Informal meeting on Code of Practice for Packing of Cargo Transport Units

at the request of the United Nations Economic Commission for Europe Working Party on Intermodal Transport and Logistics

Geneva and virtual, 12-13 July 2022

Load distribution

Submitted by IUMI and Mariterm AB

This document proposes changes to section 3 of Annex 7, paras 3.1.4 to 3.1.8 in order to implement the essentials of Informative Material 6 into the main body of the Code. This revised version suggests further adjustments to the text presented in CTU-Code/2022/first-informal-meeting/10. They are marked through green text.

Background:

The guiding principles for the text changes proposed in this paper were outlined in Paper 10 submitted for the first meeting of 2022 of the informal working group. Since the exact figures for load distribution diagrams varies for individual vehicles, local road regulations, track capacities etc, the focus has been to describe the general principles for constructing and using such diagrams and to provide a few relevant examples, rather than to have comprehensive diagrams for specific cases as is the case in the current IM 6. These changes, if accepted, would require renumbering of the section on “General stowage/packing techniques”.

Proposed text:

3 Principles of packing

3.1 ~~Load distribution~~ Bedding arrangements in freight containers (box type)

3.2 Bedding arrangements on flatracks and platform containers and in road vehicles

For content, see document CTU-Code/2022/second-informal-meeting/9 on bedding arrangements

3.3 Load distribution

3.3.1 In order to enable safe handling and transport of CTUs, all relevant limitations that restricts the allowable eccentricity of the centre of gravity for combined mass of the cargo, securing equipment and bedding arrangement must be considered. The allowable ~~cargo~~ ~~weight~~ mass of cargo and securing materials based on the position of the centre of gravity may be visualized through a Load Distribution Diagram, in which a limiting curve is plotted based on all applicable restrictions (see figures X,… , X below). The precise longitudinal position of the centre of gravity of the cargo may be determined by calculation (see appendix 4 to this annex).

3.3.2 Where freight containers, including flatracks or platforms, will be lifted and handled in a level state during transport, the cargo should be so arranged and secured in the freight container that its joint centre of gravity is close to the mid-length and mid-width of the freight container. The eccentricity of the centre of gravity of the ~~cargo~~ container's gross ~~weight~~ mass should not exceed ±5% in general. As a rule of thumb this can be taken as 60% of the cargo's total mass in 50% of the freight container's length. ~~Under particular circumstances an eccentricity of up to ±10% could be accepted, as advanced spreaders for handling freight containers are capable of adjusting for such eccentricity. The precise longitudinal position of the centre of gravity of the cargo may be determined by calculation (see appendix 4 to this annex).~~

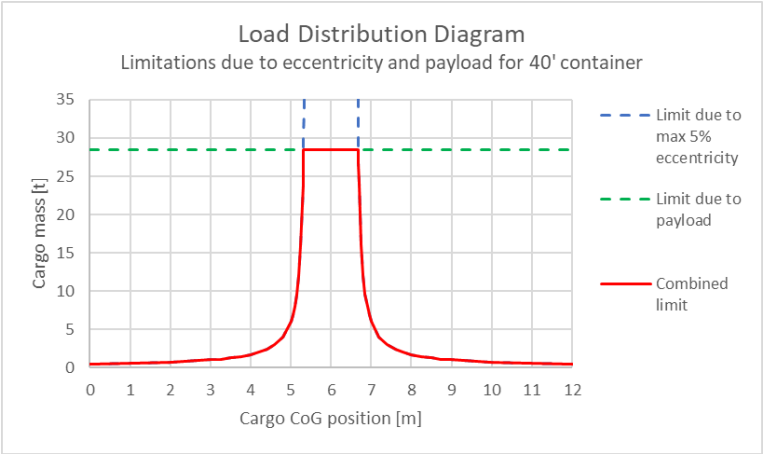

Figure 7.X An example of a load distribution diagram for the safe loading and handling of a 40-foot container, based on the following parameters:

- Tare ~~weight~~ mass of container: 4000 kg
- Max Payload ~~cargo weight (payload)~~: 28 500 kg
- Maximum eccentricity: ±5% of the container's length

3.3.3 Roll trailers have structural properties similar to platforms, but are less sensitive to concentrated loads due to the usual wheel support at about 3/4 of their length from the gooseneck tunnel end. As they are generally handled without lifting, the longitudinal position of the cargo centre of gravity is also not as critical~~.~~ but may further be restricted by the allowable deck and ramp capacities of the vessel.

3.3.4 Swap bodies have structural properties similar to freight containers, but in most cases ~~less tare weight~~ have a smaller tare mass and less overall strength. They are normally not stackable. The loading instructions given under subsection 3.1.2 and 3.1.5 should be applied to swap bodies as appropriate.

3.3.5 Road trucks and road trailers are in particular sensitive regarding the position of the centre of gravity of the cargo packed in them, due to the manufacturer's specified axle loads for maintaining steering and braking ability as well as the infrastructure's restrictions for vehicle gross ~~weight~~ mass as well as axle and bogie loads. In case of semi-trailers, the maximum king pin load, resulting from the towing trucks restrictions, must also be considered. ~~Such~~ Individual vehicles may be equipped with specific load distribution diagrams~~, which show the permissible cargo mass as a function of the longitudinal position of its centre of gravity.~~ Generally, the maximum ~~cargo mass~~ payload may be ~~used~~ utilized only when the centre of gravity (CoG) is positioned within narrow boundaries about half the length of the loading space (see figures 7.22 and 7.23).

Remove example!

~~**Figure 7.22 An example of a load distribution diagram for a rigid truck**~~

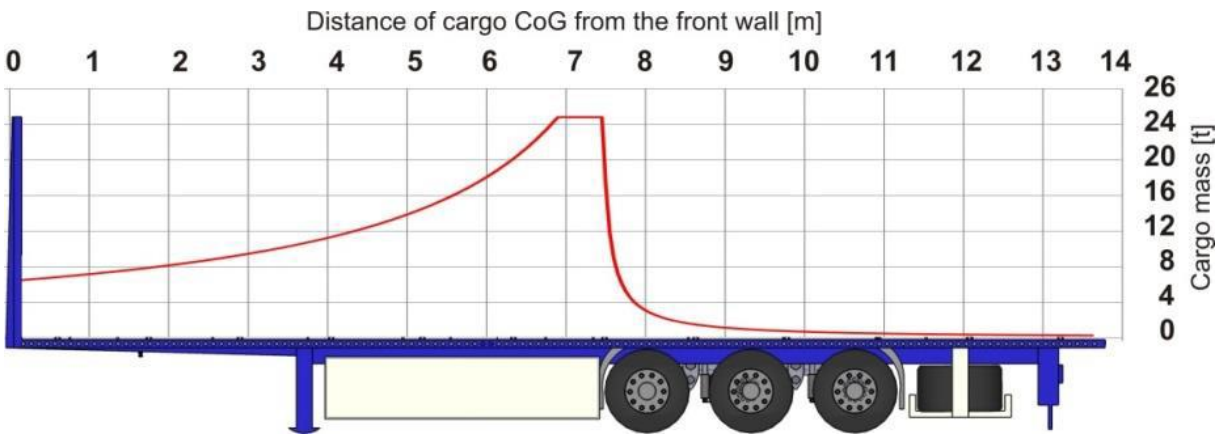

Figure 7.23 An example of a load distribution diagram for a semi-trailer

3.3.6 Railway routes are generally classified into line categories, by which permissible gross ~~weights~~ masses for wagons, axle loads and loads per metre length of cargo space are allocated to each railway wagon. The applicable figures should be observed in view of the intended route of the wagon. Tolerable concentrated loads are graded

depending on their bedding length. The appropriate load figures are marked on the wagons. The transverse and longitudinal ~~deviation~~ eccentricity of cargo centre of gravity from wagon ~~centre lines~~ centrelines is limited by defined relations of transverse wheel loads and longitudinal axle/bogie loads. The proper loading of railway wagons should be supervised by specifically trained persons.

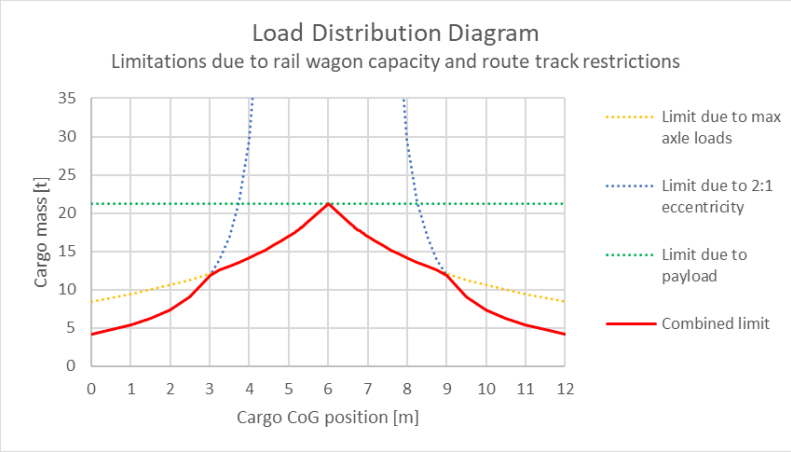

Figure 7.X An example of a load distribution diagram for a 40-foot container on a two-axle rail wagon, based on the following parameters:

- Maximum gross ~~weight~~ mass for wagon: 36 000 kg
- Tare ~~weight~~ mass of wagon: 10 800 kg
- Tare ~~weight~~ mass of container: 4000 kg
- Max cargo ~~weight~~ mass (payload): 21 200 kg
- Maximum axle load: 18 000 kg
- Distance between axles: 8 m
- Maximum difference between weight on axles: 2:1 (e.i. no axle may carry more than twice the weight of the other)

3.3.7 Load Distribution Diagrams for different modes of transport may be superimposed to show the combined limiting curve for the whole intended voyage, as illustrated in the example in figure 7.X.

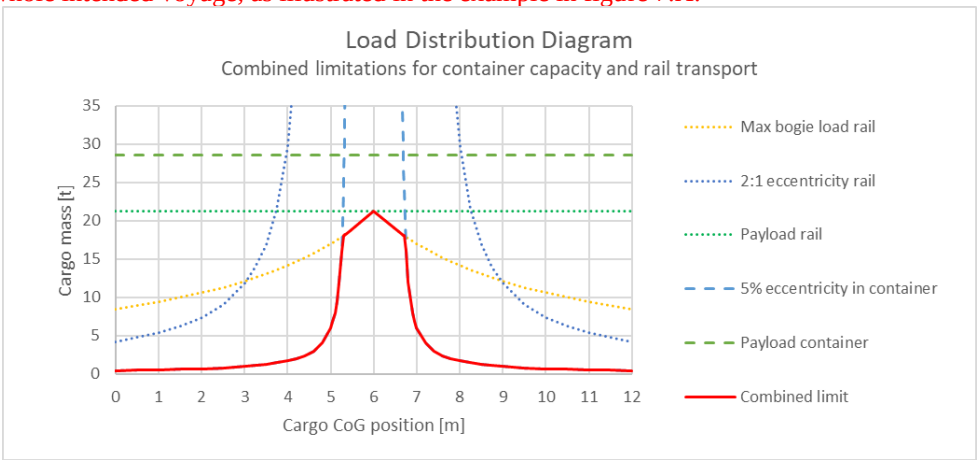

Figure 7.X An example of a combined load distribution diagram for the handling and capacity of a 40-foot container as well as transport on a two-axle rail wagon