PACKAGING/TRANSPORT AND STORAGE OF DANGEROUS GOODS
Guide Lines

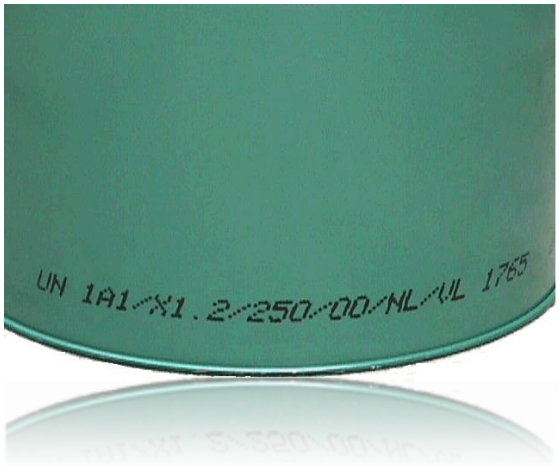
UN recommendations on the transport of dangerous goods;

This information is to be regarded as general and informative, official documentation on this subject will always be leading. [Recommendations on the Transport of Dangerous Goods and National/International regulations governing the various modes of transport]

The UN Recommendations have been developed by the United Nations Committee of Experts on the Transport of Dangerous Goods in the light of technical progress, and above all, the requirement to ensure the safety of people, property and environment. They are addressed to governments and international organizations concerned with the regulation of the transport of dangerous goods. The UN Recommendations cover principles of classification and definition of classes, listing of the dangerous goods, general packing requirements, testing procedures, marking, labeling, and transport documents.

UN Marking on Drums;

UN markings on drums indicate that this packaging design type has been successfully tested and as such complies with UN provisions related to its manufacture, not to its use. Therefore, the UN mark does not confirm that the packaging may be used for any substance. The type of packaging (e.g. a steel drum), its maximum capacity/mass, and any specific requirement are for each substance and transport mode specified in the regulations.
The marking is there to identify the type and to indicate those performance test recommendations that have been met. It will assist packaging users, carriers and regulatory authorities in making the right choice.



Once a package is UN certified no change to its design specification is allowed

PACKAGING GROUPS:

Packaging Group	Marking on Drum	Degree of Hazard
I	X	Major Danger
II	Y	Danger
III	Z	Minor Danger

EXAMPLES OF CODES:

1A1	Drum, Steel, Non – removable head [TH]
1A2	Drum, Steel, removable head [OH]
6HA1	Drum, Composite, plastic inner, steel outer, shape of drum

Examples of markings found on drums:

Example 1. UN 1A1/X1.2/250/06/NL/TS 1111

UN	**United Nations Symbol** (Symbol indicates drum has UN approval)
1A1	**Tight Head Steel Drum for Liquids** (Packaging Drum (1), Steel (A), Tight Head (1), Open Head (2)
X	**Certified for Groups I, II and III** (Packaging group; I = X, II = Y, III = Z)
1.2	**Relative Density** (Relative density of test content for liquids or maximum gross mass in kg for solids)
250	**Hydraulic Test Pressure [kPa]** (For which the drum tested for liquid can withstand)
06	**Year of manufacture**
NL	**Netherlands** (TNO) Authorization
TS 1111	**UN Certification Number** (Unique to each drum type and manufacturer)

Example 2. UN 1A2/Z250/S/06/NL/TS 2222

UN	**United Nations Symbol** (Symbol indicates drum has UN approval)
1A2	**Removable Head Steel Drum** (Packaging Drum (1), Steel (A), Tight Head (1), Open Head (2)
Z	**Certified for Group III** (Packaging group; I = X, II = Y, III = Z)
250	**Maximum gross mass [kg]** (Relative density for liquids or maximum gross mass in kg for solids)
S	**Solid or inner packaging** (The letter "S" indicating solids only)
06	**Year of manufacture**
GB	**Great Britain** (PIRA) Authorization
TS 2222	**UN Certification Number** (Unique to each drum type and manufacturer)

UN marking ref: UN "Orange Book" Part 6.1

The Washer/Gasket type is not part of the UN approval. Always use the correct type of Washer/Gasket recommended for the product to be filled.

It is FORBIDDEN by Law to use drums without UN approval for dangerous goods!!

UN Testing of Drums:

Performance based UN recommendations are now implemented worldwide.

UN markings on drums indicate that this packaging design type has been successfully tested and as such complies with UN provisions related to its manufacture. As such the drums will need to pass the following tests.

Hydrostatic testing

Drop testing

Leak testing

Stack testing

Drop Test:

- For solids and liquids, if performed with the product or other substance having the same physical characteristics **[A].**
- When tested with water **[B],** relative density not exceeding 1.2.
- For substances having a relative density **(ρ)** exceeding 1.2 the drop-height must be calculated **[C].**

	Packaging Group I	Packaging Group II	Packaging Group III
A	1.8 m	1.2 m	0,8 m
B	1.8 m	1.2 m	0.8 m
C	ρ **x** 1.5 m	ρ **x** 1.0 m	ρ **x** 0.67 m

Note: A closure can only be tested as an integral part of the packaging. As such a Closure (component) on its own cannot be UN approved.

Storage conditions for hazardous goods;

Hazardous goods must be stored in tightly closed containers/drums and in a special storage area. For safe storage such a storage area must at least be in compliance with the following;

- The store Area must be well ventilated and illuminated.
- All electric equipment in this Area (including telephone) must be explosion proof.
- The air volume of the Area must be changed at least 5 times per hour (Measured on the floor).
- Only powered industrial trucks that are approved under the national safety regulations can be used in this Area. No access for general traffic.
- Smoking and open flames are prohibited in this Area.
- There can be no direct connection from the Area to sewer system or drainpipes.
- The Area must have Liquid tight floors and/ or second containment.
- A second containment must have a volume of 10% of the stored volume or at least the volume of the largest packaging unit (National regulations).
- Second containment must be made from inflammable materials, sufficiently strong and liquid tight.
- The Area must be separated from adjacent areas with a fire resistant separation wall. If no fire resistant wall is used, the distance to other buildings should be at least 10 meter.
- The Area must be equipped with fire detectors, have an adequate earth connection and lightning protection.
- The Area must have sufficient and adequate firefighting equipment and be provided with a reservoir to collect water used during fire extinction. This reservoir should have adequate provisions for the easy discharge of the collected water.

Always check National Regulations for additional requirements!!

General Storage conditions;

- The way in which the drums are handled, transported, filled, and stored can significantly affect the lifetime of the drums.
- Storage conditions that will influence the lifetime of a steel drum are: inside or outside storage, temperature, humidity, etc.
- In principle, vertical storage of drums is preferred and vertical storage is an option. In some tropical countries, law prohibits vertical stacking: water collecting on the drum may become a breeding place for mosquito's and thus help spread malaria.