ADR Regulations
(Carriage of dangerous goods by road)

The new ADR Regulation 2007 is a European agreement, which supersedes the ADR 2003, ADR 2005 and the 1996 Carriage of Dangerous Goods.

Its main purpose is to standardise transport regulations across Europe. ADR applies to everyone carrying gases in the course of his or her work in a vehicle except when:

- Loads are under the exemption limits (small load exemptions)
- When private individuals carry dangerous goods, which are packaged for retail sale and intended for personal use. *E.g. A person collecting a cylinder of propane for a home barbecue.*

1. How do the ADR regulations work?

- Every cylinder is assigned a number of transport units dependent on its capacity or the or the maximum weight of product.
- There is a threshold below which certain basic legal safety regulations apply, above this threshold, the full ADR legislation applies.
- All gases have been classified by ADR into four categories, relating directly to the hazard diamonds for each product.

The calculation and threshold limit depends on whether the customer is transporting:

- A load containing one transport category
- A **mixed load** containing gases with multiple products of different categories

Product	Type of Gas / Liquid	ADR Threshold (units)
Toxic Gases - litre/kg		50
Ammonia & chlorine - litre/kg	ammonia & chlorine	20
Flammable gasses - litre/kg	acetylene, hydrogen, propane, propylene	333
Asphyxiants & oxidants - litre/kg	argon, carbon dioxide, nitrogen, CFC's, HCFC's HFC's (not HC's)	1000
Mixed loads (see mixed loads below)	any of the above	1000
Empty cylinders	Any of the above	Unlimited

2. How do you calculate Transport Units?

To determine the quantity of product in a cylinder the following rules apply:-

For compressed gases (e.g. oxygen, nitrogen) use the cylinder water capacity of cylinder in litres
For liquefied gases (e.g. refrigerant) use the nett mass of gas in kg
For dissolved gases (e.g. acetylene) use the nett mass of gas in kg

The regulations require different sizes to be added together, some in litres of water capacity and some in kilograms. These values are referred to as transport units.

2.1 For mixed loads: -

Each category of gas carried has an associated calculation. You must do this calculation for each individual category of gas, and then add the transport units together.

There are five steps:

1. Calculate toxic gas transport units, T Transport Units

Transport Units per cylinder x number of cylinders x 50

For ammonia and chlorine the calculation is:
Transport Units per cylinder x number of cylinders x 20

2. Calculate flammable gas transport units, F Transport Units

Transport Units per cylinder x number of cylinders x 3

3. Calculate asphyxiant/oxidant gas transport units, A Transport Units

Transport Units per cylinder x number of cylinders

4. Add the three values together to acquire Transport Units for the total mixed load

T toxic Units + F flammable Units + A asphyxiant / oxydant Units = Total Transport units.

5. Determine whether your load is above or below the threshold (1000 units)

If the total Transport Units for the load is below 1000, the small load requirements apply; above 1000 the regulations must be observed in full

1 x K Acetylene cylinders (water capacity = 1 l)
1 x E Oxygen cylinders (water capacity = 5 l)
1 x X Nitrogen (oxy free) cylinders (water capacity = 10 l)
1 x 12 kg 134a cylinder
1 x 9 kg 404A cylinder
1 x 10 kg 407C cylinder
1 x 12 kg 410A cylinder
1 x 12 kg R22 cylinder

Mixed load transport units for above product load = 73Transport Units

ADR Calculator	No of Cylinders Carried	Cylinder Size	TU per Cylinder	Multiplier for Mixed Load	TU for Mixed Product Load
Flammable Gas					
Acetylene	1	K	1	3	3
Compressed Gas					
Oxygen	1	E	5	1	5
Nitrogen	1	X	10	1	10
Refrigerant					
R134a	1	12	12	1	12
R404A	1	9	9	1	9
R407C	1	10	10	1	10
R410A	1	12	12	1	12
R22	1	12	12	1	12
					TU for Mixed Product Load
TOTAL TU					**73**

The threshold for a mixed load is 1000 transport units so the above load is below the ADR regulations threshold and 'small load exemptions' apply – see section below.

2.2 For loads containing one transport category (see product table on page 1)

Transport units per cylinder x number of cylinders = Total load Transport Units

Example for a Mixed Load: -

3. What should I do if I am above the threshold?

Note - this will apply to very few RAC engineers. If you are carrying products above the ADR transport unit threshold professional advice should be taken from you gas supplier. Do not proceed with the journey as you will be breaking the law unless you comply with the ADR regulations!

4. Basic legal safety requirements for a load below the ADR threshold (small load exemptions)

Note – this will apply to most RAC engineers.

4.1 Driver training

- Drivers should be trained in:
  - The hazards and dangers of the goods
  - Safe handling of gas cylinders
  - Emergency procedures and the use of fire fighting equipment

4.2 Vehicle ventilation

- Vehicles used for the transportation of gas cylinders should be open. Most refrigeration engineer's vehicles are not so the vehicle should be well ventilated. Toxic gases (e.g. Ammonia) must **not** be carried in a closed vehicle unless specifically designed for the purpose

4.3 Safety Equipment

- A 2 kg fire extinguisher is required on all vehicles carrying gas cylinders. (Dry Powder recommended)

4.4 Basic safety

- Cylinder valves must be closed whilst in transit and all equipment such as cylinder adaptors disconnected
- Cylinders should be secured properly and should not project beyond the sides or end of the vehicle
- Cylinder labels must never be removed or defaced

4.5 Marking of vehicles

This is not strictly required when under the ADR threshold but extremely useful to the emergency services in an accident, especially if you are knocked unconscious!

4.6 Information about the load

- It is strongly advisable to carry the material safety data sheet or a TREM card (transport emergency card available from the gas supplier) for any gas that is in your vehicle
- This should be visible to the emergency services in case you are unable to tell them about your load, and to hand.

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