

## Industrial packaging products

1. Industrial packaging is used for the transport of chemicals, solvents, paints and glues, fragrances and flavourings, petroleum products, pharmaceuticals, and foods and beverages. This appendix describes the types of industrial packaging and their principal physical characteristics. The range includes:
  - (a) bulk transport by tanker, either lorry or ship;
  - (b) intermediate bulk containers (IBCs);
  - (c) drums from large to small, made of steel, plastic or fibre; and
  - (d) other types of packaging, such as flexible bags, casks and kegs.
  
2. Bulk transport by tanker may be an alternative to IBCs, drums etc as a means of transport, but only where quantities are substantial. In the strict sense it is not packaging—lorries or ships are not suitable for onsite storage.
  
3. Other packaging, such as flexible bags, does not offer the same physical protection as drums or IBCs; for others, such as casks, kegs and small steel drums, the standard size is smaller than the large drums that are the focus of the inquiry. Each of these, and the many other specialist variants on the basic types of packaging—namely drums and IBCs (see below)—is suitable for the transport or storage of different ranges of products that overlap to only a limited degree with the range of products transported or stored in drums. This appendix focuses on large drums and IBCs, as they provide the packaging for the overwhelming proportion of industrial users.

## **New steel drums**

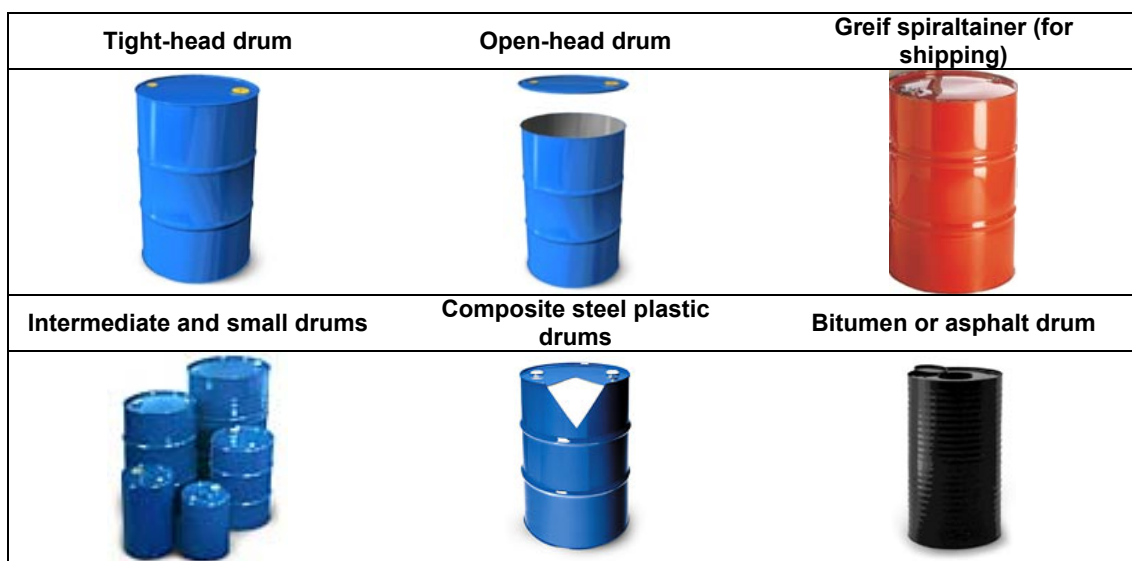
4. Steel drums are manufactured from mild steel in varying sizes and gauges. Size determines capacity; gauge determines strength, and suitability for reconditioning (see below).

### ***Types of large steel drum***

5. Large steel drums with a capacity of about 210 litres account for 86 per cent, by weight, of the total quantity of steel drums manufactured in the UK. (Figures from the Industrial Packaging Association (IPA).)
6. There are four basic types: tight-head and open-head, each either lacquered or plain. Tight-head drums have a sealed top with a screw opening and are generally used to store free-flowing liquids. Open-head drums have removable lids with lugs and are generally used for viscous liquids, semi-solid and dry goods. Plain steel drums are the commoner type. Lacquered drums are used for products that would react with plain steel. There are also specialist drums, made for hot asphalt or bitumen which solidifies after cooling. More generally, there may be variations of design, or lining, to cater for special customer requirements. Figure 1 shows examples.

FIGURE 1

**Examples of steel drums**



Source: [www.greif.com/packaging-systems](http://www.greif.com/packaging-systems).

***Gauge of steel used***

- The gauge of steel that is used for the body of the drum, or the heads varies. Thicker gauges are stronger, and may be preferred where the contents are hazardous and/or the handling or storage involves high risk of damage. The choice of gauge is based on an assessment of price vs performance and risk. Some purchasers have switched to thinner gauges to reduce costs. We were told that imported drums are often of thinner gauge than is the norm in the UK. Gauge affects whether a drum can be used for reconditioning or remanufacturing. Thinner-gauge drums may not be suitable for reuse, or may not be able to be reused as many times as thicker-gauge drums.

***Uses, advantages and disadvantages of large steel drums***

- Large steel drums are used to transport and store a wide range of hazardous and non-hazardous industrial substances, free-flowing and viscous petroleum products, chemicals, solvents, paints, resins and adhesives, and many other products.

9. The IPA website says that steel drums are uniquely strong and therefore are regarded as the safest form of container for hazardous materials. Steel drums can be rolled and are the only form of large package that can be safely handled by one person without the need for mechanical handling equipment or prepared surfaces, although we were told that UK health and safety regulations have tended to encourage a switch to mechanical handling. We were told that steel drums had the following advantages:

- versatility in use and application;
- strength and stackability;
- durability;
- not inflammable;
- can be reconditioned or recycled (see below); and
- are the only acceptable packaging for certain export markets.

However, steel drums do have some disadvantages. They are:

- vulnerable to corrosion and are not suitable for water-based products; and are
- heavy.

### **Reconditioned steel drums**

10. Used steel drums can be:

- reconditioned, either by washing or by furnacing; or
- recycled as scrap.

11. *Washed drums* are used steel drums which have been chemically cleaned internally, sand-blasted externally, and, if necessary, repaired. The production of washed steel drums in the UK has declined in recent years, we were told, for four reasons:

- the decline in the sale of new large steel drums to the UK market;
- many UK-produced steel drums are used for export, which reduces the number available for reconditioning;

- many imported steel drums are too thin a gauge to be suitable for reconditioning; and
- the high price of scrap steel, and the rules influencing recycling, have increased the incentives for scrapping used drums (see paragraphs 15 to 17).

12. *Furnaced drums* are used steel drums that have been cleaned and put through the furnace, so that residues that are toxic, or impossible to remove by washing, are burnt off. Drums that have held some types of content must be treated this way. This process requires that the tops of tight-head drums are removed prior to cleaning and furnacing, so much of the output is open-headed drums, although some have tight heads refitted.

### ***Advantages and disadvantages of reconditioned drums***

13. The advantage of reconditioned drums is that they are cheap. A standard reconditioned steel drum costs significantly less than a new drum, and we were told that they may be reconditioned up to seven or eight times. Furnaced drums are more expensive than washed drums. For producers of certain products, we were told that furnacing is the only economic way of disposing of used drums that are contaminated with hard-to-clean products or toxins. Generally, the range of applications for furnaced drums is limited to the type of substance previously packed in the drum, because the drum may carry some residues from its previous use.
14. Despite the cleaning and furnacing processes, reconditioned drums are inferior to new steel drums. They may:
- be tainted with traces of former contents, or with residue of the cleaning agents, making them unsuitable for food products or fine chemicals such as fragrances;
  - have marks or dents that affect their appearance; and

- have a rough external surface—due to the sand-blasting process—to which paints or printed designs will not adhere, making them unattractive to end-users.

These factors limit the range of products for which customers will use reconditioned drums.

### ***Scrapping for recycling vs reconditioning***

15. Packaging regulations place obligations on ‘producers’, ie businesses that place packaging on the market, and that satisfy certain threshold tests to recover and recycle specified tonnages of packaging waste each year.
16. To demonstrate that the required amount of recovery and recycling has been carried out, a producer (or a compliance scheme on their behalf) must purchase evidence of compliance from an accredited reprocessor or an accredited exporter. They will issue, respectively, Packaging Waste Recovery Notes (PRNs) or Packaging Waste Export Recovery Notes (PERNs). These are the only legal forms of demonstrating compliance.
17. The Department for the Environment, Farming and Rural Affairs told us that as drum reconditioners carried out an operation that promoted reuse, which was not recycling, it could not issue evidence of compliance in the form of PRNs. Drums that were sold as scrap for recycling did qualify for the issue of PRNs. Because of this, pack2pack told us that it believed that the regulatory regime created an incentive for business to send a used drum for scrapping in order to fulfil its recycling targets.

### **Plastic drums**

18. Plastic drums are blow-moulded from polyethelene (PE). They come in the same range of basic types as steel drums, ie tight-head and open-head, lined and unlined. And similarly they come in a range of sizes and specifications, including the about

210-litre capacity equivalent to large steel drums. However, because the physical properties of plastic are different, their dimensions are not quite the same as a steel drum of similar capacity. This can have implications for handling gear, especially when automated. Figure 2 shows a range of types of plastic drum.

FIGURE 2

### Examples of plastic drums



Source: [www.harcostar.co.uk/](http://www.harcostar.co.uk/).

### ***The advantages and disadvantages of plastic drums***

19. We were told that the advantages of plastic drums over steel drums were that they are:
  - suited to water-based products;
  - of lighter weight; and
  - historically cheaper.
  
20. However, plain plastic drums also had disadvantages. They:
  - are not as strong as steel;

- are attacked chemically by some products, such as certain solvents;
  - may taint some substances, such as scents or flavourings;
  - may produce static electricity, which can be dangerous with products that are highly inflammable; and
  - cannot be used for substances that require heating to be filled or emptied (because they lose strength over 65°C).
21. A number of these disadvantages—chemical attack, tainting and static electricity—can be countered by coatings, or multi-layered lamination. These coated or laminated plastic drums are suitable for a wider range of products. However, they are more expensive than plain plastic drums, and are regarded by some customers as unproven technology.
22. Whilst plastic drum technology is clearly continuing to develop, we were told that substances that required to be heated to be filled would continue to be captive to steel drums, because it was of the nature of plastics that their strength diminished at high temperatures.
23. The collection and reconditioning of used plastic drums is not as well developed as it is for steel drums. We were told that for some potential purchasers this was a significant constraint.

### **Fibre drums**

24. Fibre drums are made from fibreboard. All fibre drums have a removable lid made of fibre, plastic or steel. A range of capacities are available. The performance of a fibre drum can be enhanced by adding a lining (polyethylene, polyfoil silicone) or weather-proofing. However, generally they are used for solids, powders, pastes and semi-liquid products rather than liquids, and require storage indoors. They do not offer the

same physical protection as steel or plastic drums. They are not reconditioned.

Figure 3 shows examples of fibre drums.

FIGURE 3

**Examples of fibre drums**

All fibre	Metal chimb top and bottom	Slip-on lid/Metal base chimb
		

Source: [www.theipa.co.uk/ibcs.htm](http://www.theipa.co.uk/ibcs.htm).

**Intermediate bulk containers**

25. IBCs are cube-shaped containers that come in a variety of designs, according to product/user requirements; see Figure 4. The most widely used are made of a rigid external steel cage, on a pallet-sized base, containing an inner ‘bottle’ that is commonly flexible and plastic, but is sometimes steel. (There is a wide range of variants, often designed for specialist sectors of the market, which we do not describe here.) Typically IBCs have a capacity of 1,000 litres—almost as much as five large steel or plastic drums, although they take up no more space than four. There are two main types. Composite IBCs are those that have a steel cage and a plastic bottle. Steel IBCs have a steel bottle.

FIGURE 4

### Examples of IBCs



Source: [www.theipa.co.uk/ibcs.htm](http://www.theipa.co.uk/ibcs.htm).

26. *Stainless steel IBCs*, we were told, are a niche product, used only for a few specialist applications. They account for only 4 per cent of IBC sales in the UK. Their weight and price (approximately £1,700) mean that they are not used in the same way as new large steel drums. Rather, they are seen as a reusable capital investment for specific production facilities. We do not consider stainless steel IBCs in the main analysis.
27. *Composite IBCs* are by far the most common. In the rest of this report, we use the term 'IBCs' to refer to composite IBCs unless the context indicates otherwise.

#### ***The uses, advantages and disadvantages of IBCs***

28. IBCs are widely used by catering, brewing and industrial customers, as they provide large, convenient, easy-to-handle, easily transported and safe storage facilities for products used in bulk quantities. Their size means that they have to be handled mechanically—by fork lift—and are suited only to products that are moved in larger volumes.

29. We were told that IBCs may be less suitable for global exporters, as they are not suitable for less developed markets, both, we were told, because handling facilities may not be sufficiently developed at the destination, and because transport and stacking during transport by sea may be problematic. They tend to be better suited to the large-volume intra-European market.
  
30. For more hazardous products, IBCs may be considered less safe than steel drums. When used to store flammable or combustible liquids, IBCs present a higher fire hazard than steel drums. In the UK, the Health and Safety Executive has conducted research on the behaviour of IBCs in fires. It concluded that higher standards needed to apply to storage facilities when storing flammable or combustible liquids in IBCs.

### ***Reconditioning of IBCs***

31. IBCs can be reconditioned (ie cleaned and repaired) or rebottled (where the plastic bottle is replaced but the original steel frame retained). One of the major manufacturers has an arrangement for collecting and reconditioning, or rebottling its IBCs.