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Group of Experts for the revision of the IMO/ILO/UNECE Guidelines for Packing of Cargo Transport Units

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Item 6 (b) of the provisional agenda

Proposals for amendments to the final draft of the CTU Code:

General comments and proposals for a revised structure

Revised structure of the CTU Code and annexes

Transmitted by the expert of Germany

Introduction

1. The draft CTU Code as presented in its main part was agreed in principle by the Group of Experts. During consideration by DSC 18, this main part was not substantially questioned; only minor amendments had been requested, as shown in document DSC 18/WP.3 Annex 4.
2. However, the extensive volume of annexes was not unanimously supported and it was proposed to identify those annexes which contain necessary provisions and are referenced in the chapters of the main part, and others which are mentioned only in the introduction or not referenced at all. The latter should be reclassified as “informative material”.
3. In addition, the German expert is of the opinion that the present annexes “CTU types” and “Transport of perishable cargo”, although being referenced in the main part, should also become “informative material”, as this information may be useful, but is not necessarily needed for the **safe packing** of a CTU. The introduction to the Code should outline how the annexes are referred to in the respective chapters and should also provide a list of all “informative material” for guidance.

Proposal

4. It is proposed to restructure annexes and informative material in the following sequence:

Annexes

- A1 Information and documentation flow
- A2 Safe handling of CTU
(replacing present annex 3, see *enclosure 1* to this document)
- A3 Prevention of condensation damages
- A4 Approval plates
- A5 Condition checks
- A6 Receiving CTU
- A7 Minimizing the risk of contamination
- A8 Packing and securing cargo (with Appendices)
- A9 Access to tank top
- A10 Fumigation
- A11 Topics to be included in a training programme

Informative Material

- IM 1 Consequences of improper packing procedures
- IM 2 CTU types
- IM 3 Quick lashing guides
- IM 4 Intermodal road and sea load distribution
- IM 5 Manual handling
- IM 6 Transport of perishable cargo
- IM 7 Seals
- IM 8 Testing CTU for hazardous gases

5. The proposed restructure of the Code of Practice requires amending Chapter 1. A proposal for a revised Chapter 1 is presented as *enclosure 2* to this document.

Enclosure 1

New Annex A2 (Safe handling of CTU) to replace present Annex 3 (Safe transport of containers at sea)

The introduction to present Annex 2 states *“Although much of the information in that document is outside of the scope of the Code of Practice, it provides those involved with the packing and handling of container type CTUs with a better understanding of the requirements for safe transport of containers on maritime transport and is recommended reading.”*.

It is proposed to replace this annex (which is obviously beyond the scope of the Code) by the attached annex. The proposed version reflects more the responsibilities of a terminal operator (as assigned in section 4.2.7 of the Code) und is applicable to all terminal operators and not only to marine terminals.

ANNEX 2

BASIC PRINCIPLES FOR THE SAFE HANDLING AND SECURING OF CTU

1 General

1.1 Cargo Transport Units (CTU) are designed for intermodal transport. They are capable to be transferred from one mode of transport to another by rolling or lifting. A swap body can be carried on a road vehicle or on a railway wagon. A container can be carried on a road vehicle, on a railway wagon, on an inland barge or on a sea going vessel. A road vehicle can be carried on a railway wagon, on an inland barge or on a sea going vessel (ro/ro-vessel). A railway wagon can be carried on a sea going vessel (railway ferry).

1.2 When CTUs are handled, it should be ensured that all handling devices such as lifting appliances and internal movement equipment are in good condition and suitable for the intended purpose.

1.3 On completion of handling, CTUs have to be secured to the means of transport as appropriate for the specific transport mode

2 Transfer by rolling

2.1 Swap bodies are carried by road on special swap carrier vehicles. The carrier vehicle is capable to be lowered on its wheels and to roll under the swap body standing on its supports. By lifting the vehicle to its normal operating position, the swap body is taken onto the chassis of the carrier vehicle. Then the support legs are retracted.

2.2 Road vehicles may be rolled onto a ship driven by their own engine. Semi-trailers are normally carried on board ships without tractor unit. They are loaded to and unloaded from the ships by specific port internal movement vehicles. These vehicles should be conspicuously painted or marked and fitted with a flashing or rotating yellow beacon. The drivers' cab should provide good all-round visibility, with minimal obstruction of the driver's view. Only authorized persons should be allowed on the ramp or any vehicle deck while vehicle movements are taking place. The movement of persons on foot on the ramp should be strictly controlled and minimized.

2.3 The cargo decks of railway ferries are equipped with several rail tracks which can be accessed by a movable ramp which is fitted with rails, capable to be connected to the rail tracks on board. The maximum permissible kink angle between the ramp and the level of the rail deck in the ship is restricted and depends on the type of wagons shunted into the ship. In specific cases this angle may be as low as 1.5°.

3 Transfer by lifting

3.1 Before lifting a CTU, the handling staff should ensure that the lifting equipment is safely attached to the CTU and that all securing, fixing and lashing devices have been released.

3.2 Swap bodies for combined road/rail transport and also purpose built semi-trailers for combined road/rail transport are equipped with standardised recesses for being lifted at four points by grapples arms attached to the spreader of a crane or reach stacker. Thus they can be transferred from road to rail and vice versa.

3.3 Lifting of containers (refer to ISO 3874)

3.3.1 The most appropriate method to lift a container is the use of a top lift spreader. The spreader is locked by twistlocks to the top corner fittings of the container. This method can be used for all container sizes fitted with top corner fittings, in an empty or loaded state. When the spreader cannot be attached directly to the corner fittings, e.g. in case of overheight cargo, slings or chains can be used and connected to the spreader so that the lifting force remains vertical.

3.3.2 The side-lift frame is designed to lift a container by the two top corner fittings of one side and to take the reaction forces on the bottom corner fittings of the same side or on suitable corner post areas above those corner fittings. This method can be used on all sizes of empty box containers. In case of loaded containers, this method is suitable for 20ft and 10ft box containers only.

3.3.3 The end-lift frame is suitable only for the handling of 20ft and 10ft empty box containers. The frame is designed to lift a container by the two top corner fittings of one end and to take reaction forces on the bottom corner fittings of the same end or on suitable corner post areas above those corner fittings.

3.3.4 A top lift sling can be used for empty box containers of all sizes. The container is lifted by all four top corner castings with forces applied other than vertically. Lifting devices need to be properly engaged, hooks always be placed in an inward to outward direction. In the loaded state, this method is suitable only for 10ft containers, provided that the lifting forces are applied at an angle not less than 60° to the horizontal.

3.3.5 A bottom sling is used in connection with a cross beam spreader bar. The container is lifted from the side apertures of four bottom corner fittings by means of slings which are connected to the corner fittings by means of locking devices. Hooks are not suitable for this connection. This method can be used for all container sizes in an empty or loaded state. For loaded containers the angle between the sling and the horizontal should not be less than 30° for 40ft containers, 45° for 20ft containers and 60° for 10ft containers.

3.3.6 When a container is provided with fork pockets, it can be lifted by means of forks under certain conditions. The forks should, ideally, extend the whole width of the container, but under no circumstances should they extend less than 1,825 mm into the fork pockets. This method can be used on 20ft and 10ft containers in an empty or loaded state with the exception of tanks and pressurized bulk containers which should not be lifted by fork trucks at all. Where there are no fork pockets, the container should not be lifted by forks in any state.

3.4 Railway wagons may be lifted and may change bogies when the railway ferry operates between countries where the gauge of the track is different. In such cases, the railway wagons must be suitable for an easy exchange of bogies. The involved ferry ports provide specific equipment for this operation.

4 Stacking on ground and terminal operation with containers

4.1 The ground should be a firm, flat and drained surface. On the ground, the container should be supported by the four bottom container fittings only. When stacking containers, the bottom surfaces of the lower corner fittings of the upper container should have complete contact with upper surfaces of top container fittings of the lower container. A shift of up to 25 mm laterally and 38 mm longitudinally may be tolerated.

4.2 A container stack may be subject to forces by heavy wind. This might lead to sliding and toppling of containers. Stacks of empty containers will be more subject to such dangers than stacks of loaded containers. The critical wind speed is higher for multiple rows than for a single row. Wind effect can be reduced by limiting the stacking height, by block stowage or by a combination of both. A recommended combination is shown in the table below:

Number of tiers	20ft standard	40ft standard	40ft high cube
2	2 rows	2 rows	3 rows
3	2 rows	3 rows	3 rows
4	2 rows	3 rows	3 rows
5	3 rows	3 rows	4 rows
6	4 rows	4 rows	5 rows

Above recommendation is applicable for a wind speed up to 20 m/s (8 Bft). In case of higher wind speeds, additional measures should be considered, such as changing the block to a stepped pyramid or securing containers with lashings to the ground.

4.4 Containers should be moved within a terminal area only by use of suitable equipment, such as van carriers, reach stackers or trailers. Trailers should be so constructed that the containers are supported by their corner fittings. For operation within the designated terminal area, tie down devices are not required, provided that the container is correctly loaded on the trailer and prevented from moving horizontally. Therefore, trailers which are not equipped with twistlocks should be fitted with substantial corner plates or other restraints of sufficient height to retain the container in position.

5 Securing of CTU

5.1 Swap bodies are carried by road on dedicated carrier vehicles. The corner fittings of the swap body fit onto cones of locking devices (twistlocks) which, by turning the cones, provide a form closure between the swap body and the vehicle structure.



Figure 2.1 Twistlock on a road vehicle

5.2 Containers should be carried by road on purpose built container chassis, where the container is supported by the four corner fittings. The corner fittings of the container fit onto the twistlocks cones of the chassis, similar to the securing devices described in 13.5.1

5.3 When carried by rail, swap bodies and containers are loaded on open wagons which are specifically fitted with stacking or locking devices. Semi-trailers may be carried on wagons equipped with dedicated bedding devices for accommodating road vehicles.

5.4 Container vessels are specifically constructed for the carriage of containers. Cargo spaces under deck or cargo spaces on hatchless container vessels are equipped with cell guides, where the containers are stacked, obtaining sufficient hold and securing. Twenty-foot containers may be stowed in forty-foot cell guides, provided that suitable stacking cones are inserted into the corner fittings of the containers. Containers carried on deck are affixed to the ships structure by means of twistlocks. Twistlocks are used also to interconnect containers stowed one on top of another. In addition, container stacks on deck are secured to the ships structure by means of lashing rods and tensioning devices (bottle screws). Details of the securing arrangement are described in the Cargo Securing Manual of the individual ship.



Figure: 2.2 Cell guides and lashing rods on a container vessel

5.5 When carried on general cargo ships which are not specifically constructed for the carriage of containers, the containers are secured to the ships structure by means of lashing chains or wire ropes and tensioning devices (see CSS Code Annex 1). Further details are described in the Cargo Securing Manual of the individual ship.

5.6 When vehicles are loaded in a vehicle deck of a ro/ro-ship, the parking brakes should be applied and locked, engines should be in gear. Uncoupled semi-trailers should not be supported on their landing legs but preferably supported by a trestle or similar device. Lashings which are attached to the securing points of the vehicle should be connected with hooks or other devices so designed that they cannot disengage from the aperture of the securing point if the lashing slackens during the voyage. Only one lashing should be attached to any one aperture of the securing point on the vehicle. Further details are described in the Cargo Securing Manual of the individual ship.

5.7 The wheels of railcars shunted into the rail deck of a railway ferry should be chocked on the rail with appropriate steel chocks. The wagons should be secured to the ships structure with chains and tensioning devices (bottle screws). In case of severe weather conditions, the spring system of the wagons should be released by use of specific trestles. Further details are described in the Cargo Securing Manual of the individual ship.

Enclosure 2: revised Chapter 1 (Introduction)

Chapter 1 Introduction

1.1 Scope

- 1.1.1 The aim of this Code of Practice (CTU Code) is to give advice on safe packing of cargo transport units (CTU) to those responsible for the packing and securing of the cargo and by those whose task it is to train people to pack such units. The aim is also to outline theoretical details for packing and securing as well as to give practical measures to ensure the safe packing of cargo onto or into cargo transport units.
- 1.1.2 In addition to advice to the packer, the CTU Code also provides information for all parties in the supply chain up to and including advice for those involved in un-packing the CTU.
- 1.1.3 The CTU Code is not intended to conflict with, or to replace or supersede, any existing national or international regulations which may refer to the packing and securing of cargo in cargo transport units, in particular existing regulations which apply to one mode of transport only, e.g. for transport of cargo in railway wagons by rail only.

1.2 Safety

- 1.2.1 Improper packed and secured cargo, the use of unsuitable CTUs and the overloading of CTUs may endanger persons during handling and transport operations. Improper declaration of the properties of the cargo may also cause dangerous situations. The misdeclaration of the CTU's gross mass may result in the overloading of a road vehicle or a rail wagon or in the allocation of an unsuitable stowage position on board a ship thus compromising the safety of the ship.
- 1.2.2 Insufficient control of humidity may cause severe damages to the cargo.
- 1.2.3 More information on the consequences of improper packing procedures is provided in Informative Material IM 1.

1.3 Security

- 1.3.1 It is important that all personnel involved in the packing, security sealing, handling, transport and processing of cargo should be made aware of the need for vigilance and the diligent application of practical procedures to enhance security, in accordance with national legislation and international agreements.
- 1.3.2 Guidance on the security aspects of the movement of cargo transport units intended for carriage by sea may be found in a variety of documents including the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended; the International Ship and Port Facility Security (ISPS) Code; the ILO / IMO Code of Practice on Security in Ports; and the Standards and the Publicly Available Specifications developed or being developed by the International Organisation for Standardisation (ISO) to address cargo security management and other aspects of supply chain security. Furthermore, the World Customs Organization (WCO) has developed a SAFE Framework of standards to secure and facilitate global trade.

1.4 How to use the Code of Practice (CTU Code)

- 1.4.1 This Code of Practice comprises 13 chapters. Most of them refer to one or more annexes which is highlighted in the text where applicable.
- 1.4.2 Following the introduction in Chapter 1, Chapter 2 lists definitions of terms which are used throughout the Code. Chapter 3 provides catchphrases as an overview on basic safety issues related to the packing of CTUs, briefly described as "dos and don'ts". Detailed information on how to comply with these "dos" and how to avoid the "don'ts" are contained in the following chapters and in the related annexes.

- 1.4.3 Chapter 4 identifies the chains of responsibility and communication for the principle functionaries in the supply chain and is supplemented with Annex 1 on information and documentation flow and, particularly for terminal operators, with Annex 2 on the basic principles for the safe handling and securing of CTUs.
- 1.4.4 Chapter 5 (general transport conditions) describes the acceleration forces and the climatic conditions to which a CTU is exposed during transport. Annex 3 provides additional guidance on the prevention of condensation damages.
- 1.4.5 Chapter 6 (CTU properties), Chapter 7 (CTU suitability) and Chapter 8 (arrival, checking and positioning of CTU) should be considered to select the appropriate CTU for the cargo to be carried and to ensure that the CTU is fit for its intended purpose. Additional guidance to these topics is provided in Annex 4 (approval plates), Annex 5 (condition checks), Annex 6 (receiving CTU) and Annex 7 (minimizing the risk of recontamination). More Information on the properties of the various CTU types is provided in Informative Material IM 2.
- 1.4.6 Chapter 9 (packing cargo into CTUs) is the core chapter of this Code dealing with the actual packing operation. This chapter directs the user to the related provisions in Annex 8, where detailed information on load distribution, securing arrangements, capacity of securing devices and methods for the evaluation of the efficiency of a certain securing arrangement are provided. This annex is supplemented with appendices on packing marks, friction factors and on calculations for load distribution and cargo securing. Guidance for working on the top of tank CTUs or solid bulk CTUs is provided in Annex 9. To facilitate the evaluation of the efficiency of cargo securing arrangements, the “quick lashing guide” provided in Informative Material IM 3 may be helpful. In addition, very detailed information on intermodal load distribution is provided in Informative Material IM 4. Information on manual handling of cargo is provided in Informative Material IM 5. Information on the transport of perishable cargo is provided in Informative Material IM 6.
- 1.4.7 Chapter 10 provides additional advice on the packing of dangerous goods. Chapter 11 describes the actions required on the completion of packing. Information on CTU seals is provided in Informative Material IM 7.
- 1.4.8 Chapter 12 contains advice on the receipt and unpacking of CTUs and is supplemented with Annex 6 (receiving CTUs) and Annex 10 (fumigation). Additional information on the testing of gases is provided in Informative Material IM 8.
- 1.4.9 Chapter 13 outlines the required qualification of personnel engaged in the packing of CTUs. The topics to be included in a training programme are listed in Annex 11.

Table 1: Summary of contents

Chapter	Referenced Annexes	Related Informative Material
1 Introduction		IM 1: Consequences of im-proper packing procedures
2 Definitions		
3 Catchphrases on safety		
4 Chains of responsibility and information	A1: Information and documentation flow A2: Safe handling of CTUs	
5 General transport conditions	A3: Prevention of condensation damage	
6 CTU properties	A4: Approval plates	IM 2: CTU types
7 CTU suitability	A4: Approval plates	
8 Arrival, checking and positioning of CTUs	A4: Approval plates A5: Condition checks A6: Receiving CTUs A7: Avoiding the risk of recontamination	
9 Packing cargo into CTUs	A8: Packing and securing cargo (supplemented with appendices) A9: Access to tank top	IM 3: Quick lashing guides IM 4: Intermodal load distribution IM 5: Manual handling IM 6: Transport of perishable cargo.
10 Additional advice on dangerous goods		
11 On completion of packing		IM 7: CTU seals
12 Advice on receipt and unpacking of CTUs	A6: Receiving CTUs A10: Fumigation	IM 8: Testing CTUs for hazardous gases
13 Training in packing of CTUs	A11: Topics to be included in a training programme	