



FEDERATION EUROPEENNE DE LA MANUTENTION
SECTION II
CONTINUOUS HANDLING

FEM
2.271

DESCRIPTION OF UNIT LOADS
CARDBOARD AND MILLBOARD BOXES

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Preliminary remark

For each installation of continuous handling equipment for unit loads, the characteristics of the goods to be conveyed are important for its proper functioning, being part of the system. It matters therefore to provide a precise description of the product to be conveyed as early as the planning phase. The necessary indications and properties to be mentioned are contained in the International Standard ISO 3569.

Section II "Continuous Handling Equipment" of FEM (Fédération Européenne de la Manutention) presents hereunder one of a series of documents giving complementary information concerning a group of products to be conveyed and provide the user of continuous handling equipment to understand why it is necessary to supply such detailed information and what consequences can be expected in using the equipment for a unit load not foreseen, especially since the user might encounter a problem of such nature for the first time.

1 General

Usually, cardboard and millboard boxes are easy to convey, even with the simplest conveyors. The advantage of such simple conveyors lies in their low price — their disadvantage in their sensitiveness in handling unit loads which deviate from the ideal. In that respect, the surface directly in contact with the conveyor is of particular importance (refer to paragraph 6). The solutions where even considerable deviations from this ideal product do not cause any problems are very costly. The best compromise in a particular case, takes into account:

- the type of the expected deviations
- their frequency
- the type of the resulting problem
- the consequences of a malfunction
- the expense necessary to correct the malfunction
- the cost of the installation
- the operating costs

and can only be obtained by cooperation between the manufacturer and the user with a complete exchange of necessary information.

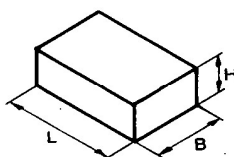
The properties are discussed in the sequence indicated in the ISO 3569 Standard.

2 Shape

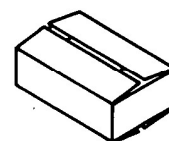
Usually, a square shape will be indicated by its length (L), its height (H) and its width (B).

Is this correct?

Does the shape remain as described?

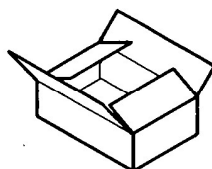


2.3 When light boxes are empty, this can also happen with the bottom (see also § 6.1).

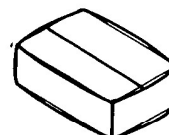


Very often, the following deviations are forgotten:

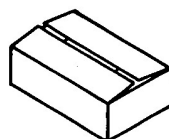
2.1 Open lids, increasing the height and frequently reaching beyond the sides. The cross-section provided must be much bigger than the square shape itself!



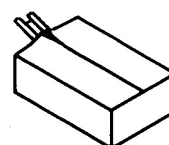
2.4 Boxes, once filled, can expand, therefore they need more space.



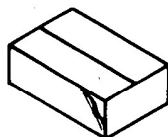
2.2 Closed lids but not (or not sufficiently) glued or fastened.



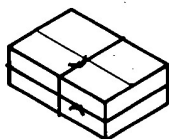
2.5 The packed product extends beyond the square shape (in height or on the sides). Not only is extra space needed, but this can lead to fouling the other boxes or other parts of the surroundings.



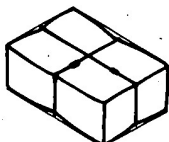
- 2.6 If the boxes are damaged, possible shreds can protrude.



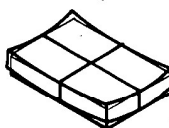
- 2.7 Straps and bindings of boxes constitute ribs in addition to the protrusion of knots and seals.



- 2.8 Soft cardboard boxes with tight strings get a shape like a strangulated bale.



- 2.9 Especially where larger flat boxes are concerned the edges turn up if the string is only located at the centre.



Not all these differentiations from the original shape lead to an immediate malfunction of handling equipment, if taken into consideration beforehand. In this context the bottom surface of the box is of special importance (see also § 6).

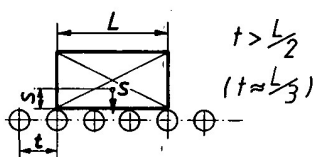
3 Alignment

If the shape is exactly square, only the width of the handling equipment and the number of units that can be placed on a particular piece of equipment will be affected. The effect of deviations according to § 2.1, 2.4 and 2.5 is obvious, but it varies according to the alignment.

An additional influence can be created by deviations described in §§ 2.1, 2.2, 2.3, 2.5, 2.6, 2.7 and 2.9 when the loose parts or the protruding ones get caught on fixed parts of the surroundings.

4 Position of the centre of gravity

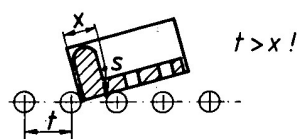
The necessary indications pertaining to the position of the centre of gravity are contained in ISO 3569, § 4.2.



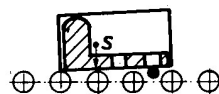
4.1 Eccentric position of the centre of gravity

What will happen if the centre of gravity is offset?

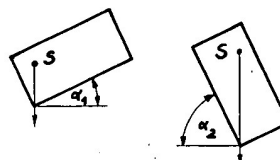
- 4.1.1 A smaller pitch will be required for roller conveyors, wheel conveyors, and transfer points.



- 4.1.2 The triggering of intermediate rollers or similar equipment is no longer reliable, since the load bearing at the end is not sufficient.

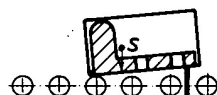


- 4.1.3 The tipping angle differs between elevating and lowering.

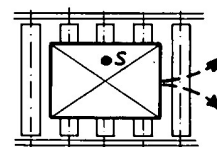


- 4.1.4 If the centre of gravity is displaced mainly toward the front, the conveyed loads have a tendency to rotate (especially when getting in contact with distribution arms or at transfer points including changes of direction).

- 4.1.5 If the centre of gravity is towards the rear, then it is easy to jump over stops.

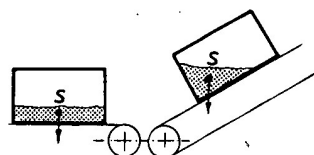


- 4.1.6 If the centre of gravity is displaced to the side, the load tends to turn uncontrollably.



4.2 Unstable centre of gravity

If the loose contents of the container can move out of place (e. g. loose sand, liquids, loose parts etc.) the behaviour described under § 4.1 will be modified depending on the slope of the conveyor; if the contents are not easy to move and if, for instance, the product is brought to a different position by shocks or vibrations, the centre of gravity will move after an indefinable period.



5 Material

A precise knowledge of the material in contact with the conveyor is extremely important. Its strength, its friction coefficient (which in some case may vary according to the load), its resistance to abrasion, its resistance to the conditions of the environment such as dampness and the modifications of its properties due to the influence of the environment, are so important that it is not enough to speak merely of „a cardboard box“.