnes)</th>
<th>Total kg dry powder or equivalent</th>
<th>Minimum size of one extinguisher kg dry powder or equivalent (if more than 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>over 7.5 tonnes</td>
<td>12 kg</td>
<td>6 kg</td>
</tr>
<tr>
<td>between 3.5 – 7.5 tonnes</td>
<td>8 kg</td>
<td>6 kg</td>
</tr>
<tr>
<td>under 3.5 tonnes</td>
<td>4 kg</td>
<td>2 kg</td>
</tr>
</tbody>
</table>
All extinguishers must comply with EN3 Portable fire extinguishers (EN3-7:2004 +A1:2007) and be fitted with a seal verifying that they have not been used.

All extinguishers shall be marked by a competent authority to indicate compliance (e.g. BSi kite-mark or CE-marked) and must be inscribed with either the next inspection date (month, year) or the “use by” date. Clearly the extinguishers must be within date! Fire extinguishers must be installed on the vehicle so that they are protected from weather and accessible by the vehicle crew.

Since fire extinguishers must be carried by every vehicle transporting dangerous goods, they are a favourite subject with road-side inspectors in all countries. If your extinguishers do not meet all the requirements of ADR, the driver will, in the UK, be required to pay one or more fixed penalties on the spot.

FYI: Although fire extinguishers do not have to have content/pressure gauges for ADR, if there is a gauge, the indication must be in the “green” zone – in order to guarantee functional safety.

Miscellaneous equipment for protection

A vehicle which is subject to the full requirements of ADR (carrying over 1000 points) must also have a set of equipment intended for general and personal protection. Some of the equipment to be carried is dependent on the label numbers of the goods being carried and this is indicated with small superscript notes on the last page of the Instructions in Writing. These details have changed with recent editions of ADR. At the time of writing, a vehicle transporting only Class 2 gases must carry:

- a wheel chock – size to suit vehicle weight and wheel diameter
- two self standing warning signs (such as; red triangles, cones or amber flashing beacons)

For each crew member:

- a (high-visibility EN471) warning vest
- a portable lighting apparatus (torch, without a metal surface liable to product sparks)
- a pair of protective gloves
- eye protection (e.g. protective goggles or safety glasses)

If, and only if, toxic gases (with white label 2.3) are being transported:

- an emergency escape mask (e.g. combined gas/dust filter cartridge of type A1B1E1K1-P1 or A2B2E2K2-P2 or similar in EN141) for each crew member

The following items are not required if only Class 2 gases are on board, but are required if other dangerous goods are being transported and the total load exceeds 1000 points:

Not required for labels 1, 1.4, 1.5, 1.6, 2.1, 2.2, 2.3, but needed if goods of other classes are carried as well:

- eye rinsing liquid (sealed and in date)

Only required for solids or liquids with danger labels 3, 4.1, 4.3, 8 or 9:

- a shovel
- a drain seal (usually a rubber mat to lay over surface water drains for preventing contamination from a spill or leak)
- a collecting container (e.g. bucket!)
7 The vehicle driver, crew and passengers

Any driver must hold a vehicle driving licence relevant for the type/size of vehicle being driven. Any driver of a vehicle carrying dangerous goods must as a minimum, have “awareness” training of the hazards of the goods and of his duties under ADR. The training can be provided in-house and informally delivered but should be documented in his training records.

A driver who does not hold a valid ADR Driver Training Certificate is only permitted to drive loads up to 1000 points.

ADR Driver Certificate

When a vehicle is carrying loads 1000 points or more (full ADR scope) the driver must have completed formal vocational training – known as the “ADR licence” valid for the classes of goods being carried. He must have in his possession, on every journey, the original of his current ADR Driver Training Certificate covering the classes of goods being carried (i.e. Class 2 for gases).

If driver has lost the original of his ADR Driver Training Certificate he is forbidden from driving 1000 point loads until an official replacement is in his possession. Driving an “orange plate” journey without the proper ADR certificate onboard is an extremely serious offence. Enforcing authorities will impound a vehicle until either the original Certificate or another driver with a valid certificate is brought to the vehicle.

It is strongly recommended that companies employing drivers keep a photocopy of the ADR Driver Training Certificate, in a drivers’ personnel file for reference (but this will not be accepted by inspecting authorities as a substitute!)

The ADR Certificate is valid for five years. It can be ‘refreshed’ anytime in the fifth year of its validity, but not with less than five weeks validity remaining. Any unexpired portion of an ADR Certificate will be added to the validity of the new Certificate upon successful completion of a refresher course and exams.

Crew members

In ADR crew members are trained personnel who are authorised to accompany the driver/vehicle. Crew members travelling on “orange plate journeys” must specifically know; how to use the on-board fire extinguishers, how to use any escape equipment and must understand the basic hazards of the goods being carried.

Passengers

The carriage of passengers is expressly forbidden on “orange plate” journeys subject to the full scope of ADR. Only trained vehicle crew members can travel on these journeys.

If the load does not exceed 1000 points, ADR does not forbid passengers, but in practice most responsible companies will not authorise other persons to accompany the driver unless they are trained vehicle crew, travelling with the employer’s permission.
8 Documentation

Air Products ensures that our products are packaged and labelled correctly. However, before loading a vehicle, the consignor must provide the vehicle operator (driver) with all the correct information about the goods to be carried.

The documents required by ADR for “Orange Plate” journeys over 1000 points are:

- ADR Driver Training Certificate (see page 17):
- Instructions in Writing (see page 20)
- ADR “Transport document” (delivery note) containing all the information prescribed in ADR 5.4.1 (see page 19, opposite)

**Note:** ADR actually requires Transport Document (ADR 5.4.1) for international journeys, even below 1000 points. The UK government has approved a derogation stating that this transport document does not need to be carried for domestic (inside United Kingdom) road journeys where the quantity of dangerous goods being carried does not exceed ADR 1.1.3.6. [RO-a-UK-2]

**FYI:** For UK domestic road-only journeys, the vehicle must carry paperwork which accurately reflects the load carried, in order to demonstrate that the load is 1000 points or less. This informal delivery note would not have to comply with the exact information requirements in ADR 5.4.1.

Journeys with loads that do not need Orange Plates (1000 points or less) which cross international borders or include a sea-going journey (e.g. ferry crossing), must carry proper ADR “Transport Document” (see page 19, opposite).

**AP Portal**

Delivery notes generated through the Agents’ Portal use Air Products SAP information and will comply with ADR. It is strongly recommended that you use the Agents Portal for all your delivery documentation. The guidance provided in this booklet is only a brief summary to assist you on the occasion where you may need to write a delivery note manually. If you have any questions contact the relevant person indicated on page 34, for your organisation.
When subject to the full requirements of ADR, a Transport Document (Delivery note) is required for each delivery on board the vehicle. Each delivery note must include the following information as prescribed by ADR 5.4.1:

- for each dangerous substance being carried:
  - the UN number, preceded by the letters “UN”
  - the Proper Shipping Name
  - the label model numbers
  - unless it is known that the journey will not include a tunnel, the tunnel restriction code as shown in the Dangerous Goods list
  - the number and description of packages (e.g. 3 47litre cylinders)
  - If the substance is labelled as Environmentally Hazardous or Marine pollutant (i.e. the cylinder carries a “dead fish” label), then the transport document must include the words “ENVIRONMENTALLY HAZARDOUS” for a road journey, or “MARINE POLLUTANT” if the journey includes a maritime leg
  - the total quantity of dangerous goods with the same UN number (if total vehicle load exceeds 1000 points then the UN substance total is mass of gas in kg, if the load is in accordance with ADR 1.1.3.6 then the “points” total should be given for each Transport Category, see page 10)
  - the name and address of the consignor (sending company)
  - the name and address of the consignee (receiving company)
  - a declaration that the packages have been inspected and are fit for transport

As the consignor, you have a legal duty to document that the goods being presented for carriage are properly labelled and in a suitable condition for carriage (i.e. valves closed, not leaking). Effectively the person signing your delivery note is making this declaration and should check all the cylinders themselves before transport.

Some examples of the correct and complete descriptions of some gases are shown here (the commas are important!):

- **UN 1072 Oxygen, Compressed, 2.2 (5.1), (E)**
- **UN 1001 Acetylene, dissolved, 2.1, (B/D)**
- **UN 1017 Chlorine, 2.3 (5.1, 8), (C/D), ENVIRONMENTALLY HAZARDOUS**

If transport of gas cylinders is to pass through a tunnel that is subject to dangerous goods restrictions, the tunnel code for the goods must be given after the UN class number(s) as in the examples above. For an explanation of tunnel restrictions and codes, please see page 25.

**FYI:** The easiest way to ensure that you describe dangerous goods correctly is to check the Delivery notes that accompany Air Products deliveries to your site!
9 Instructions in Writing (IIW)

IF the load exceeds 1000 points the **Instructions in Writing** must be available in the vehicle cab and the vehicle crew must understand the relevant instructions for Dangerous Goods being carried. It is the responsibility of the vehicle owner (carrier) to issue the IIW to drivers.

**FYI:** Old-style TREMcards are no longer valid and must not be carried.

ADR prescribes one set of instructions “as an aid during an accident emergency situation”. The document sets out what additional equipment is to be on board a vehicle when carrying certain UN Classes of goods and gives instructions about actions to be taken by the driver/crew in the event of an incident or accident involving the load.

The instructions must be printed exactly as they appear in ADR on A4 paper. Screen shot extracts of the **2011 IIW** are included here for guidance only:
You can download the Instructions in Writing as PDF in most European languages FREE from: [http://www.unece.org/trans/danger/publi/adr/adr_linguistic_e.html](http://www.unece.org/trans/danger/publi/adr/adr_linguistic_e.html) - Instructions in Writing (IiW)

**FYI:** If the journey is 1000 points or less, the Instructions in Writing (IiW) may be carried on board – often they are simply left permanently in vehicles used to carry dangerous goods. If IiW are carried, they should be up-to-date and more importantly inspectors could interpret that the vehicle and crew need to carry the Miscellaneous Equipment for protection (see page 16) listed at the end of IiW.
10 Loading, unloading and load security

ADR places duties on vehicle operators, drivers, and other personnel involved in the operation to ensure the safety and security of dangerous goods. In the UK there is also a general legal “duty of care”, to ensure that there is no risk to the health and/or safety of any person resulting from the way that the goods have been loaded/ unloaded or stowed.

Load security is paramount! The owner of the vehicle must ensure that there are suitable sufficient load securing devices on board his vehicle(s).

Before loading the vehicle, the consignor must provide the vehicle operator with all the correct information about the goods to be carried (see page 18).

Generally speaking the safe loading and unloading of gas cylinders depends upon having appropriate handling equipment (e.g. fork lift truck or automated vehicle tail lift) to assist with moving heavy metal cylinders, pallets and/or packs onto and off a vehicle. However ADR also includes some very specific requirements associated with loading and unloading activities. These apply to any activity irrespective of load size:

- if examination of the documents or inspection of the load/vehicle indicates a non-compliance with ADR, which might affect the safety of the unloading then the goods should not be unloaded. (ADR 7.5.1.3)
- If orientation arrows are shown, then packages shall be oriented accordingly.
- Class 2 dangerous goods may not be loaded on the same transport unit as any goods with label numbers; 1, 1.4, 1.5, 1.6 (i.e. explosives) ADR 7.5.2.
- Where appropriate the vehicle shall be fitted with devices to facilitate the securing and handling of dangerous goods. Packages shall be secured to prevent any movement during carriage. ADR 7.5.7.1.
- Packaged shall not be stacked unless designed for that purpose ADR 7.5.7.2.
- Packages shall be protected from damage during loading/unloading ADR 7.5.7.3
- Neither the driver nor vehicle crew may open a package of dangerous goods ADR 7.5.7.5.
- Smoking shall be prohibited in the vicinity of handling operations ADR 7.5.9.
- Additional provisions applicable to class 2 gases when specified in the Dangerous Goods list;
  - CV9 Packages shall not be thrown or subjected to impact
  - CV10 Cylinders which are sufficiently stable or are carried in suitable devices (pallets) preventing them from overturning, may be placed upright. Cylinders which are laid flat shall be wedged, attached or secured so that they cannot shift. Cylinders if laid, should be laid along or perpendicularly across the vehicle (i.e. not diagonal).
  - CV36 If packages are transported in closed vehicles or, then the cargo doors should display a warning sign with lettering not less than 25mm high:

![WARNING
NO VENTILATION
OPEN WITH CAUTION](image)
Cylinders containing liquid or dissolved gases such as LPG or Acetylene should always be stored and transported in an upright position.

These additional requirements are mandated when the load exceeds 1000 points (but they are also good practice for smaller loads):

- Engine must be **switched off** during loading or unloading (ADR 8.3.6)
- Whenever the vehicle is parked, the **parking brake or a wheel chock must** be used. (ADR 8.3.7)
- Electrical connection cables between motor vehicle and trailer equipped with anti-lock brakes must be **connected** at all times during carriage. (ADR 8.3.8)
11 HCDG and Security (preventing theft/misuse)

Doing good business means that sites involved in storage, transport and sale of dangerous goods already have an incentive to prevent theft. So for safety and financial reasons cylinder storage areas should already be well-lit and secure areas.

ADR 1.10 addresses the security measures or precautions to minimise theft or misuse of dangerous goods that may endanger people, property or the environment. These security precautions are mandated for “orange plate” journeys where the load exceeds 1000 points. In particular:

- all persons involved in the carriage of dangerous goods shall **consider security** aspects of their role
- Vehicle depots and storage areas shall be properly **secured, well lit** and where appropriate, not accessible to the general public.
- all crew members must carry **photo-identification** (ADR 1.10.4.4)
- vehicle and site inspections should consider security aspects
- ADR training for each role (driver, crew member etc.) shall include elements of security awareness. **Security awareness training** shall be recorded

High Consequence Dangerous Goods (HCDG)

“High Consequence Dangerous Goods” are defined in ADR1.10.3.1 as those which terrorists may misuse producing very serious consequences. Most gases handled by Air Products Agents are not HCDG, so this section does not apply for most Agents.

Any gases which are classified as **toxic (label 2.3) are defined as HCDG** for transport. Any Sales Centres (or by exception, some Agents) who are authorised to transport or store Class 2.3, must:

- Apply arrangements, devices or equipment to **prevent the theft** of a vehicle carrying HCDG and its cargo. Ensure these measures are always effective.
- Adopt, implement and comply with a detailed **Security Plan**. Guidance on the content and structure of this plan is given on the **UK DfT web site** (see page 28)

**FYI:** VOSA will also inspect sites known to be involved in the carriage of HCDG. The checklist for VOSA site inspections can be downloaded from the same DfT web site.
12 Tunnel Restrictions

Road tunnels are categorised A, B, C, D or E, based on a hazard assessment of the transport through the tunnel as well as alternate routes. The tunnel category indicates the substances which are not permitted to travel through each tunnel.

Loads up to 1000 points are not subject to tunnel restrictions according to ADR, although privately owned tunnels may impose further restrictions (e.g. Dublin Port Tunnel).

All dangerous goods are now assigned a “tunnel restriction code” in ADR. This letter is always shown in brackets and must be included on the ADR transport document. Some substances are assigned a combination of codes e.g. (B/D), where the first and more restrictive code is for bulk (tank) transport and the second is relevant for transport in packages (cylinders). The most restrictive code on a load defines whether carriage is prohibited through a particular tunnel.

Category A tunnels have no restrictions. (“Anything can go through an A tunnel”). For this reason A tunnels are not identified or signposted.

Note that the tunnel category can be defined differently depending on time of day or day of week. Examples include the Heathrow and Dartford tunnels

Category B tunnels forbid passage of substances with codes B, C, D and E

Category C tunnels forbid passage of substances with codes C, D and E

Category D tunnels forbid passage of substances with codes D and E

Category E tunnels forbid passage of substances with code E.

Class 2 goods in packages (cylinders) always have tunnel restriction code D or E. This means that “Orange plate” journeys can go through tunnel categories A, B, C without restriction.

Simplified Tunnel guide for Class 2 goods in cylinders

<table>
<thead>
<tr>
<th>(Tunnel Code) example gases</th>
<th>Tunnel Category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>≤1000points (i.a.w 1.1.3.6)</td>
<td>✓</td>
</tr>
<tr>
<td>(B/D)</td>
<td>✓</td>
</tr>
<tr>
<td>UN1001 ACETYLENE, DISSOLVED, 2.1, (B/D)</td>
<td>✓</td>
</tr>
<tr>
<td>UN1049 HYDROGEN COMPRESSED, 2.1 (B/D)</td>
<td></td>
</tr>
<tr>
<td>(C/D)</td>
<td>✓</td>
</tr>
<tr>
<td>UN1005 AMMONIA ANHYDROUS, 2.3, (C/E)</td>
<td>✓</td>
</tr>
<tr>
<td>(C/E)</td>
<td>✓</td>
</tr>
<tr>
<td>UN1013 CARBON DIOXIDE, 2.2, (C/E)</td>
<td>✓</td>
</tr>
<tr>
<td>(E)</td>
<td>✓</td>
</tr>
<tr>
<td>UN1002 AIR, COMPRESSED, 2.2, (E)</td>
<td>✓</td>
</tr>
<tr>
<td>UN1066 NITROGEN COMPRESSED, 2.2, (E)</td>
<td></td>
</tr>
</tbody>
</table>
Tunnel signage

Tunnels which have restrictions are clearly sign posted before the mandated turn-off to the alternate route.

Clear instructions require drivers of vehicles carrying, in this case a load with tunnel restriction code E, to follow a marker alternate route (like a diversion).

Transporting a prohibited load through a tunnel is an offence which can result in a fine or even a jail sentence.

Clearly for “Orange Plate” journeys it is important to know the category of your local tunnels and to plan your route in advance, including the time of day.

<table>
<thead>
<tr>
<th>Tunnel Name</th>
<th>Tunnel Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dartford, GB</td>
<td>C. Note that a number of goods falling within the Category C classification will only be permitted to transit the tunnels between 22.30 and 05.30.</td>
</tr>
<tr>
<td>Mersey, GB</td>
<td>D</td>
</tr>
<tr>
<td>Clyde, GB</td>
<td>D</td>
</tr>
<tr>
<td>Ramsgate, GB</td>
<td>A</td>
</tr>
<tr>
<td>Limehouse, GB</td>
<td>E</td>
</tr>
<tr>
<td>Rotherhithe, GB</td>
<td>E</td>
</tr>
<tr>
<td>Blackwall, GB</td>
<td>E</td>
</tr>
<tr>
<td>East India Dock Road, GB</td>
<td>E</td>
</tr>
<tr>
<td>Tyne, GB</td>
<td>D</td>
</tr>
<tr>
<td>Heathrow Airport M4 spur, GB</td>
<td>Between 0400 and 2300, the tunnel will be assigned to Category E; outside those times it will be the more restrictive Category C</td>
</tr>
</tbody>
</table>

All other UK tunnels are assigned to category A, with no restrictions

Dublin Port Tunnel, ROI                | C, with additional local bye-laws in force |

This information is for advice and believed correct at the time of writing. Signage at the tunnel is definitive.
13 Dangerous Goods Safety Advisor (DGSA)

Any company which consigns or carries amounts of dangerous goods in excess of the load threshold limits (“1000 points”), explained on pages 9 and 10 of this booklet, is required to appoint a qualified DGSA.

The only practical exception to this for transport of gases is when the company (Agent) only sells dangerous goods to customers who collect their own goods.

To pass the exams needed to obtain a DGSA certificate is extremely difficult indeed, and there are no ‘grandfather rights’ or equivalent qualifications that can be used instead of passing the DGSA exams.

Smaller companies may choose to appoint an external DGSA as a consultant, who is contactable to answer ADR related questions and provide compliance advice on a ‘retainer.’ It is advisable to use a DGSA who is familiar with the requirements for Class 2 goods.

The duties and responsibilities of DGSAs are set out in great detail in ADR.

This is an indication of the variety of enforcing authorities who have duties under ADR in the United Kingdom:
14 Useful information sources

www.hse.gov.uk/cdg/index.htm
HSE Carriage of Dangerous Goods web site

www.bcga.co.uk
British Compressed Gas association web site

www.unece.org/trans/danger/danger.html
United Nations Economic Commission for Europe (UNECE)

www.dft.gov.uk/topics/freight
UK Department for Transport (freight) web site

www.dft.gov.uk/topics/freight/dangerous-goods/security
DfT Security of dangerous goods in transport

www.airproducts.com/msds
Air Products public access MSDS

Carriage of Dangerous Goods Prosecutions – public listing
APPENDIX 1: Operator’s Licence

Goods vehicle licensing is not part of ADR, but is a separate set of regulations.

No-one in UK is allowed to use a “goods vehicle” on the road, either for “hire or reward” or for the carriage of goods in connection with any trade or business, unless they have an “Operator’s Licence”. “Small goods vehicles” are exempt from the O licence requirement, if it is a single (not combination) vehicle;

- with a plated weight of not exceeding 3.5 tonnes OR
- which does not have a relevant plated weight, and having an unladen weight not exceeding 1525 kilograms

Similar, but slightly more complex weight limits are defined for exempt small articulated or vehicle/trailer combinations.

This is commonly called an “O licence” and is obtained from VOSA online.

See also: VOSA Goods Vehicle Operator Licensing Guide-GV74.pdf

This legislation also applies to vehicles used for “Own Use” in Northern Ireland from 1st July 2012.
## APPENDIX 2: ADR classifications

### ADR 3.2.1 Dangerous Goods list Table A (extract)

<table>
<thead>
<tr>
<th>UN Number</th>
<th>Name and Description: (3.1.2)</th>
<th>Class: (2.2)</th>
<th>Classification Code: (2.2)</th>
<th>Packaging Group: (2.1.3)</th>
<th>Labels: (5.2.2)</th>
<th>Special Provisions: (3.3)</th>
<th>Limited quantities: (3.4.6)</th>
<th>Excepted Quantities: (3.5.1.2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN1001</td>
<td>ACETYLENE, DISSOLVED</td>
<td>2</td>
<td>4F</td>
<td>2.1</td>
<td></td>
<td></td>
<td>0</td>
<td>E0</td>
</tr>
<tr>
<td>UN1002</td>
<td>AIR, COMPRESSED</td>
<td>2</td>
<td>1A</td>
<td>2.2</td>
<td>655</td>
<td>120ml</td>
<td>E1</td>
<td></td>
</tr>
<tr>
<td>UN1005</td>
<td>AMMONIA, ANHYDROUS</td>
<td>2</td>
<td>2TC</td>
<td>2.3 + 8</td>
<td>23</td>
<td>0</td>
<td>E0</td>
<td></td>
</tr>
<tr>
<td>UN1006</td>
<td>ARGON, COMPRESSED</td>
<td>2</td>
<td>1A</td>
<td>2.2</td>
<td></td>
<td></td>
<td>120ml</td>
<td>E1</td>
</tr>
<tr>
<td>UN1013</td>
<td>CARBON DIOXIDE</td>
<td>2</td>
<td>2A</td>
<td>2.2</td>
<td>584</td>
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</tr>
<tr>
<td>UN1017</td>
<td>CHLORINE</td>
<td>2</td>
<td>2TOC</td>
<td>2.3 + 5.1 + 8</td>
<td></td>
<td></td>
<td>0</td>
<td>E0</td>
</tr>
<tr>
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<td>1A</td>
<td>2.2</td>
<td></td>
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<td>120ml</td>
<td>E1</td>
</tr>
<tr>
<td>UN1049</td>
<td>HYDROGEN, COMPRESSED</td>
<td>2</td>
<td>1F</td>
<td>2.1</td>
<td></td>
<td></td>
<td>0</td>
<td>E0</td>
</tr>
<tr>
<td>UN1066</td>
<td>NITROGEN, COMPRESSED</td>
<td>2</td>
<td>1A</td>
<td>2.2</td>
<td>653</td>
<td>120ml</td>
<td>E1</td>
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<tr>
<td>UN1072</td>
<td>OXYGEN, COMPRESSED</td>
<td>2</td>
<td>1O</td>
<td>2.2 + 5.1</td>
<td>355</td>
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<td>0</td>
<td>E0</td>
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<tr>
<td>UN1079</td>
<td>SULPHUR DIOXIDE</td>
<td>2</td>
<td>2TC</td>
<td>2.3 + 8</td>
<td></td>
<td></td>
<td>0</td>
<td>E0</td>
</tr>
<tr>
<td>UN1954</td>
<td>COMPRESSED GAS, FLAMMABLE, N.O.S.</td>
<td>2</td>
<td>1F</td>
<td>2.1</td>
<td>274</td>
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<td>0</td>
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<td>UN1956</td>
<td>COMPRESSED GAS, N.O.S.</td>
<td>2</td>
<td>1A</td>
<td>2.2</td>
<td>274</td>
<td>120ml</td>
<td>E1</td>
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<tr>
<td>UN1978</td>
<td>PROPANE</td>
<td>2</td>
<td>2F</td>
<td>2.1</td>
<td>652</td>
<td></td>
<td>0</td>
<td>E0</td>
</tr>
</tbody>
</table>

CAUTION: this is an uncontrolled copy of part of ADR 2011 3.2.1 Table A!
<table>
<thead>
<tr>
<th>UN Number</th>
<th>Name and Description</th>
<th>Special Provisions for carriage</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN1001 ACETYLENE, DISSOLVED</td>
<td>2 4F 2.1 0 E0</td>
<td>P200 MP 9 2 (B / D) CV9, CV10, CV36 S20 239</td>
</tr>
<tr>
<td>UN1002 AIR, COMPRESSED</td>
<td>2 1A 2.2 655 120ml E1</td>
<td>P200 MP 9 3 (E) CV9, CV10 20 UN1002</td>
</tr>
<tr>
<td>UN1005 AMMONIA, ANHYDROUS</td>
<td>2 2TC 2.3 + 8 23 0 E0</td>
<td>P200 MP 9 1 (C / D) CV9, CV10, CV36 S14 268 UN1005</td>
</tr>
<tr>
<td>UN1006 ARGON, COMPRESSED</td>
<td>2 1A 2.2 120ml E1</td>
<td>P200 MP 9 3 (E) CV9, CV10, CV36 20 UN1006</td>
</tr>
<tr>
<td>UN1013 CARBON DIOXIDE</td>
<td>2 2A 2.2 584 653 120ml E1</td>
<td>P200 MP 9 3 (C / E) CV9, CV10, CV36 20 UN1013</td>
</tr>
<tr>
<td>UN1017 CHLORINE</td>
<td>2 2TC 2.3 + 5.1 + 8 0 E0</td>
<td>P200 MP 9 1 (C / D) CV9, CV10, CV36 S14 265 UN1017</td>
</tr>
<tr>
<td>UN1046 HELIUM, COMPRESSED</td>
<td>2 1A 2.2 120ml E1</td>
<td>P200 MP 9 3 (E) CV9, CV10, CV36 20 UN1046</td>
</tr>
<tr>
<td>UN1049 HYDROGEN, COMPRESSED</td>
<td>2 1F 2.1 0 E0</td>
<td>P200 MP 9 2 (B / D) CV9, CV10, CV36 S20 S20 23 UN1049</td>
</tr>
<tr>
<td>UN1066 NITROGEN, COMPRESSED</td>
<td>2 1A 2.2 653 120ml E1</td>
<td>P200 MP 9 3 (E) CV9, CV10, CV36 20 UN1066</td>
</tr>
<tr>
<td>UN1072 OXYGEN, COMPRESSED</td>
<td>2 1O 2.2 + 5.1 355 0 E0</td>
<td>P200 MP 9 3 (E) CV9, CV10, CV36 25 UN1072</td>
</tr>
<tr>
<td>UN1079 SULPHUR DIOXIDE</td>
<td>2 2TC 2.3 + 8 0 E0</td>
<td>P200 MP 9 1 (C / D) CV9, CV10, CV36 S14 268 UN1079</td>
</tr>
<tr>
<td>UN1954 COMPRESSED GAS, FLAMMABLE, N.O.S.</td>
<td>2 1F 2.1 274 0 E0</td>
<td>P200 MP 9 2 (B / D) CV9, CV10, CV36 S20 S20 23 UN1049</td>
</tr>
<tr>
<td>UN1956 COMPRESSED GAS, N.O.S.</td>
<td>2 1A 2.2 274 120ml E1</td>
<td>P200 MP 9 3 (E) CV9, CV10, CV36 20 UN1956</td>
</tr>
<tr>
<td>UN1978 PROPANE</td>
<td>2 2F 2.1 652 0 E0</td>
<td>P200 MP 9 2 (B / D) CV9, CV10, CV36 S20 S20 23 UN1978</td>
</tr>
</tbody>
</table>

CAUTION: this is an uncontrolled copy of part of ADR 2011 3.2.1 Table A!
### APPENDIX 3:

<table>
<thead>
<tr>
<th>Product</th>
<th>Cylinder size</th>
<th>Cylinder capacity</th>
<th>ADR points value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class 2.2 Non-flammable, Non-toxic compressed gases</strong> such as: Argon, Astec® gas, Coogar® gas, Hytec™2 gas, Innomaxx® gas, Alumaxx® gas, Nitrogen, Oxygen, Protec™5 gas, Weldap® gas</td>
<td>X10S</td>
<td>10 litres</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>X20S</td>
<td>20 litres</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>X30S</td>
<td>30 litres</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>X47S</td>
<td>47 litres</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>X50S</td>
<td>50 litres</td>
<td>50</td>
</tr>
<tr>
<td><strong>Hydrogen, Hytec™5 gas, Hytec™35 gas and Protec™10 gas</strong> <em>(Class 2.1 flammable, compressed gases)</em></td>
<td>X10S</td>
<td>10 litres</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>X30S</td>
<td>30 litres</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>X47S</td>
<td>47 litres</td>
<td>141</td>
</tr>
<tr>
<td></td>
<td>X50S</td>
<td>50 litres</td>
<td>150</td>
</tr>
<tr>
<td><strong>Dissolved Acetylene</strong> <em>(Class 2.1 flammable, dissolved gas)</em></td>
<td>X10S</td>
<td>1.8 kg</td>
<td>5.4</td>
</tr>
<tr>
<td></td>
<td>X30S</td>
<td>6.0 kg</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>X50S</td>
<td>8.7 kg</td>
<td>26.1</td>
</tr>
<tr>
<td></td>
<td>X51S</td>
<td>9.4 kg</td>
<td>28.2</td>
</tr>
<tr>
<td></td>
<td>X58S</td>
<td>9.4 kg</td>
<td>28.2</td>
</tr>
<tr>
<td><strong>Propane, LPG</strong> <em>(Class 2.1 flammable, liquefied gas)</em></td>
<td>X30S</td>
<td>13 kg</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>X43S</td>
<td>19 kg</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>X108S</td>
<td>47 kg</td>
<td>141</td>
</tr>
<tr>
<td><strong>Carbon dioxide</strong> <em>(Class 2.2 liquefied gas)</em></td>
<td>X10S</td>
<td>7.2 kg</td>
<td>7.2</td>
</tr>
<tr>
<td></td>
<td>X30S</td>
<td>22.5 kg</td>
<td>22.5</td>
</tr>
<tr>
<td></td>
<td>X47S</td>
<td>34 kg</td>
<td>34</td>
</tr>
<tr>
<td><strong>Chlorine</strong> <em>(Class 2.3 Toxic gas)</em></td>
<td>X47S</td>
<td>59 kg</td>
<td>1180</td>
</tr>
<tr>
<td><strong>Ammonia, Anhydrous</strong> <em>(Class 2.3 Toxic gas)</em></td>
<td>X9</td>
<td>4.8 kg</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td>X47</td>
<td>25 kg</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>X108</td>
<td>58.2 kg</td>
<td>1164</td>
</tr>
<tr>
<td><strong>Sulphur dioxide</strong> <em>(Class 2.3 Toxic gas)</em></td>
<td>X54S</td>
<td>65 kg</td>
<td>3250</td>
</tr>
</tbody>
</table>

**Notes:**
- For compressed gases, the nominal capacity of the cylinder (“water volume”) in litres is used.
- For liquefied gases (such as CO2 or LPG) or dissolved gas (Acetylene) the actual nett mass of product, in kilograms, must be used.
- The weight of Acetylene inside Dissolved Acetylene cylinders is very small. This is because the weight of the porous mass and acetone, used to safely dissolve the Acetylene, are included in the cylinder weight.
- 1 x 47 litre Chlorine cylinder = 59kg x 20 (Note a) = 1180 (just for one cylinder!) = full scope ADR

**FYI:** If you use APDirect® portal then the weights and all necessary transport information are printed on each delivery note.
Answers

Mixed load answers from page 12:

A: 16 x 50 litre Oxygen cylinders (1 pack), 5 x 47 litre Heligas cylinders

\[
\begin{align*}
16 \times 50 \text{ litre Oxygen} &= 16 \times 50 \times 1 = 800 \text{ points} \\
5 \times 47 \text{ litre Heligas} &= 5 \times 47 \times 1 = 235 \text{ points} \\
\text{TOTAL} &= \underline{1035 \text{ points}} = \text{full scope ADR}
\end{align*}
\]

B: 3 x 50 litre Hytec5, 4 x 30 litre Hytec35, 2 x 47 litre Protec5, 4 x 30 litre Carbon dioxide

\[
\begin{align*}
3 \times 50 \text{ litre Hytec5} &= 3 \times 50 \times 3 = 450 \text{ points} \\
4 \times 30 \text{ litre Hytec35} &= 4 \times 30 \times 3 = 360 \text{ points} \\
2 \times 47 \text{ litre Protec5} &= 2 \times 47 \times 1 = 94 \text{ points} \\
4 \times 30 \text{ litre Carbon dioxide} &= 4 \times 22.5 \times 1 = 90 \text{ points} \\
\text{TOTAL} &= \underline{994 \text{ points}} = \text{“ADR-lite”}
\end{align*}
\]

C: 4 x 50 litre Oxygen, 4 x 50 litre Ferromaxx, 4 x 50 litre Hydrogen

\[
\begin{align*}
4 \times 50 \text{ litre Oxygen} &= 4 \times 50 \times 1 = 200 \text{ points} \\
4 \times 50 \text{ litre Ferromaxx} &= 4 \times 50 \times 1 = 200 \text{ points} \\
4 \times 50 \text{ litre Hydrogen} &= 4 \times 50 \times 3 = 600 \text{ points} \\
\text{TOTAL} &= \underline{1000 \text{ points}} = \text{“ADR-lite”}
\end{align*}
\]

D: 4 x 43 litre Propane, 8 x 50 litre Argon, 10 x 10 litre Acetylene

\[
\begin{align*}
4 \times 43 \text{ litre Propane} &= 4 \times 43 \times 3 = 516 \text{ points} \\
8 \times 50 \text{ litre Argon} &= 8 \times 50 \times 1 = 400 \text{ points} \\
10 \times 10 \text{ litre Acetylene} &= 10 \times 1.8 \times 3 = 54 \text{ points} \\
\text{TOTAL} &= \underline{970 \text{ points}} = \text{“ADR-lite”}
\end{align*}
\]
Notes to Air Products’ Sales Centre employees

Further questions about the storage, transport or handling of cylinder gases should be addressed to your supervisor or line manager.

Additional health and safety advice is available from Field EHS. For ADR-specific questions, please contact Air Products’ DGSA for UK (or Ireland) as appropriate.

Notes to Air Products’ Agents

For further safety information regarding the storage, transport and handling of cylinder gases please contact your local Air Products’ Field Agent Support (FAS) team member.

Air Products’ DGSA is not responsible to fulfil the ADR role of “safety advisor” for Agents. Your FAS team member can provide contact details for an external DGSA service provider, who is familiar with transport of cylinder gases, provides ADR training and offers a reduced price for Air Products’ Agents.
Be safe, be legal!

- Only properly trained and competent people should handle compressed gases.
- Observe all regulations and requirements regarding the storage, handling and transport of cylinders.
- Carry out vehicle safety checks before every journey.
- Always check your load is secure before departure.
- Ensure that the Instructions in Writing (iW) are carried in vehicle.
- Display orange plates if you exceed the “1000 point” maximum transport quantity per vehicle.
- Understand the Emergency Action plan established by your employer in case of an incident.
- In the event of an incident on the road involving gas cylinders, contact your employer in the first instance. Air Products can also provide 24-hour emergency advice by telephone: 0500 020202

The information contained in this booklet:
- is intended for guidance only
- focuses on key aspects of transporting gases in cylinders only
- does not replace the employers’ duty to ensure that people involved in the transport of Dangerous Goods are properly trained and informed,
- is correct at time of going to press. Air Products bears no responsibility for changes in relevant legislation since time of going to press

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