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**MEASURES TO BE TAKEN FOR MECHANISING
OPERATIONS AND MODERNISING INSTALLATIONS
FOR HANDLING SUNDRIES TRAFFIC
AT STATIONS AND ROAD DEPOTS.**

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1 - PRELIMINARY REMARKS

This leaflet contains recommendations concerning suitable arrangements for handling sundries traffic and instructions for the design of the fixed installations necessary for this purpose and for the use of transhipment methods.

The special techniques for accelerated forwarding of «fast goods» traffic or «Express» traffic have not been taken into consideration in this leaflet. «Express» traffic is covered by Leaflet DOC 20.

Generally speaking, problems relating to the handling of dangerous goods covered by the «International regulations concerning the transport of dangerous goods by rail» (RID) (Appendix 1 to the CIM) are also excluded.

In view of the many peculiarities and differences as compared with the conventional system, the questions arising from the use of large containers for sundries traffic are covered in Appendix 1 to this leaflet.

2 - MECHANISATION OF GOODS HANDLING

2-1 - Preliminary conditions

The introduction of technical methods for mechanising goods handling is only economically viable provided that :

- the organisation of the loading and forwarding of the goods is such that a sufficient volume of goods can be concentrated together;
- the nature of the goods is to a very large extent suitable for loading and transport units.

These two conditions are simplified if :

- flows of sundries traffic are concentrated on the railway centres;
- the use of pallets or small containers is constantly extended and, wherever possible, these units are employed throughout the journey from sender to consignee.

Another essential condition is that there should be fixed installations meeting the conditions for use of technical methods.

Adoption of partially automated processes, such as sorting installations, means that there are additional conditions concerning such things as the dimensions and weights of the packages to be handled.

2-2 - Methods of mechanisation

2-21 - Ancillary methods of loading and transport

So that packages can be combined into load and transport units and mechanical handling appliances used that operate from the ground, ancillary methods of loading and transport are used, such as flat pallets, box pallets and small containers. The technical provisions with which the usual methods must comply are prescribed in the following UIC leaflets :

- 435-I Loading and box pallets for use on international services,

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- 435-2 Qualitative standard for a European flat pallet made of wood, with four openings, measuring 800×1200 mm,
- 435-3 Qualitative standard for a metal European box pallet with four openings, measuring 800×1200 mm,
- 590 Small and medium containers - technical conditions to be complied with by the containers for their use on international services.

2-22 - Handling equipment working at ground level

For the transshipment of packages combined into load and transport units, preference should be given to the use of handling equipment working at ground level not running on rails. Generally speaking, with such equipment, the pallets and box pallets are picked up from their wider side (lengthwise). Particularly when space is limited, it is possible for the pallets to be picked up from beneath, from their shorter side (widthwise). This sort of equipment is particularly useful for handling packages over routes that branch off in numerous directions

Particular use is made of the following :

- hand pallet-trucks
- fork-lift trucks,
- motorised trucks with or without loading platform,
- trucks

The following technical and constructive conditions for length-wise handling are given as a guide.

2-221 - Hand pallet-trucks

In order to lift and convey ancillary means of loading and transport which can be picked up from beneath, such as flat pallets and box pallets, the use of manual or battery-driven electrical hand pallet-trucks is

particularly recommended. In order to lift the load, the fork itself rises by about 100 mm. It is preferable for such machines to be battery-controlled.

Hand pallet-trucks must comply with the following technical and constructional provisions :

- lifting force 2000 kp ⁽¹⁾
- overall length (manually controlled) 1350 mm
- overall length (battery-controlled) 1500 mm
- length of the fork 940 mm
- overall width (manually controlled) 560 mm
- overall width (battery-controlled) 670 mm
- outside width of the fork 560 mm
- width of the teeth of the fork 160 mm

If the machine is also to be used for stacking pallets, it is recommended that a fork-lift truck with high lifting range should be used. Here, the carrying fork rests on a rigid fork fitted with rollers. The hydraulic mechanism should be battery, not manually, controlled.

The following constructional characteristics must be complied with :

- overall height with the fork in the low position 1800 mm
- maximum height of lift 1400 mm

(1) 1Kp = 9.81 N

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2-222 - Fork-lift trucks

Fork-lift trucks are particularly suitable for mechanised loading and unloading operations with wagons used for sundries traffic. They have fork lifting mechanisms which are generally at the front and with which the load can be picked up and put down automatically. Because of their system of propulsion they can be used both as lifting appliances and as a means of transport on the ground. However, for economic reasons fork-lift trucks should be used in the first instance as a means of loading, whilst packages should be transferred by other more adequate means (see section concerning motorised trucks with or without platforms and continuous conveyors).

The economic limit for the transshipment distance by means of a fork-lift truck is about 100 to 150 m.

The ratio of transfer work to stacking should not exceed 40 : 60.

It is preferable for fork-lift trucks to have battery-controlled mechanisms, since appliances with heat engines are noisy and cause pollution.

Bearing in mind the height of the doors of the wagons, the total height of the fork-lift truck should not exceed 1.90 m (or better still 1.80 m), load included.

The following technical and constructional characteristics should be taken into consideration:

- lifting force 1000 kp
- permissible speed on the flat 10-15 km/h
- lifting speed (under load) 12 m/min

- overall width	1000 mm
- width of the teeth of the fork	120 mm
- maximum outside width of the fork	980 mm
- overall length (including forks)	2400 mm
- length of the fork	900 mm
- overall height (fork in low position)	< 1800 mm
- height of lift necessary for stacking pallets in the wagons	1600 mm
- maximum height of lift	2500 - 3000 mm
- permissible load per wheel	1500 kp
- outside turning circle	1400 mm
- width of lanes permitting stacking	2700 mm

2-223 - Motorised trucks with platforms

For the purpose of transporting certain objects, motorised trucks equipped with a loading platform (electric trucks) can be used.

For constructional reasons, this platform is generally relatively high and, in most cases, loaded manually.

These machines must comply with the following technical characteristics :

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- loading capacity	2000 kp
- force at the hook	100 kp
- permissible speed	10 km/h
- overall length	3200 mm
- length of the platform	2200 mm
- overall width	1200 mm
- width of the platform	1200 mm
- overall height	1350 mm
- height of the platform above the ground	750 mm
- permissible load per wheel	900 kp

2-224 - Motorised trucks (without platforms)

For relatively large volumes of goods, horizontal transfer (from about 50 m onwards) will be by hauled raft, i.e. by means of motorised trucks and trolleys.

Since idle time is unavoidable during trolley loading or unloading, these operations will preferably be carried out independently of the presence of the truck.

The ratio between the number of trucks and that of trolleys will be at least 1 to 3 to ensure maximum use of the trucks. Preference will be given to electrically driven trucks rather than petrol or diesel trucks (see Appendix 2), since the use of these latter, especially in enclosed spaces, gives rise to noise and polluting exhaust gases.

The trucks must comply with the following technical and constructional provisions :

- force at the draw hook 100 kp
- permissible speed 10 km/h
- overall length 2000 mm
- overall width 1000 mm
- overall height 1300 mm
- permissible load per wheel 500 kp
- height of the coupling system 320 mm

2-225 - Trolleys

Trolleys are used to form rafts hauled by motorised trucks. The most suitable type of this means of transport is one where the loading platform is as low as possible (Trolleys with low platform).

To increase the manoeuvrability of these appliances, these trolleys shall be equipped with a system so that all four wheels can swivel round. Trolleys specially designed for the conveyance of pallets should be fitted with platforms with special supports (guide pieces).

Characteristics :

- loading capacity 2000 kp
- length of the platform 2700 mm

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- width of the platform	1200 mm
- height of the platform above the ground	300 mm
- height of the shaft	320 mm

2-23 - Continuous conveyors

At stations and road depots where traffic is heavy (about 800 to 1000 t/day), the use of overhead transshipment lines or those set in the ground and of belt conveyors, has proved particularly suitable (see the comparative table of the advantages and disadvantages of the various systems available given in Appendix 3).

2-231 - Overhead transshipment line

Provided the construction of the roof is suitable, overhead transshipment lines suspended from the roof can be used. If the construction of the framework is unsuitable for suspending the draw gear, the contact rail can be mounted on separate steel supports provided the necessary space for this installation is available. Known installations use low platform trolleys as well as hand pallet-trucks for carrying flat pallets or box pallets.

Connection to the haulage line is by means of drive devices fitted with a mechanical release device.

The speed of the haulage line is fairly low (about 25 m/min), which - subject to complying with the necessary distance between two drive devices - limits its capacity.

Since transshipment line devices can only operate as a closed circuit, dead-end depots with one or two wide loading platforms are most suitable for the use of overhead lines ; if necessary, the open ends of the platform will be provided with movable gangways.

Haulage line systems consisting of several circuits can be connected together by means of complicated switching systems.

2-232 - Haulage lines set in the ground

The same form of mechanisation as with an overhead transshipment line can be obtained with a haulage line set in the ground.

A real advantage of this system is that there are no suspended parts (drive devices) which limit the space available. In addition, haulage lines set in the ground make it easier to install a system of connections by means of switches.

The following are the decisive factors when choosing one of these systems :

- the installations involved (for example construction of the roof, supports),
- the cost of installation (for example, cost of an underground channel to house the haulage line).

2-233 - Belt and roller conveyors

For the conveyance of individual packages with specific external dimensions and a weight of not more than 150 kp, belt conveyors (slat conveyors) and roller conveyors (operated mechanically or by gravity) are suitable.

However, such means of conveyance are used preferably in sorting installations.