National Operational Guidance

Section

The UN system

NFCC National Fire Chiefs Council

Developed and maintained by the NFCC

Contents

The UN system

The UN model regulations (Recommendations on the Transport of Dangerous Goods, commonly known as the orange book) establishes a basic system for the safe transport of dangerous goods. The system is designed to reduce the risk of serious incidents involving dangerous goods and the impact of such incidents when they do occur.

- Dangerous goods are substances that meet the criteria for one or more classes.
- The regulations stipulate that dangerous goods are:
- Classified (identified) according to their hazard(s)
- Packaged to the required standards
- Marked
- Labelled
- Documented
- The regulations also state that relevant personnel should be properly trained.

Classification

- Classification is a fundamental part of the UN system incorporating:
- UN class
- UN packing group
- UN number
- Proper shipping name

Dangerous goods are firstly assigned to one of nine hazard classes, known as UN classes, according to their primary hazard. Secondly, an assessment is made of the relative hazard of a substance within the same class and the substance is assigned to one of three packing groups. Each substance is then allocated a substance identification number which is designed to allow identification of the substance in transit. These code numbers are commonly known as UN numbers. The UN recommends that UN numbers appear on all transport documents and are displayed on packages, containers, vehicles, along with a description of the substance called the proper shipping name.

Diagram 3 below shows how the nine UN hazard classes are numbered and sub-divided into divisions. The Regulations also contain rules on identifying the hazards and danger of the substances. Each class (and sometimes division) is therefore assigned a hazard symbol.

Class 1 Explosives

(Divisions - 1.1, 1.2, 1.3, 1.4, 1.5, 1.6 (1.6 not used in the UK)

Class 2 Gases

Division 2.1 Flammable gases

Division 2.2 Non-Flammable, compressed gases

Division 2.3 Toxic gas

Class 3 Flammable liquids

Class 4 Flammable solids

Division 4.1 Flammable solids, self-reactive substances and solid desensitised explosives

Division 4.2 Substances liable to spontaneous combustion

Division 4.3 Substances that in contact with water emit flammable gases.

Class 5 Oxidising substances

Division 5.1 Oxidising substances other than organic peroxides

used until 2009

Division 5.2 Organic peroxides

Class 6 Toxic and infectious substances

Division 6.1 Toxic substances

Division 6.2 Infectious substances

Class 7 Radioactive material

Category I, Category II, Category III and fissile material (capable of nuclear explosion)

Class 8 Corrosive substances

Class 9 Miscellaneous dangerous substances and articles

Diagram 3 United Nations class, division and hazard symbol

United Nations packing groups

The UN system identifies substances in a particular class or division according to the degree of danger. This is known as the packing group:

- Packing group I: high danger
- Packing group II: medium danger
- Packing group III: minor danger

Goods are assigned to one of these groups based on the criteria. Packing groups do not apply to explosives (class 1), gases (class 2), organic peroxides (class 5.2), infectious substances (class 6.2), radioactive material (class 7) or self-reacting substances found in class 4.1. Instead there are special packaging and transport provisions for these materials.

The international agreements for the carriage of dangerous goods require packaging to be of a design type certified by a national competent authority. This involves testing the packaging to ensure its suitability for the carriage of certain dangerous goods. Such packaging is often referred to as a type-approved or UN-certified and is marked in particular ways, prefixed by the UN logo and followed by a set of codes that detail the standard of packaging.

UN number

Once a product has been assigned to an appropriate hazard class and packing group, it is assigned a UN number. The United Nations (UN) number is a means of identifying a chemical substance or an article containing a chemical. A list of UN numbers can be found in the current version of the Dangerous Goods Emergency Action Code List.

Several other organisations publish lists of additional numbers for use in their countries, or by a particular mode of transport:

The North American 8000 series, published by the International Air Transport Association (IATA) includes entries for some additional substances and articles that are to be transported by air.

The North American 9000 series also contains many additional numbers for substances and articles not otherwise classified for transport.

UN numbers also divide into four types. Precedence is given to the most specific entry that is applicable to the substance, mixture, preparation or article in the following order:

- Single entries for well-defined substances or articles (for example, UN 1090 ACETONE)
- Generic entries for well-defined groups of substances or articles (for example, UN 1133 ADHESIVES containing flammable liquids or UN 1263, PAINT)
- Specific entries not otherwise specified (N.O.S.) covering a group pf substances or articles of a particular chemical or technical nature (for example, UN 1987 ALCOHOLS, N.O.S. or UN 1224, KETONES, LIQUID, N.O.S)
- Generic entries not otherwise specified (N.O.S.) covering a group of substances or articles meeting the criteria of one or more classes or divisions (for example, UN 1993 FLAMMABLE LIQUIDS, N.O.S. or UN 1992, FLAMMABLE LIQUID, TOXIC, N.O.S)

Proper shipping name

The name immediately following the UN number is the proper shipping name (PSN) and is the one that should be quoted on packages, tanks and in documentation. Even when the substance is

known by more than one name, it is the PSN that should always be used. Examples include UN 1035 Ethane and UN 1993 Flammable liquid, N.O.S.

Segregation

There are rules on segregation as a means of keeping incompatible goods apart from one another using a barrier or intervening space. Chemicals must be segregated when either stored or transported to reduce the likelihood of them mixing if an accident occurs. This is an essential element of the safe system of work designed to prevent fires, explosions and the release of harmful gases, etc. The rules for sea transport (i.e. International Maritime Dangerous Goods IMDG code) are more strict than for road or rail.

The regulations contain segregation tables that can be referenced to see if two materials can be transported together, or if conditions apply if they are transported in the same shipment. These tables can be a useful guide for establishing some common incompatibilities, or where additional hazards will result from chemicals mixing (for example, a flammable material and an oxidising agent which could result in a fire if mixed).

Documentation

Slightly different rules apply when describing the load on the documentation that must accompany consignments of dangerous goods for each mode of transport. However, they are all based on the same principles. These documents are a valuable means of identifying the load and hence obtaining hazard information that can be used to develop the incident response plan.

The documentation should contain the following information for each dangerous substance, material or article being carried:

- United Nations number preceded by the letters ‘UN’
- Proper shipping name (PSN) supplemented with the technical name in brackets, when applicable
- Packing group for the substance preceded by the letters ‘PG’ (e.g. PG II), or the initials corresponding to the words ‘packing group’ for other languages
- Total quantity of dangerous goods for different UN number, proper shipping name or packing group (shown as by volume or mass (weight) as appropriate)
- Number and description of the packages, when applicable
- Total quantity of dangerous goods contained in dangerous goods in machinery or equipment
- Name and address of the consignor (i.e. where it was sent from)
- Name and address of the consignee(s) (i.e. where it is going to); if this is not possible (e.g. a consignment with multiple delivery addresses) then the words ‘delivery sale’ may be shown instead.

There are special provisions for explosives (Class 1) and radioactive material (Class 7).

The most common form of transport document likely to be encountered is the dangerous goods note (DGN) accompanying the movement of dangerous goods by road. Since July 2009 and the

removal of product-specific instructions in writing for the driver (commonly known and referred to as Tremcards®), which emergency responders used as a means of identifying the load, the DGN is the main means of identifying the contents of a vehicle carrying packaged dangerous goods.