

## **Lecture 10. Transport complexes for package and piece loads.**

**Purpose of the lecture:** to evaluate the effectiveness of the use of various options for complex mechanization and automation of loading and unloading operations for given conditions, including during reconstruction, examination of projects of warehouses, points of loading and unloading goods at stations and organizations;

**Keywords:** packaged, piece cargo, storage of unit-piece and piece-cargo

**Types of lectures :** Lecture-explanation.

### **10.1. Transport characteristic of packaged and piece cargo**

### **10.2. Methods of transportation and storage of unit-piece and piece-cargo**

### **10.3. Classification of ways of packing piece cargo**

#### **10.1. Transport characteristic of packaged and piece cargo**

Unit loads can be classified according to the following criteria:

- by transportation methods (carried in indoor and outdoor rolling stock);
- by purpose and sectors of the national economy (metals, equipment and devices, electrical goods, paper and cellulose, building materials, rubber and rubber products, plastics and chemical materials, tare oil products, hemp and jute products, consumer goods and industrial consumer goods and etc.);
- by the methods of warehousing and processing: cargoes of open and closed storage, tare-piece (general - according to the terminology of sea transport), lengthy, bulky and heavy, self-propelled vehicles;
- by type and parameters of packaging and transport packaging: without packaging and packaging; in hard, soft, semi-rigid packaging; in boxes, crates, cardboard boxes, bags, barrels, flasks, cans, etc .;
- by type and parameters of freight transport units: in bundles, packs, individual pieces in a transport container, in transport packages on pallets of 1200x800 mm or 1200x1000 mm.

Unit loads are characterized by the following main parameters:

- the dimensions of individual cargo places (length, width, height), mm;
- mass of individual cargo places, kg;
- bulk mass of cargo, t / m<sup>3</sup>;
- the shape of the goods (the most common are rectangular box, cylinder, ring, sheet, complex or irregular shape);
- the nature and properties of containers and packaging (rigid, hard or soft, elastic, pliable, crumpled, etc.);
- the number of goods (in packaging, freight transport unit, transport lot);

- the number of seats in the transport lot and its total mass, kg

## **10.2. Methods of transportation and storage of unit-piece and piece-cargo**

Most packaged goods are transported in the indoor rolling stock of rail and road transport, since in accordance with the technical conditions they must be protected during transportation from the effects of weather conditions.

There are two types of loading and unloading sections of packaged goods warehouses: open (when vehicles approach the sleep-gun warehouse) and closed (when all loading and unloading operations are carried out inside the warehouse). For loading and unloading railway transport, it is recommended to arrange open sections (with the approach of the railway track to the warehouse from the outside), since they do not take away useful volumes inside the warehouse, which can be more effectively used for warehousing. For loading and unloading vehicles, it is advisable to provide opening doorways in the warehouse wall, with a trump card, a tight seal around the perimeter of the opening, a transition bridge, a flexible door leaf with an electric drive and a thermal curtain.

## **10.3. Classification of ways of packing piece cargo**

Stacking of cargo on flat pallets of 1200x800 or 1200x1000 mm in 2 tiers in height, which is widespread in many warehouses, has the following advantages:

- lack of additional costs for shelving;
- lack of stationary structures (racks) and the possibility of operational stacking depending on the size of arrival and departure of goods;
- good filling of the warehouse area (with the same type of cargo).

Disadvantages of stacking storage:

- low storage height, incomplete use of warehouse volume;
- the possibility of damage to goods in the lower tier of the stack;
- instability of the stack, the possibility of loss of goods and injury to workers;
- difficulty in accounting for cargo placement;
- the impossibility of warehousing multi-item cargo;
- the inability to automate the storage of goods.

In view of these shortcomings, it is recommended to use stacked storage only in small warehouses of the same type of cargo, with a small number of items and a large number of packages for each item (for example, in railway warehouses of wagon consignments with small cargo flows).

Advantages of shelf storage of goods: large storage height, good filling of warehouse volumes with goods (which is a prerequisite for achieving their high technical and economic indicators), the possibility of automated accounting and warehousing operations.

In modern mechanized and automated warehouses, only shelf storage of packaged goods on pallets of various designs is used.

### **Questions:**

1. What containers and packaging transport unit cargo?

2. What types of rolling stock are used for the transport of piece goods?
3. What are the main ways of storing packaged goods.
4. What is the main task in designing an effective warehouse for piece cargo?
5. In which warehouses is the effective use of the block method of warehousing cargo?

#### Literature and resources

1. Zhuravlev N.P., Malikov O.B. Transport and cargo complexes: Textbook. allowance. - M.: Route, 2016.-- 232 p.
2. Boyko N.I., Cherednichenko S.P. Transport and cargo systems and warehouses: textbook / N.I. Boyko, S.P. Cherednichenko. - Rostov n / a.: Phoenix, 2007.-- 400 p.
3. Transport and cargo systems. Textbook / A.S. Balalaev, I.A. Baburova, A. Yu. Kostenko. - Khabarovsk: Publishing house of FVGUPS, 2015.-- 101 p.
4. 4. Complex mechanization and automation of loading and unloading operations: Textbook / Ed. Timoshina A.A. and Machulsky I.I.-M.: Route, 2013.- 400 p.

#### **Internet resources:**

1. Abdikerimov, G.S. Logistic management of cargo transportation and terminal and warehouse activities [Text]: A textbook for specialists / G.S. Abdikerimov, S.Yu. Eliseev, V.M. Nikolashin, A.S. Sinitsyna, O.B. Malikov // M: FGBOU "Educational-methodical / center for education in railway transport". - 2013.-- 428 p. <https://e.lanbook.com/reader/book/59016/#1>
2. Balalaev A.S., Leontiev R.G. Transport and logistics interaction in multimodal transportation: monograph. - M.: FGBOU "Educational-methodical center for education in railway transport", 2012. - 268 p. - <http://e.lanbook.com/view/book/58896/page58/>
3. Design of loading and unloading devices and warehouses: Method. instructions / compiled by V.A. Bolotin, E.K. Korovyakovsky, N.G. Yankovskaya.- SPb.: FSBEI HPE PGUPS, 2015.- 38 p.

Available online: Additional educational material and Internet sources used to complete the assignments of lectures, seminars, CDS, will be available on your page in the Univer.kaznu system.