



## راهنمای تجهیزات بسته بندی و حمل مواد شیمیایی



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## Introduction

This guide contains pictures and information on the various package types supplied and used by Indaver to transport dangerous goods for our customers.

Information on the suitability of different package types for different waste streams is given. Pictures are provided to help identify the different package types.

This guide is meant for information purposes only. In all cases the choice of a package type for a waste stream should be done by a qualified member of Indaver's Technical Team.

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## Interpretation of UN Marking System

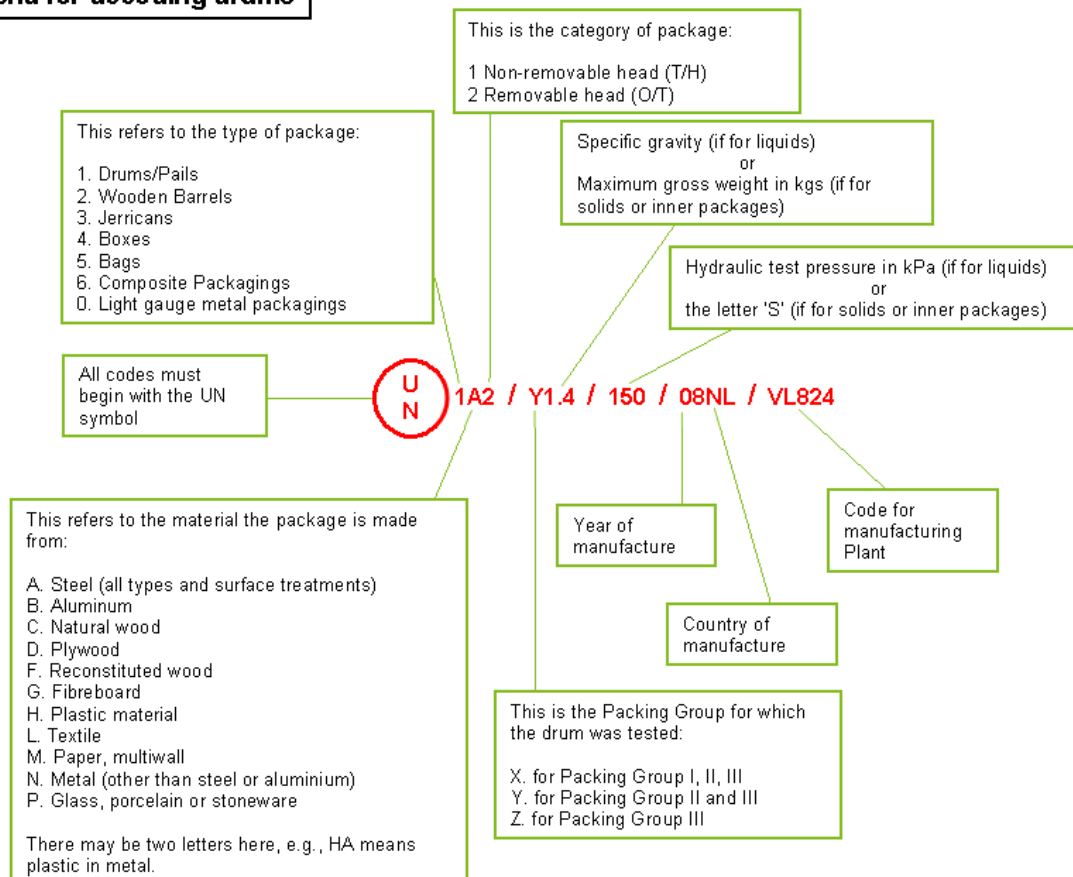
All dangerous goods that are regulated under the various transport regulations must be contained in UN approved packages for transport.

All packages must undergo rigorous testing before they are considered UN approved. The approval marking is then printed or embossed on the package like in the picture on the left.

Drums and IBC's are marked in similar, but slightly different, formats. The two examples below show how the markings can be decoded.

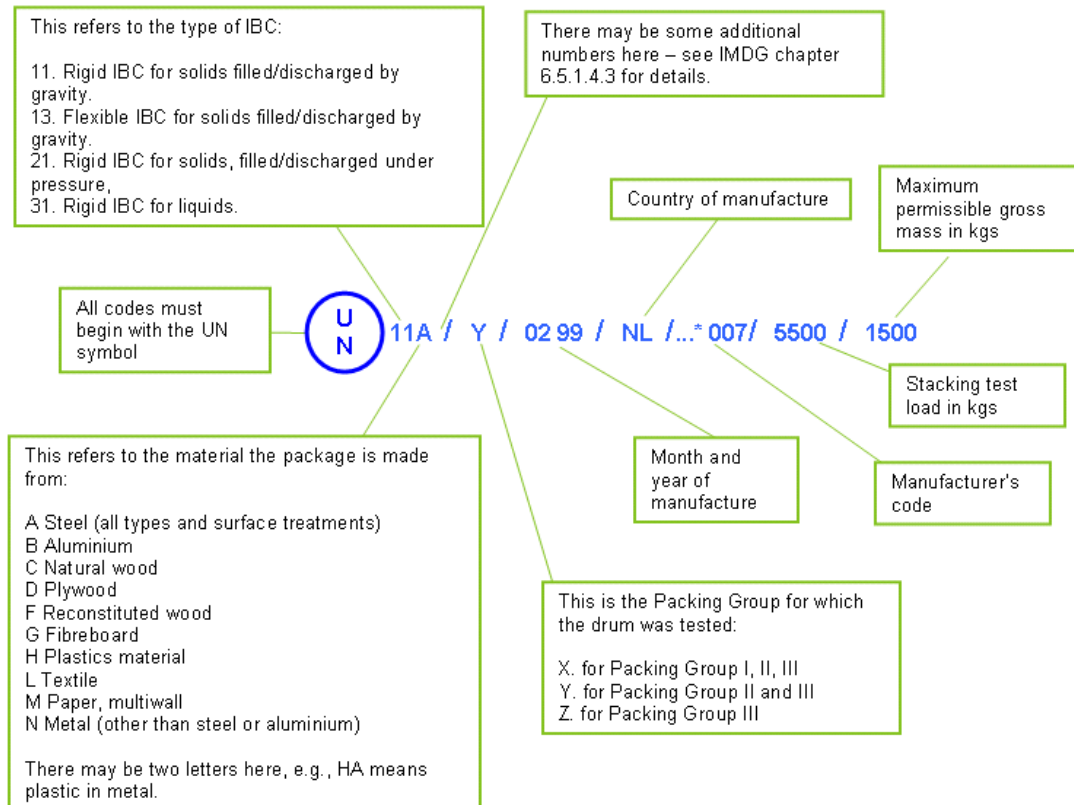
The first example (in red) shows the approval marking for an open top steel drum, approved to carry packing group (PG) II or III liquids of specific gravity 1.4 or lower. It was manufactured in the Netherlands in 2008. Using the legend it is possible to decode the markings on all drums. More examples are given throughout the guide.

### Legend for decoding drums



The second example (in blue) shows the approval marking for a metal (steel) IBC approved to carry packing group (PG) II or III solids discharged by gravity, manufactured in February 1999 in the Netherlands. The stacking test load is 5500kgs and the maximum permissible gross mass is 1500kgs.

### Legend for decoding IBCs



For each package that Indaver supply, Indaver has a test certificate, test report and manufacturer's instructions for use on file.

The test report documents the rigorous testing which the package must endure to achieve UN approval status, and is effectively proof that the package has reached the standards which it must achieve to be used in the transport of dangerous goods.



## Tight Head Drums

**Tight Head Plastic Drums** have a screw-on bung and are used to transport liquids. They are available in 60 litre, 120 litre and 210 litre. All are PG II (Y) approved.

- They are suitable for containing most industrial solvents, e.g., ethanol, ethyl acetate, acetone. However some solvents (such as Diethyl Ether and Chloroform) are **not compatible** with plastic and steel drums must be used for these
- Like all plastic packages their UN approval expires after **5 years** so the date of manufacture is important to check. Note that in the case of Nitric acid (>55%) and Hydrofluoric acid (>75%) the approval only lasts **2 years**
- Here are some examples of UN codes found on tight-head plastic drums
  - 1H1/Y1.7/200/\*\*/GB/1695
  - 1H1/Y1.6/200/--/D/BAM 11155-GEM
  - 1H1/Y1.9/200/--/GB/380



**Tight-Head Steel Drums** serve a similar purpose to tight-head plastics. They are available in 25 litre, 60 litre and 200 litre. The 25 and 200 litre sizes are PG I (X) approved.

- Steel drums must be used for some solvents (such as Diethyl Ether and Chloroform) as these solvents are **not compatible** with plastic
- They should never be used to contain **acidic material**, as acids react with steel and this would weaken the drum. So Sulphuric acid, Nitric acid, etc. should always be in plastic drums
- Here are some examples of UN codes found tight-head steel drums
  - 1A1/Y1.2/150/--/F/CSP/LRM P038
  - 1A1/X1.2/250/--/NL/VL2718
  - 1A1/X1.6/270/--/GB/1945



**Polylined Steel Drums** are a composite package made up of a steel outer shell and an inner plastic layer (polyethylene).

- The advantage of these drums is that they are as strong as tight head steel drums but are compatible with a broader range of liquids
- Their UN approval does not expire (as in the case of plastic drums)
- Note that their UN code specifies both the plastic and steel parts of the package - 6HA1/X1.3/250/--/GB/1655







## Open Top Drums

**Open Top Plastic Drums** are available in 30 litre, 32 litre (white), 60 litre, 120 litre and 220 litre. All are PG I (X) approved except for the 32 and 220 litre sizes (these are only PG II approved).

- They are used for containing many **solid materials** (powders, crystals, wipes etc.)
- They are also used to pack lab chemicals (**lab smalls**). In this case vermiculite is used to secure the bottles inside the drums. 220 litre drums may not be used for this purpose as AVG will not accept lab smalls in this size package
- They are **not leak proof** so should not be used for liquids. If they have been mistakenly filled with liquids then the drums must be over packed into a steel combi drum. If this is not possible the liquid will have to be transferred (cross-pumped) into a more suitable drum (usually a tight-head drum)
- Like all plastic drum their UN approval expires after **5 years** so the date of manufacture is important to check. Note that in the case of Nitric acid (>55%) and Hydrofluoric acid (>75%) the approval only lasts **2 years**
- Here are some examples of UN codes found on open-top plastic drums
  - 1H2/X237/S/--/GB/4932
  - 1H2/Y335/S/--/GB/4934
  - 1H2/X112/S/--/GB/5069



**Reco Drums** (or reconditioned drums) are open-top plastic drums which are made from reconditioned plastic. They are black and so are easily distinguished from standard open-top drums. There are also a few other differences:

- They are significantly **cheaper** than new open-top drums and so should be used wherever possible
- They are only PG II (Y) approved and are certified to carry less weight than standard open-top plastic drums, so they are **not as versatile**
- Here are some examples of UN codes found on reco drums:
  - 1H2/Y220/S/--/NL/WIVA 2899
  - 1H2/Y134/S/--/NL/WIVA 2898
- Note that the 60L Reco is actually a jerrican, not a drum. So it's UN stamp is slightly different
  - 3H2/Y63/S/--/NL/WIVA 2900





**Open Top Steel Drums** serve a similar purpose to open top plastic drums. However they only come in 60 litre and 220 litre sizes. Also the following differences must be noted:

- When used to contain **acidic solids** the waste must be placed in a plastic liner first. This is because most acidic materials react with steel and this would weaken the drum
- AVG will **not accept lab smalls** packed in steel drums. Burning a steel drum takes a lot more energy than a plastic one so they do not like this
- Here are some examples of UN codes found on open-top steel drums
  - 1A2/X270/S/--/GB/2702
  - 1A2/X65/S/--/NL/GEF 871
  - 1A2/Y319/S/\*\*/GB 2097



### Combination Drums

**Steel Combi Drums** are normally approved to carry both liquids and solids, so they combine many of the advantages of tight-head and open-top drums. They are available in 25 litre, 60 litre, 110 litre and 210 litre.

- Similar to open-top drums the lid lifts off so they can be used to transport solids and inner packages
- Similar to tight-head drums they are leak proof so they can be used to transport liquids. (many come with a bung in the lid for filling)
- They are only PG II (Y) approved so cannot take PG I (X) material.
- Combis are often used to over pack drums that are not suitable to move (out of date, bad condition, leaking, etc.). For example, a leaking 100 litre tight-head plastic drum of Ethanol may be over packed into a 200 litre steel combi
- A combi that is approved for both liquids and solids should carry two UN markings. These are printed together at the bottom of the drum pictured, liquid first, then solid
- As they are made of steel, acidic material should not be packed directly in these drums. However placing a liner inside first can often overcome this problem in the case of solids. For example, wipes contaminated with Hydrochloric acid





**Plastic Combi Drums** are a new drum type that have only become available recently. Like their steel counterparts they are open top drums that are approved to carry both liquids and solids. The one pictured on the right has a bung in the centre for filling with liquid like tight-heads. For now they are only available a 150 litre size but other sizes should become available in the future.

- As acids do not damage plastic these are ideal for certain waste types that could not go in steel combis, e.g. wipes contaminated with Hydrochloric acid
- The UN stamp on the drum pictured is
  - 1H2/Y/100/.../D/BAM 6260
  - 1H2/Y204/S/.../D/BAM 62



### Overdrums

**Overdrums** or **Salvage Drums** are used to contain drums that for various reasons are unsuitable to move. This can include drums that are out of date, leaking or in bad condition (dented, rusted etc).

- Overdrums are very expensive and so should only be used to contain large drums that cannot fit in a 200 litre steel combi
- A damaged drum full of a liquid should never be put in an overdrum if it is likely to rupture during transport. The liquid must first be cross pumped out into a new drum. Then the damaged drum can be placed in the overdrum
- Both Steel (orange) and plastic (yellow) overdrums are available. The steel are cheaper so are normally used, however plastic overdrums are larger and have to be used in certain cases (200 litre tight-head plastic drums and badly domed steel combis will not fit in a steel overdrum)
- Here are some examples of UN codes found on overdrums or salvage drums
  - 1A2T/Y320/S and 1A2/X440/S
  - 1H2T/Y296/S/--/USA/M4339







## Boxes

**4G Combination Boxes** are normally used to carry laboratory size chemicals e.g., a 2.5 litre glass Winchester bottle of Acetone. They are only approved to take the inner package that was supplied by the manufacturer. Therefore they are only used when the material is in the original manufacturer's packaging.

Some common types of 4G combination boxes are:

- Pallet boxes
- 4GV Combination Boxes

**Pallet Boxes** are a very cost effective option for bulkier waste streams. Their large size make them suitable for carrying many lightweight solid waste streams. Of course they may not be used to transport liquids as any escaping liquid would soak through the cardboard.

- Pallet boxes should never be left out in the open as rain would weaken the walls
- An important provision in the ADR and IMDG allows paints and inks in containers of 5 litre or less to move in pallet boxes (assuming they are in good condition and not likely to leak)
- An example of a UN code found on pallet boxes is
  - 4G/Y300/S/\*/D/BAM 5859-SCA-MI



**4GV Combination Boxes** are a much more useful option for moving waste. They don't look any different but the 'V' means that they are approved to carry ANY inner package.

- They are normally used to transport small volumes of waste such as samples going for analysis
- These are 'combination' boxes so there must always be an inner package (like a Winchester bottle). Most come with an inner liner which must always be used. Without this they are no longer UN approved
- There is a specific procedure for closing the boxes with UN tape. Failure to adhere to this invalidates the UN approval
- If needed, 4GV boxes are available up to half a metre in width
- Here are some examples of UN codes found on 4GV combination boxes
  - 4GV/X3/S/..A/PA-02/5856
  - 4GV/X8/S/..A/PA-02/5785
  - 4GV/X41/S/..A/PA-02/5787





## IBC's

**IBCs (Intermediate Bulk Containers)** are a larger scale alternative to drums. They are typically used for customers who produce large quantities of a waste stream. A 1000 litre IBC allows 25% more waste to fit on a pallet than 4 x 200 litre drums.

Some common types of IBC's are:

- Composite IBC's
- Metal IBC's/ASP's
- FIBC's

**Composite IBC's** are the most commonly used type of IBC. The picture on the right shows a plastic inner receptacle in a metal cage outer. They fulfil a similar role to tight-head drums and are used for a broad range of waste streams e.g., solvents and acids.

- The waste producer fills them through the cap at the top and the disposer discharges the contents through the drip cap at the bottom
- Some disposers will wash the IBC after discharge and send it back to the waste producer for reuse
- IBC's need to be tested every two and a half years to maintain their UN approval.
- An example of a UN code found on an IBC is
  - 31HA1/Y/\*\*/D/BAM6987\*\*/4056/1722



**Metal IBC's**, often called **ASP's**, are the IBC equivalent of open top drums. They are a good choice for large quantities of solid materials like powders. Generally the material is packed in liners first so that the ASP only require minimal cleaning after the disposer empties it.

- ASPs must be tested every two and a half years. The date of the test is then marked on the side
- An example of a UN code found on an ASP is
  - 31A/Y/\*\*/D/BAM 0189-PT/4000/\*





**FIBC's (Flexible Intermediate Bulk Containers)** are large plastic/canvas bags which can be tied at the top. They are a very cost effective solution for bulky solid material. Of course they can never be used to transport wet or material.

- The FIBC's supplied by Indaver come with an inner liner. If this is missing the UN approval no longer stands.
- An example of a UN code found on an FIBC is
  - 13H3/Y/\*\*/E.../CPOL  
E/5400/1000



### Other Package Types

**Jerricans** are like a small scale alternative to tight-head plastic drums. They usually have a handle embedded in their top surface.

- An example of a UN code found on a Jerrican is
  - 3H1/Y1.9/200/\*\*/GB2698



**Hermetically Sealed Cans** resemble paint tins and are used to pack laboratory chemicals which must be kept airtight. They are not UN approved and so must be packed in an outer package for shipping (usually a 4GV box).







## Other Useful Products

**Spray Adhesive** is used to help stick labels to packages. The IMDG states that labels should stay affixed to packages for 3 months at sea so this is used to supplement the adhesive already on the label. It is most often required for open top plastic drums where the curved shape of the drum makes the labels more difficult to apply.



**Vermiculite** is a packing material which is ideal for use in the packing of hazardous waste. It is lightweight, absorbent and non abrasive. Most frequently it is used for packing lab smalls where it serves to secure the bottles in the drums and also to absorb any liquids that may leak during transport.

- Note that it is a respiratory irritant so a face-mask must always be worn when using it.





## Preparation of Drums for Shipment

**Pallets** must always be used when transporting packages.



**Shrink-wrap** is also applied to secure them.

