

1.1. Types and technical capabilities of delivering cargo

Buying and selling goods and services very often involves not only the buyer and the seller, but also those transporting the goods. Transport is a critical type of logistics activities whose purpose is to deliver materials and finished products using a certain mode of transportation.

DEFINITION

***Cargo** includes manufacturing products, raw materials, semi-finished goods, food that is in transportable packaging intended for transportation.*

1.1.1. Types of cargo

The transportation technology and conditions, the loading, unloading and storage of cargo is determined by a set of parameters of the cargo:

- physical and chemical properties of cargo;
- dimensions, volume, mass;
- packaging;
- hazard level;
- storage conditions;
- loading and transportation technology;
- properties determining the level of hazard and the technical conditions for transportation.

Cargo is categorised based on its physical or transport characteristics affecting not only the selection of the transport vehicles, but also the machinery and technology to be used to load and unload it, any auxiliary equipment and types of warehouse premises etc. The variety of cargo delivered using different modes of transportation is very extensive. Storage, packaging and transportation regulations are developed taking into account the properties of every cargo.

Based on its physical state, cargo is broken down into:

- 1) piece cargo,
- 2) bulk cargo (for pouring and dumping),
- 3) liquid cargo.

Piece cargo is divided into: unit cargo, packaged cargo, pallet cargo, container cargo.

Unit cargo can be without packaging (bundles, packs, rolls etc.) and with packaging (boxes, barrels, special vessels).

Packaged cargo includes products, parts and substances in specially manufactured packaging. Packaging is a manufactured product used for storing cargo and ensuring that its properties are preserved.

Pallet cargo refers to individual units of goods, goods in piece packaging and standard packaging, placed on standard pallets.

Container cargo is packaged, piece cargo and pallet cargo placed in shipping containers.

Typical piece cargo includes parts and products for machinery; equipment; metals and metal products; timber and construction materials; food and non-food products in transport packaging.

Loose cargo is any cargo that is accepted for transport without any packaging or cargo units, and unlike dumped cargo, it is poured, not dumped. This cargo is loose, and it can move during transport.

Dumped cargo includes a broad variety of cargo transported without packaging and not divided into individual units of cargo (grain, ore, coal, salt, pelleted chemical fertilisers etc.). Most of the cargo consists of uniform or non-uniform particles of limited dimensions.

Liquid cargo (liquid, semi-liquid, viscous goods): oil and oil products, lubricants, acids, alkalis, lacquers and paints, reinforcing agents, solvents, liquefied gases etc. It also includes various foods (ethanol, oils, wine, milk, grease etc.). Liquid cargo is divided into safe and hazardous kinds. Most of the cargo of this type is hazardous, and requires safety measures in transport and storage.

Based on their physical and chemical properties, there are the following types of cargo:

- hygroscopic (absorbing moisture);
- self-heating and self-igniting (grain);
- toxic cargo and cargo that emits harmful gases;
- flammable;
- explosive;
- cargo producing strong odours;
- cargo absorbing strong odours;
- dusty cargo etc.

Based on their storage conditions, cargo is divided into two categories: cargo that needs storing indoors (in warehouses), and cargo that can be stored outdoors.

The storage and transport conditions set for cargo determine two main classes of cargo: standard cargo and special-conditions cargo. Standard cargo does not require any special for storage, transport and loading or unloading. Special-conditions cargo includes, for example, hazardous and highly perishable goods. Such cargo not only requires certain levels of temperature and humidity, but also can be subject to special regulations, such as storage and transportation during quarantine.

Classification **based on the compatibility of cargo**.

The compatibility of different cargo is affected by three main factors:

- biological properties of the product (emitting and absorbing gases and odours);
- required temperature range;
- humidity.

This type of cargo includes dairy and meat products, seafood, fruits, vegetables, flowers and young plants, biological products, drugs and various chemicals.

Based on the special properties of cargo

The special properties of a piece of cargo are determined by its name:

- hazardous cargo is dangerous to the environment and human life;
- highly perishable cargo includes foods that, if stored, prepared or transported improperly (including temperature) can become hazardous cargo at any stage of processing, producing toxins hazardous to life;
- oversize and/or overweight cargo is hazardous to roads and road structures, because its dimensions and weight exceed the requirements set for every mode of transport, based on traffic safety regulations.

Another special category is that of cargo with a specific value (precious metals and products made out of them, piece of art, paintings etc., as well as personal property of private individuals) that must be delivered to the party that ordered the cargo in sealed packaging.

In international practice, there is also price, tariff and transport classification in addition to the classification of cargo based on the parameters already discussed. The Harmonized System has become an international standard in the classification of goods. The Harmonised System consists of a uniform nomenclature of commodities (including tariff and statistics nomenclature). The system has a six-digit commodity coding system for customs purposes. It simplifies the identification of a product if a translation of its description is approximate or unclear. In Latvia, the Combined Nomenclature is used for commodity classification, available on the website of SRS: <https://itvs.vid.gov.lv/itms/>



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<https://itvs.vid.gov.lv/itms/>.*

Cargo transport classification is based on the methods used to transport and load/unload cargo. Based on this classification, there is general, bulk and special cargo (Figure 1).

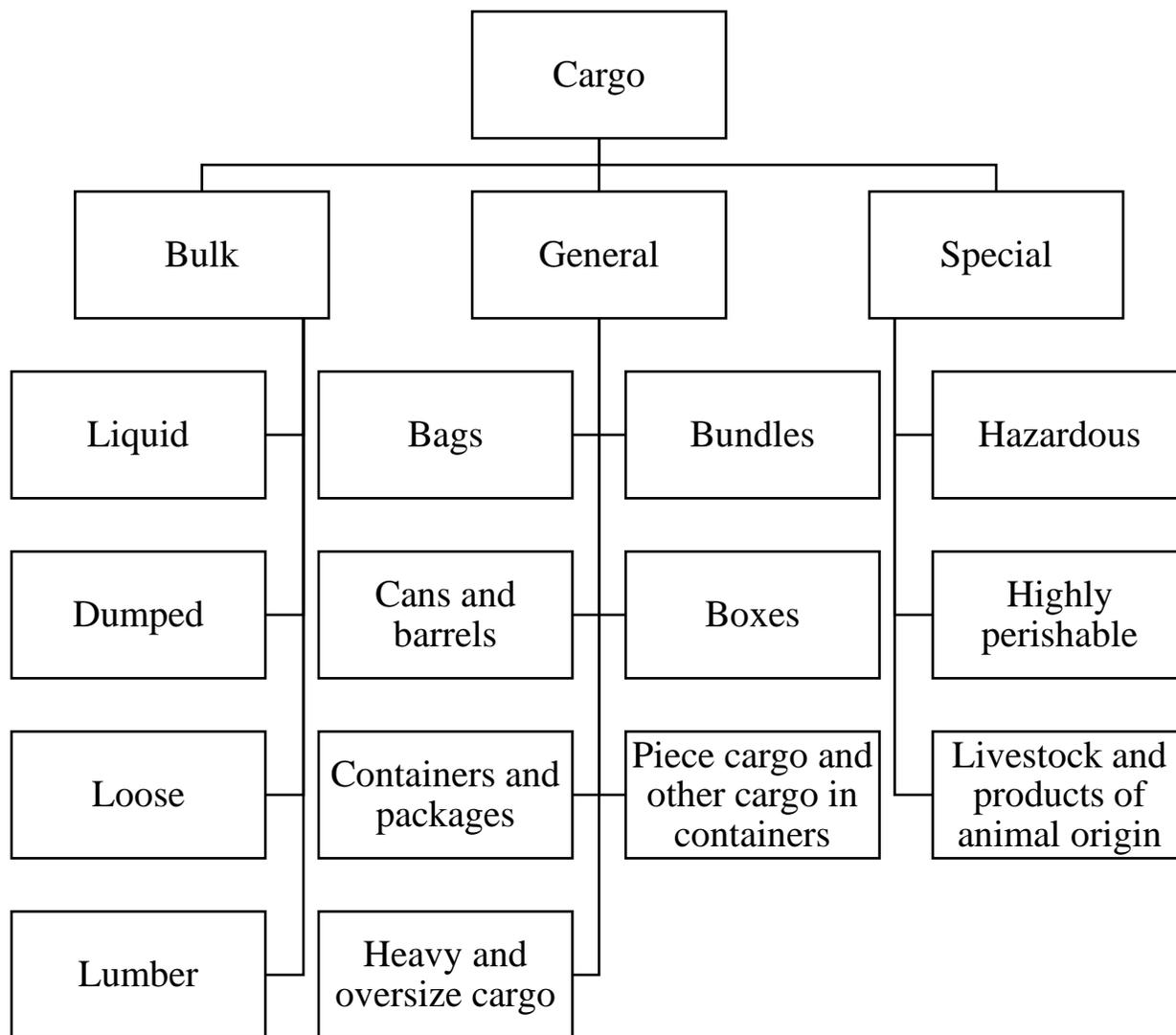


Figure 1. Cargo classification based on the methods used to transport and load/unload cargo
Source: prepared by the author

General cargo is cargo that is ready for transport and consists of individually packaged or non-packaged units classified based on the following features:

- the form, in which the cargo is supplied for transport (with or without packaging);
- the size (standard, extra long, oversize);
- the weight (light, heavy);
- the labelling (labelled, unlabelled) and other features.

Light cargo is any cargo that occupies a volume of more than 2 m³ per tonne (wool, tobacco, cotton wool etc.).

Extra long cargo is any cargo with a cargo unit length of more than 3 m. *Oversize cargo* is any cargo that does not fit the dimensions of ship tanks, railway cars, containers, platforms, trailers etc.

General cargo also includes cargo in large cargo and transport units (on pallets, in packages, trailers, containers).

Bulk cargo has a certain structure and, by weight, takes up the main share of cargo carried by all modes of transport. There are four basic categories of bulk cargo: liquid, dumped, loose and lumber.

Special cargo is cargo that is stored and transported based on special conditions. It includes:

- hazardous cargo;
- highly perishable cargo (e.g. non-preserved animal and plant-based foods);
- livestock and poultry, as well as raw products of animal origin.

Hazardous cargo includes objects with hazardous properties, setting special conditions for transporting and storing them. Hazardous cargo properties include, for example, explosiveness, flammability, toxicity etc.

Highly perishable cargo is cargo that needs protection against the effect of high and low temperatures in transport. In other words, it requires that the transport conditions be controlled through cooling, heating, ventilation, maintenance or condition monitoring. Highly perishable cargo supplied for transport can be divided into groups based on similar features or properties.

Livestock, poultry, and cargo of animal origin. Transportation of this type of cargo requires veterinary and health control, as well as specially equipped cargo spaces.

1.1.2. Types of packaging

DEFINITION

A **container** is a material or an object used for packaging and transporting products.

Cardboard, plastic boxes, glass or polymer bottles and jars are most commonly used to store and transport foods (see Figure 2). Containers intended to be reused are usually standardised (with certain dimensions), so that they can be efficiently laid out on pallets, and so that they occupy the cargo compartment of a vehicle as fully as possible.



Figure 2. Storage and transport containers. Source: prepared by the author

DEFINITION

Wrapping is a special product packaging material or object intended to contain a product (box, bottle, bag, paper etc.) intended to preserve the quality of a product when transporting and storing it, and to make it more attractive (see Figure 3).

A large variety of materials can be used: cardboard, wood, textile, polyethylene, paper etc., and the choice of material depends on the properties of the packaged product, on its intended buyer, as well as other properties. Packaging materials take up a significant part of the prime cost of production, and cause much environmental pollution.





Figure 3. Examples of wrapping

The paper used in wrapping must be strong, contain little moisture, have low air permeability and a certain resistance to water. Food packaging paper must be aseptic, safe for health and the environment. Different types of packaging paper have different properties and uses. For example, special paper for wrapping fruits is thin and soft. Light-sensitive protective paper is heavy. Parchment paper is oil-impermeable. Water-resistant wrapping paper includes tar paper (for grill charcoal) and aluminium foil paper. Packaging¹ is removed from the product during or prior to its consumption.

DEFINITION

Packaging is a set of products added to goods to protect, contain, deliver, store, conveniently use, sell and present them throughout the entire life cycle of the packaging, from the manufacturer to the end consumer (see Figure 4).



Figure 4. Examples of product packaging

¹ Packaging Law. Available at: <https://likumi.lv/doc.php?id=57207>

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Packaging Find out more about packaging on the website of the Latvian Packaging Association <http://www.packaging.lv/> and assess the evaluation criteria used for the Latvia's Best Packaging ('Labākais iepakojums Latvijā') awards and their results.

! NOTE

Classification of packaging based on its use.

Table 1.

Type of packaging	Use
primary packaging	This packaging is used to arrange individual units of merchandise, and it is provided to the end consumer at the place of retail (e.g. beer keg, package of flour, bucket of paint, candy wrapper)
secondary packaging	The purpose of this packaging is packing a certain number of units of merchandise intended for sale together. It can be removed at the place of retail, or remain in place and be received by the end consumer. Removing secondary packaging (e.g. film wrapping a box of chocolates, or a certain number of bottles of mineral water) does not affect the properties of the product
tertiary or transport packaging	This packaging is used to transport goods intended for sale or manufacture, or units in secondary packaging, with the purpose of preventing transport damage to these goods (e.g. boxes, barrels, iron bands, impact-absorbing materials, such as pieces of polystyrene foam or wood chips)

Source: prepared by the author, based on the Packaging Law

Different materials can be used to make packaging. Table 1 shows the types of such materials.

Table 2.

Packaging materials

Type of packaging material	Materials
natural fibre raw materials	wood, cork, paper, cardboard, corrugated cardboard, textile (cotton, jute, other textile materials)
metals	iron, sheet iron, aluminium and other metal material
plastics	polyethylene terephthalate (PET), high-density polyethylene (HDPE), low-density polyethylene (LDPE), polyvinyl chloride (PVC), polypropylene (PP), polystyrene (PS) and other plastics
composite materials	laminated paper and cardboard with plastic and/or metal components, laminated glass with plastic and/or metal components
glass	colourless and coloured glass

Source: prepared by the author, based on the information materials by the 'Latvijas zaļā josta' association



NOTE

Packaging takes up approximately 30% of all household waste:

- 40% glass
- 29% paper
- 19% polymer
- 5% wood
- 4% metal
- 3% other packaging materials

Currently, only just under 20% of all used packaging is recycled.

Packaging accounts for a significant part of household waste, and its manufacture and use is governed by applicable laws and regulations. According to the laws and regulations, packaging must be designed, manufactured and used in a way that facilitates its recycling and reduces its negative effects on human health and environment. In order to promote the collection, reuse and recycling of packaging, it is classified based on the materials used in their production, and appropriately labelled.

! NOTE

*The packer is responsible for managing used packaging. It is important to understand, who is the **packer** of a product within its lifecycle: the manufacturer of the product, the service provider, or the seller.*

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About LOOK THIS UP Find out more about the management of packaging on these websites:

- http://www.varam.gov.lv/lat/likumdošana/normative_akti/?doc=3143
- <http://www.lzi.lv>
- <https://www.atkritumi.lv/lv/>