Code of Practice for Packing of Cargo Transport Units (CTUs)

(CTU Code)

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Preamble

The use of freight containers, swap-bodies, vehicles or other cargo transport units substantially reduces the physical hazards to which cargoes are exposed. However, improper or careless packing of cargoes into/onto such units, or lack of proper blocking, bracing and lashing, may be the cause of personnel injury when they are handled or transported. In addition, serious and costly damage may occur to the cargo or to the equipment.

The person who packs and secures cargo into/onto the cargo transport unit (CTU) may be the last person to look inside the unit until it is opened by the consignee at its final destination. Consequently, a great many people in the transport chain will rely on the skill of such persons, including:

- road vehicle drivers and other road users when the unit is transported;
- rail workers, and others, when the unit is transported by rail;
- crew members of inland waterway vessels when the unit is transported on inland waterways;
- handling staff at inland terminals when the unit is transferred from one transport mode to another;
- dock workers when the unit is loaded or unloaded;
- crew members of a sea going ship which may be taking the unit through its most severe conditions during the transport operation as well as passengers on board RO/RO passenger vessels; and
- those who unpack the unit.

All persons, such as the above, passengers and the public, may be at risk from a poorly packed container, swap-body or vehicle, particularly one which is carrying dangerous goods.

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 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 Security

1.2.1 It is of important that all personnel involved in the packing, security sealing, handling, transport and processing of cargo should are 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.

1.2.2 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.

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

1.3.1 This code of practice comprises of 13 chapters many of which need to be read in conjunction with one or more annexes each of which will be highlighted in the text.

1.3.2 Following the introduction in Chapter 1, Chapter 2 lists definitions of terms which are used throughout the Code and should be read in conjunction with the Acronyms listed in Annex 21. Chapter 3 provides an overview on key requirements for packing 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 later chapters and in the annexes.

1.3.3 Chapter 9 *Packing cargo into CTUs* and Chapter 12 *Advice on receipt and unpacking CTUs* are the two chapters that are of particular importance to those involved with packing and unpacking activities. Chapter 9 is short directing the user to four main annexes, including Annex 14 *Packing and securing cargo into CTUs* which provides the user with detailed instruction for packing different cargoes. For those who require more information about the various subjects found in this Annex, there are a number of Appendices which further describes the calculations required for developing the subject.

1.3.4 Packers are reminded that the success of their packing will be that the cargo reaches its destination and is unpacked safety without injury and transit damage. Chapter 12 is provided in this Code of Practice to ensure that packers are aware of the actions that the un-packer should undertake on arrival. The Chapter also reflects the principle that although the packer’s responsibility is to ensure that the cargo is properly packed and secured in the CTU, everyone in the supply chain has a responsibility to the care of the cargo and this is demonstrated in Chapter 4 *Chains of responsibility and information* which identifies the chains of responsibility and communication for the principle functionaries in the supply chain. Failure to pack CTUs correctly can be seen in Annex 1 *Consequences of improper packing procedures.*

1.3.5 The Code of Practice also provides detailed descriptions of CTU types so that the shipper may select the correct equipment to transport the goods and to understand the benefits of using a particular type of equipment. This is covered in Chapter 6 *CTU properties* and its Annex 6 *CTU types*.

1.3.6 The Code of Practice also provides simple instructions and incorporates a Quick Lashing Guide in Annex 4 *Quick lashing guide*.

1.3.7 International transport involves moving goods from one location to another and often this can involve a reasonable period of time, or delay in supply chain terms. The transport element provides a platform for alien species to be carried across international boundaries while the transport time can cause the goods to deteriorate. The Code of Practice provides information to cover the prevention of re-contaminating cleaned CTUs (Annex 13) the transport of perishable goods (Annex 9) and testing CTU for hazardous gases (Annex 19) which may have built up inside the CTU during transport.

1.3.8 Where there is insufficient information packer and shippers are advised to contact the CTU operator for further guidance.

Chapter 2. Definitions

Cargo transport unit (CTU)	a freight container, swap-body, vehicle, railway wagon or any other similar unit [in particular when used in intermodal transport]
CTU Code	IMO / ILO / UN ECE Code of practice for packing cargo transport units (CTUs).
Roll on / Roll Off Vessel (RO/RO)	a method of maritime cargo service using a vessel with ramps which allows wheeled vehicles to be loaded and discharged without cranes. Also refers to any specialised vessel designed to carry RO/RO cargo.
Packing	the placing and positioning of packaged and/or *unitised* or *overpacked* cargoes into CTUs.
Un packing	The removal of cargo from a CTU.
Package	the complete product of the packing operation, consisting of the *packaging* and its contents as prepared for transport;
Packaging	receptacles and any other components or materials necessary for the receptacle to perform its containment function
Packer	the party that places the goods within the CTU or packaging.
Overpack	an enclosure used by a single shipper to contain one or more packages and to form one unit for convenience of handling and stowage during transport. Examples of overpacks are a number of *packages* either: placed or stacked on to a load board such as a pallet and secured by strapping, shrink-wrapping, stretch-wrapping or other suitable means; or placed in a protective outer packaging such as a box or crate;
Unitised cargo	a single item or a number of items packaged, packed, or arranged in a specified manner and capable of being handled as a unit. Unitisation may be accomplished by placing the item or items in an *overpack* or by banding them securely together. Also known as a *unit load*
Unit load	palletised load or prepacked unit with a footprint conforming to pallet dimensions and suitable for loading into an CTU. See also *unitised load*.
Overloaded	a CTU where the combined mass of the cargo and the CTU is greater than the maximum gross mass shown on the safety approval plate.
Overweight	a CTU where the combined mass of the cargo and the CTU is less than the maximum gross mass shown on the safety approval plate but exceeds either: the maximum gross mass shown on the shipping manifest the road or rail maximum masses when combined with the tare of the container carrying vehicle.
Miss-declared gross mass	a CTU where the combined mass of the cargo and the CTU is different from the mass declared on the transport documents. See also *overloaded* and *overweight*.
Miss-declared cargo	a cargo transported in a CTU which is significantly different from that declared on the transport documentation.
Set Point	Temperature setting on the controller of the refrigeration unit.

Boundary	For the purposes of this Code, this refers to the edges or walls of the CTU, and surrounds the cargo deck.
Grappler arms	Hydraulically operated arms attached to a spreader device or frame that can be used to lift CTUs using specially designed grapple arm sockets built into the base frame of the CTU.
Cargo deck	The area within the CTU boundaries onto which packages may be placed and secured.

Chapter 3. Key requirements

This chapter identify those actions and tasks that are key to the safe packing and transport of cargo.

3.1 General

- **Do** arrange for a safe working environment.
- **Do** use safe handling equipment only.
- **Do** use appropriate personal protective equipment.
- **Do** check that the CTU and any cargo securing equipment are in sound condition.
- **Do not** smoke, eat or drink during packing, securing or unpacking.

3.2 Planning

- **Do** select the most suitable CTU type to accommodate the cargo for the intended transport.
- **Do** prepare a packing plan when deemed necessary.
- **Do** not exceed the permitted payload limits of the unit or the maximum allowed gross mass according to national road and rail regulations.
- **Do** select the securing methods best adapted to the characteristics of the cargo and the properties of the CTU.

3.3 Packing

- **Do** distribute heavy cargo appropriately over the floor area.
- **Do** not concentrate heavy cargo on small areas on the floor.
- **Do** use locking, blocking or lashing or a combination of these methods to prevent the cargo from sliding and tipping in all directions.
- **Do** observe all handling instructions on packages such as "this side up".
- **Do** load with the centre of gravity correctly located in the CTU.
- **Do not** load containers with eccentric load distribution.
- **Do not** build up irregular layers of packages if it could be avoided.
- **Do not** stow heavy goods on top of light goods.
- **Do not** stow goods with tainting odours together with sensitive merchandise.
- **Do not** pack wet and damp goods if it could be avoided.
- **Do not** use securing or protection equipment which is incompatible with the cargo.

3.4 Packing of dangerous goods

- **Do** check that all packages are properly marked and labelled.
- **Do** pack dangerous goods near the door where possible.
- **Do** affix required placards at the exterior of the CTU Do not pack incompatible goods which have to be segregated.
- **Do not** pack damaged packages.

3.5 Securing

- **Do** fill void spaces when necessary.
- **Do** secure the cargo in a way that forces are distributed over a sufficiently large area of a unit.
- **Do** secure each single loaded item independently where necessary.
- **Do** use non slip surface material against sliding of packages where appropriate.
- **Do** use hooks or shackles to fasten lashings where applicable.
- **Do not** secure the cargo with devices overstressing the structure of the CTU.

- **Do not** overstress securing devices.
- **Do not** fasten web lashings by means of knots.

3.6 On completion of packing

- **Do** determine the correct gross mass of the CTU.
- **Do** affix a seal when required.
- **Do** include the CTU number, the correct gross mass and, when required, the seal number in the documents.
- **Do** provide a packing certificate when required.

3.7 Unpacking

- **Do** check that the identification number on the CTU and, when the CTU is sealed, the seal serial number, are as shown on the transport documentation.
- **Do** check the exterior of the CTU for signs of leakage or infestation.
- **Do** use proper equipment to cut the seal if existing.
- **Do** open the CTU with caution as cargo might fall out.
- **Do** record every package as it is removed noting any markings and damages.
- **Do** remove all securing and protection material for re-use, recycle or dispose.
- **Do** clean the interior of the CTU to remove all traces of the cargo, especially loose powders, grains and noxious materials, unless otherwise agreed.
- **Do** remove all dangerous goods marks from the exterior of the CTU once it has been cleaned.

Chapter 4. Chains of responsibility and information

4.1 Chain of responsibility

4.1.1 In general, transport operations using cargo transport units in particular, involve various parties each of whom have a responsibility to ensure that the cargo is transported through the supply chain without incident. Notwithstanding any national legislation or contracts between the involved parties the chain of responsibility discussed below identifies the functional responsibilities of the parties involved.

4.1.2 During transport, the carrier is not responsible for the contents of a CTU. The shipper should deliver a cargo which is safe and suitable for transport. Thus, the shipper remains responsible for any deficiencies of the CTU that is a result of poor packing and securing. However, when the shipper is neither the packer nor the consignor, the packer or the consigner should fulfil their obligation to the shipper in providing the CTU that is safe for transport.. In turn the shipper may hold those parties responsible for any faults or deficiencies that can be attributed to poor packing, securing, handling or reporting procedures.

4.1.3 Within this chain of responsibilities, each party in the chain should comply with their individual responsibilities and in doing so increase safety and reduce the risk of injury to persons involved in the supply chain.

4.1.4 All persons involved in the movement of CTUs also have a duty to ensure that the CTU is not infested with insects or other animals, or that the CTU is not carrying illegal goods or immigrants, contraband or undeclared or miss-declared cargoes in accordance with their responsibility in the supply chain.

4.1.5 The supply chain is a complex operation and individual modes of transport may have defined terms for parties within the supply chain which are not consistent with other modes of transport. Therefore for the purposes of this Code of Practice the following definitions refer to functions undertaken in the supply chain:

Carrier	the party who, in a contract of carriage, undertakes to perform or to procure the performance of carriage by rail, road, sea, air, inland waterway or by a combination of such modes Can be further classified as; • road haulier • rail operator • shipping line.
Consignee	the party to whom a cargo is consigned under a contract of carriage or a transport document or electronic transport record. Also known as the receiver.
Consignor	the party who prepares a consignment for transport.. If the consignor contracts the transport operation with the carrier, the consignor will undertake the function of the shipper and may also be known as: • the shipper (maritime) • the sender (road transport)
Consolidator	the party performing a consolidation service for others. The consolidator takes advantage of lower full carload (FCL) rates, and passes on the savings to shippers.
Freight forwarder	the party who organises shipments for individuals or other companies and may also act as a carrier. When the freight forwarder is not active as a carrier, it acts only as an agent, in other words as a third-party (non-asset-based) logistics provider who dispatches shipments via asset-based carriers and that books or otherwise arranges space for these shipments
Packer	the party that places the goods within the CTU; the packer may be contracted either by the consignor, by the shipper or by the carrier; if the consignor or the shipper packs a CTU within his own premises, the consignor or the shipper is also the packer

Shipper	the party named on the bill of lading or waybill as shipper and/or who (or in whose name or on whose behalf) a contract of carriage has been concluded. with a carrier. Also known as the sender
Intermodal operator	the party who provides a service to transfer and / or stow CTUs. May be subdivided into: • Maritime terminal operator • Rail terminal • Inland waterway port
CTU Operator	The party who owns or operates the CTU and provides empty CTUs to the consignor / shipper / packer.

4.1.6 A single entity may undertake one or more of the functions listed and the flow of information between the functions are discussed further in Annex 2 Part 1.

4.2 Functions within the supply chain

Between the different functions involved in an intermodal transport chain, the tasks are assigned as follows:

4.2.1 The CTU operator is responsible for providing CTUs that:

- are fit for purpose;
- comply with international structural integrity requirements:
- comply with international or national safety regulations;
- are clean
- are free from pests
- are free from fumigants or other noxious substances.

4.2.2 The consignor is responsible for

- correctly describing the goods including the mass of each item of goods as well as the total payload;
- notifying the packer / shipper of any unusual transport parameters of individual packages, for example, the offset of the centre of gravity or transport temperatures which should not be exceeded or undercut;
- ensuring that packages and unit loads are suitable to withstand the stresses which are to be expected under normal transport conditions;
- providing all the information that is required for proper packing;
- ensuring that goods in packages and unit loads are adequately secured to prevent damage to the packaging during transport;
- ensuring that goods are ventilated so that any noxious or harmful gases are permitted to vent off before packing;
- ensuring that dangerous goods are correctly classified, packed and labelled;
- ensuring the dangerous goods transport document is completed, signed and transmitted to the packer, forwarder and carrier as applicable.

4.2.3 The packer is responsible for

- ensuring that the CTU is checked before packing and that the condition of the CTU is suitable for the cargo to be transported;
- ensuring that the floor of the CTU is not overstressed during packing operations;
- ensuring that the cargo is correctly distributed in the CTU and properly supported where necessary;
- ensuring that the CTU is not overloaded;
- ensuring that the cargo is sufficiently secured in the CTU;
- ensure that measures are put in place to prevent the movement of pests, such as closing doors and tarpaulins once packing has started but not taking place and lights that minimise the attraction of insects;
- properly closing the CTU and sealing it, if and when applicable, and reporting seal details to the shipper;

- fitting marks and placards to the CTU as required by dangerous goods regulations;
- fitting the fumigation mark if any fumigant has been used as part of the packing process.
- properly determining the gross mass[1] of the CTU and transmitting it to the shipper;
- completing the CTU packing certificate as appropriate and forwarding any documentation to the shipper.

The packer should also pass on information relating to any container CTU with a reduced stacking capacity (less than 192,000 kg marked on the CSC Safety Approval Plate)[2], to the shipper;

4.2.4 The shipper is responsible for:

- the work distribution concerning packing and securing is clearly agreed and communicated to the consignor and carrier/carriers
- a suitable CTU is used for the intended cargo for the intended transport
- the CTU used for the intended transport is in good condition, checked for serious deficiencies and cleaned before supplied to the consignor or packer
- suitable modes of transport are selected to minimize the risk of accidents and damages for the actual cargo
- all required documents are received from the consignor and from the packer;
- the cargo inside the CTU is fully and accurately described, based upon the documents received;
- ensuring that the gross mass of the CTU is accurately determined, based upon the documents received;
- the accurate description of the cargo[3] and the verified gross mass is communicated to the carrier before the transport operation commences;
- in case of sea transport, the description of the cargo and the verified gross mass is communicated to the carrier as early as required by the carrier;
- in case of dangerous goods, the transport document and (for sea transport) the packing certificate is transmitted to the carrier before the transport commences respectively as early as required by the carrier;
- the seal number (if and when applicable) is communicated to the carrier;
- any extraordinary properties such as reduced stacking capacity or out of gauge are communicated to the carrier.
- the shipper's declaration is accurate
- shipping instructions are despatched to the carrier on time and that the CTU meets the outbound delivery window
- the CTU arrives at the terminal before the stated cargo cut off time.
- the transmission of information concerning the consignment and description of packages to the consignee.

4.2.5 The road haulier is responsible for:

- confirming that the gross mass, length, width and height of the vehicle are within the national road / highway regulations limits;
- ensuring that the driver is able to get sufficient rest and does not drive when fatigued.
- moving the CTU in such a manner that there are no exceptional stresses placed on the CTU or the cargo. This means that the driver of road vehicles must be aware of the idiosyncrasies of the cargo and drive accordingly, for example: bulk liquids carried in flexitanks within general purpose containers or hanging cargo such as sides of beef carried in refrigerated vehicles.

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1 [The gross mass needs to be verified before any transport operation commences. Incorrect gross masses are a hazard for any mode of transport. Therefore, the mass verification should be carried out before the unit leaves the premises of the packer. If a certain transport mode deems it necessary that a re-verification has to take place when the CTU is transferred from one mode to another, this is beyond the scope of this Code of Practice and may be regulated in the regulations of that mode. Where a cargo is to be transported by road or rail only, the packer need only provide the net mass to the carrier when the tare of the transport vehicle is not known.]

2 As of January 1st 2012, all ISO containers with reduced stacking or racking strength are required by the International Convention for Safe Containers (CSC) to be marked in accordance with the latest version of ISO 6346: Freight containers – Coding , identification and marking.

3 A description of the cargo should include a description of the goods and the packaging, for example wine in a flexitank, hard frozen hanging beef sides or a number of packages.

4.2.6 The rail haulier is responsible for:

- handling the CTU in a manner that would not cause damage to the cargo;
- securing the CTU properly on the rail wagon;

4.2.7 The intermodal operator is responsible for:

- ensuring that pest prevention methods are in place and that pests are not inadvertently transported on CTUs which may include removal of muds and soils from the CTU.
- comply with section Annex 3 if the intermodal operator is a marine terminal operation handling containers.

4.2.8 The carrier is responsible for:

- monitoring agreed temperatures in the CTUs where applicable and reacting to changes as appropriate;
- securing the CTU on the means of transport;
- transporting the CTU in compliance with agreements and all applicable regulations.
- providing trained personnel to deal with all cargo types (break-bulk, bulk wet and dry cargoes, dangerous goods, out of gauge, refrigerated, un-containerised)..

4.2.9 The consignee / receiver of CTUs is responsible for:

- not overstressed the floor of the CTU during unpacking operations;
- correctly ventilating the CTU before entering;
- confirming that the atmosphere within the CTU is not hazardous before permitting persons to enter it;
- detecting any damage to the CTU and to notify the carrier;
- returning the CTU to the carrier completely empty and clean, unless otherwise agreed;
- removing all irrelevant marks or placards for dangerous goods.

4.2.10 All functions should minimise the risk of re-contamination of CTUs when at their facility.

- pest management programs that include lighting, netting, fencing, trapping and sanitation should be used to exclude pests
- remove any pest or contaminant that has been introduced while on site at terminal facility

Note: Re-contamination of CTUs can be categorised into two types, Low Level Contamination and High Level Contamination.

Low level contamination (non-actionable)

Low level contamination can be defined as small amounts of soil of sufficient depth that can be removed immediately or within five minutes, with minimal effort or use of equipment. Containers that have low levels of contamination completely removed from them will be allowed to exit the wharf gate without any further quarantine intervention at that point.

High level contamination (actionable)

A high level of soil contamination is defined as being of such a depth and quantity that the checker cannot easily remove the soil adhering to the container, is inaccessible, is of a high volume or quantity and is imbedded or attached to a degree that only mechanical (e.g. high pressure cleaning) methods can be employed to remove the contamination.

Containers with high levels of contamination are directed to a quarantine approved premises for treatment/cleaning prior to release back into the import pathway.

4.2.11 All functions should ensure that the flow of information is transmitted to parties identified in the transport contract along the supply chain. The information should include:

- the identification of any hazard that may be present for all or some of the journey
- CTU identification
- seal number (if and when applicable)
- verified gross mass of the CTU
- accurate description of the cargo carried in the CTU
- the proper shipping name of dangerous goods
- correct and appropriate transport documentation (see Annex 3 Part 2)
- any information required for safety and / or custom’s purposes.

Chapter 5. General transport conditions

5.1 General

5.1 Within the supply transport chain, there are a number of different stresses acting on the cargo. These stresses may be grouped into mechanical and climatic stresses. Mechanical stresses are forces acting on the cargo under specific transport conditions. Climatic stresses are changes of climatic conditions including extremely low or high temperatures.

5.2 This chapter provides information for packers who need to calculate the number of lashings or the size of blocking and bracing and should be read in conjunction with Chapter 9 and its associated annexes.

5.3 Packers should use the acceleration coefficients shown in the table below when undertaking their calculations.

5.4 Annex 4 provides worked examples of securing methods and the number of lashings required that may be used by packers rather than undertaking their own calculations. However the use of the quick lashing guides does not release the packer from their responsibility to properly secure packages and goods within CTUs.

5.5 During transport various forces will act on the cargo. The force acting on the cargo is the mass of the cargo (m) which is measured in kg or tonne, multiplied by the acceleration (a) which is measured in m/s^2.

$$\mathbf{F = m \cdot a}$$

Acceleration considered during transport are the gravitational acceleration ($a = g = 9.81\ m/s^2$) and acceleration caused by typical transport conditions such as by the braking or rapid change of traffic lanes by a road vehicle or by the motions of a ship in heavy sea. Acceleration is expressed as product of the gravitational acceleration (g) and a specific acceleration coefficient (a_{xyz}) e.g. $a = 0.8\ g$.

5.6 The following tables provide the applicable acceleration coefficients for the different modes of transport and for the various securing directions. To prevent a cargo from movement, the cargo has to be secured in longitudinal and transverse direction according to the worst combination of acceleration in each direction (see Chapter 9).

Road transport				
Securing in	**Acceleration coefficients**			
	Longitudinally (a_x)		Transversely (a_y)	Minimum vertically down (a_z)
	forward	rearward		
Longitudinal direction	0.8	0.5	-	1.0
Transverse direction	-	-	0.5	1.0

Rail transport (combined transport)				
Securing in	**Acceleration coefficients**			
	Longitudinally (c_x)		Transversely (c_y)	Minimum vertically down (c_z)
	forward	rearward		
Longitudinal direction	0.5†	0.5†	-	1.0†
Transverse direction	-	-	0.5	1.0†
† **Values apply for normal transport conditions. Under abnormal conditions and acceleration duration of 150 ms or shorter, a_x may increase to 1.0 and c_z may decrease to 0.7**				

Sea transport					
Significant wave height in sea area		**Securing in**	**Acceleration coefficients**		
			Longitudinally (a_x)	Transversely (a_y)	Minimum vertically down (a_z)
A	$H_s \leq 8$ m	Longitudinal direction	0.3	-	0.5
		Transverse direction	-	0.5	1.0
B	8 m < $H_s \leq 12$ m	Longitudinal direction	0.3	-	0.3
		Transverse direction	-	0.7	1.0
C	$H_s > 12$ m	Longitudinal direction	0.4	-	0.2
		Transverse direction	-	0.8	1.0

5.7 The effect of short term impact or vibrations should always be considered. Therefore, whenever the cargo cannot be secured by blocking, lashing is always required. The mass of the cargo alone, even when combined with a high friction coefficient (see Chapter 9 and Appendix 3 to Annex 14), does not sufficiently secure the cargo as the cargo can move due to vibrations.

5.8 The significant 20-years return wave height (H_s) is the average of the highest one-third of waves (measured from trough to crest) that is only exceeded once in 20 years. The allocation of geographic sea areas to the respective significant wave heights is shown in the following table.

A	B	C
$H_s \leq 8$ m	8 m < $H_s \leq 12$ m	$H_s > 12$ m
Baltic Sea (incl. Kattegat) Mediterranean Sea Black Sea Red Sea Persian Gulf Coastal or inter-island voyages in following areas: Central Atlantic Ocean (between 30°N and 35°S) Central Indian Ocean (down to 35°S) Central Pacific Ocean (between 30°N and 35°S)	North Sea Skagerak English Channel Sea of Japan Sea of Okhotsk Coastal or inter-island voyages in following areas: South-Central Atlantic Ocean (between 35°S and 40°S) South-Central Indian Ocean (between 35°S and 40°S) South-Central Pacific Ocean (between 35°S and 45°S)	unrestricted

Sources:

The Royal Netherlands Meteorological Institute (KNMI):
The KNMI/ERA-40 Wave Atlas, derived from 45 years of ECMWF reanalysis data
(ed. S.Caires, A.Stern, G.Komen and V.Swail), last updated 2011,
Hs 100-yr return values, 1958 – 2000

5.9 During longer voyages, climatic conditions (temperature, humidity) are likely to vary considerably. These may affect the internal conditions in a CTU which may give rise to condensation on cargo or internal surfaces (see Annex 5).

5.10 Whenever a specific cargo might be damaged when exposed to high or low temperatures during transport, the use of a CTU specially equipped for keeping the cargo temperature within acceptable limits should be considered (see Chapter 7).

Chapter 6. CTU Properties

6.1 Introduction

6.1.1 When planning a consignment for transport the shipper should ensure that they select the best possible CTU for the cargo and the probable route. If the shipper is uncertain further information can be found in Annex 6 or by contacting the CTU operator.

6.1.2 Packers should acquaint themselves with the benefits and deficiencies of each type of CTU with particular reference to:

- net mass capacity
- flooring strength
- anchor points
- thermal capabilities
- security
- weatherproofness

6.2 Containers

6.2.1 A container is a transport containment of permanent character with a structural strength that will resist repeated use. It is designed to facilitate the carriage of goods through one or more modes of transport without intermediate reloading and fitted with standardised corner fittings permitting easy handling, stacking and securing in the modes of transport; sea, road and rail.

6.2.2 The inner and outer dimensions of containers are standardized by ISO. The details are shown in Annex 6 part 1.

6.2.3 The maximum gross mass and the permitted payload of a container depend on standardised design parameters. The International Convention for Safe Containers requires each container to carry a CSC approval plate, where the maximum permitted gross mass is specified (see Annex 8 part 3 and sub-section 8.2.1). Additionally, the tare mass and the payload are marked in painted letters on the door or on the rear end of the container.

6.2.4 With the exception of platforms (a container deck without walls), loaded containers are capable to be stacked. This feature is mainly used in land-based storage areas and on ships during a sea passage. The permissible stacking mass is displayed on the approval plate. The current standard stacking mass is 213,360 kg while older containers have a stacking mass value of 192,000 kg. Containers with a stacking mass above 192,000 kg may be transported without restriction. However, containers with a stacking mass value below 192,000 kg do also exist and require special attention when used for intermodal transport, in particular for the stowage in stacks on seagoing vessels (see sub-sections 7.3.1 and 8.2.1).

6.2.5 General cargo containers are available as closed box containers, ventilated containers and open top containers. The side walls are capable to withstand a uniform load equal to 60% of the permitted payload. The front wall and the door end are capable to withstand 40% of the permitted payload. These limitations are applicable for a homogenous load to the relevant wall area and do not exclude the capability of absorbing higher forces by the framework of the container. The container floor is primarily designed to sustain the total payload homogenously distributed over the bottom structure. This results in limitations for concentrated loads (see Annex 14 Part 2 and 3).

6.2.6 Most general cargo containers have a limited number of lashing rings or bars. When lashing rings are fitted, the anchor points at the bottom have a MSL of at least 10 kN in any direction. Recently built containers generally have anchor points with a MSL of 20 kN (2,000 kgf). The lashing points at the top side rails have a MSL of at least 5 kN.

6.2.7 Container floors are built to withstand a maximum wheel pressure corresponding to an axle load of a fork lift truck of 7,260 kg or 3,630 kg per wheel[4]. Such axle loads are typical for FLTs with a lifting capacity of 3 tonnes. Containers covered by the CSC are only required to withstand an axle load of 5,460 kg or 2,730 kg per wheel.[5]

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[4] ISO1496-1:1990 Amd. 3:2005

[5] International Convention for Safe Containers, 1972 (CSC) Annex II.

6.2.8 Closed box containers generally have labyrinth protected openings for venting (pressure compensation), but these openings do not measurably support air exchange with the ambient atmosphere. Special type "ventilated containers" have weatherproof ventilation grills built into the top and bottom side rails and the front top rail and bottom sill, through which the natural convection inside the container is intensified and a limited exchange of air and humidity with the ambient atmosphere is established.

6.2.9 An open top container is similar to a closed box container in all respects except that it has no permanent rigid roof. It may have a flexible and moveable or removable cover, e.g. of canvas, plastic or reinforced plastic material. The cover is normally supported by movable or removable roof bows. In some cases the removable roof is a compact steel construction suitable to be lifted off in one piece. The header (transverse top rail above the doors) is generally movable or removable (known as swinging headers). The headers are part of the container strength and should be fitted to have full strength of the container.

6.2.10 Open side containers have a curtain or canvas on one or both sides, a rigid roof and rear doors. While the strength of the end walls is similar to that of closed box containers, the side curtain provides limited or no restraint capability. Open side containers are not covered by the ISO standard.

6.2.11 Platforms and platform based containers are characterized by having no side superstructure except either fixed or collapsible end walls (flatracks) or are designed without any superstructure (platforms). The benefit of collapsible end walls is that the flatrack may be efficiently stacked when transported in empty condition for repositioning.

6.2.12 Flatracks and platforms have a bottom structure consisting of at least two strong longitudinal H-beam girders, connected by transverse stiffeners and lined by solid wooden boards. For securing of cargo units, strong lashing brackets are welded to the outer sides of the longitudinal bottom girders with a MSL of at least 30 kN according to the standard. In many cases the lashing points have a MSL of 50 kN. Cargo may also be secured in longitudinal direction by shoring to the end walls of flatracks. These end walls may be additionally equipped with lashing points of at least 10 kN MSL.

6.2.13 Thermal containers are designed for the transport of cargo under temperature control. Such cargo is generally homogenously packed and tightly stowed from wall to wall. Therefore, the side and end wall strength is similar to that of general cargo containers. However, thermal containers are generally not equipped with anchor and lashing points. When a cargo needs to be secured by lashings, specific fittings should be affixed to the “T” section gratings, thus providing the required anchor points.

6.2.14 A tank container comprises two basic elements, the tank shell (or shells in case of a multiple-compartment tank container) and the framework. The framework is equipped with corner fittings and renders the tank suitable for intermodal transport. The frame shall comply with the requirements of CSC Convention. If dangerous goods are intended to be carried in the tank, the shell and all fittings such as valves and pressure relief devices must comply with the applicable Dangerous Goods Regulations.

6.2.15 A non-pressurised dry bulk container is a container especially designed for the transport of dry solids, capable of withstanding the loads resulting from filling, transport motions and discharging of non-packaged dry bulk solids, having filling and discharging apertures and fittings. There are box type containers for tipping discharge, having filling and discharge openings and also a door. A variant is the hopper type for horizontal discharge, having filling and discharge openings but no doors. The front and rear end walls of solid-bulk containers are reinforced and so constructed to bear a load equal to 60% of the payload. The strength of the side walls is similar to that of general purpose containers.

6.3 Swap bodies

6.3.1 A swap body is a typical European transport containment of a permanent character designed for road and rail transport. Swap bodies are generally 2.5 m or 2.55 m wide and are subdivided into three length categories:

- Class A: 12.2 to 13.6 m long (maximum gross mass 34 tons)
- Class B: 30ft (9.125 m long)
- Class C: 7.15, 7.45 or 7.82 m long (maximum gross mass 16 tons).

6.3.2 Swap bodies are fixed and secured to the vehicles with the same devices as ISO containers, but owing to the size difference, these fittings are not always located at the swap body corners.

6.3.3 Stackable swap bodies have top fittings enabling the handling with standard ISO container handling equipment. Alternatively, the swap body may be handled using grappler arms, inserted into the four recesses in the bottom structure. Swap bodies not suitable for stacking can only be handled with grappler arms. Class C swap bodies can be transferred from the road vehicle to their supporting legs and returned to the vehicle by lowering or raising the carrier vehicle on its wheels.

6.3.4 The standard box type swap body has a roof, side walls and end walls, and a floor and has at least one of its end walls or side walls equipped with doors. Class C swap bodies complying with Standard EN 283 have a defined boundary strength: the front and the rear end are capable to withstand a load equal to 40% of the permitted payload, the sides are capable to withstand 30% of the permitted payload. For a box unit the side load may be uniformly distributed over the side. For a cover-stake body type 24% of the load has to be distributed over the drop side and the remaining 6% over the rest of the side. The sides in a curtain sided swap body may not be used for cargo securing.

6.3.5 Floors of swap bodies are built to withstand corresponding axle loads of 4,400 kg and wheel loads of 2,200 kg (reference: EN 283). Such axle loads are typical for FLTs with a lifting capacity of 2.5 tonnes.

6.3.6 The open side swap body is designed similarly to a standard curtain side semi-trailer. It has an enclosed structure with rigid roof and end walls and a floor. The sides consist of removable canvas or plastic material. The side boundary may be enforced by battens.

6.3.7 A thermal swap body is a swap body that has insulating walls, doors, floor and roof. Thermal swap bodies may be insulated, but not necessarily equipped with mechanical device for cooling. A variant is the mechanically refrigerated swap reefer.

6.3.8 A swap tank is a swap body that consists of two basic elements, the tank or tanks, and the framework. The tank shell of a swap tank is not always fully enclosed by the frame work

6.3.9 A swap bulker is a swap body that consists of the containment for the dry solids in bulk without packaging. It may be fitted with one or more round or rectangular loading hatches in the roof and "cat flap" or "letter box" discharge hatches in the rear and/or front ends.

6.3.10 More information on swap bodies is provided in Annex 6 part 2.

6.4 Regional and domestic containers

6.4.1 Regional and domestic containers are designed and manufactured to meet the needs of local transport operations. They may have the appearance of an ISO container, but unless fitted with a CSC safety approval plate they may neither be carried in international road or rail transport nor by sea.

6.4.2 More information is provided in Annex 6 part 3.

6.5 Roll trailers

6.5.1 Roll trailers are exclusively used for the transport of goods in RO/RO ships and are loaded or unloaded and moved in port areas only. They present a rigid platform with strong securing points at the sides, and occasionally brackets for the attachment of cargo stanchions. The trailer rests on one or two sets of low solid rubber tyres at about one third of the length and on a solid socket at the other end. This end contains a recess for attaching a heavy adapter, the so-called gooseneck. This adapter has the king-pin for coupling the trailer to the fifth wheel of an articulated truck.

6.5.2 The packing of a roll trailer with cargo or cargo units must be planned and conducted under the conception that the cargo must be secured entirely by lashings. However, roll trailers are available equipped with standardised locking devices for the securing of ISO containers and swap bodies (Annex 6 part 4).

6.6 Road vehicles

6.6.1 Road vehicles are available in a number of different formats and designs. More information on these various types is provided in Annex 6 part 5.

6.6.2 Most vehicles have a strong front wall integrated into the closed superstructure. Closed superstructures of road vehicles may be provided with arrangements for applying approved seals.

6.6.3 Semi-trailers suitable for combined road/rail transport are generally equipped with standardised recesses for being lifted by suitable cranes, stackers or forklift trucks, to enable the lifting transfer from road to rail or vice versa.

6.6.4 Road vehicles are allocated a specific maximum payload. For road trucks and full trailers the maximum payload is a constant value for a given vehicle and should be documented in the registration papers. However, the maximum allowed gross mass of a semi-trailer may vary to some extent with the carrying capacity of the employed articulated truck as well as in which country it is operating. The total gross combination mass, documented with the articulated truck, must never be exceeded.

6.6.5 The actual permissible payload of any road vehicle depends distinctly on the longitudinal position of the centre of gravity of the cargo carried. In general, the actual payload must be reduced if the centre of gravity of the cargo is conspicuously off the centre of the loading area. The reduction should be determined from the vehicle specific load distribution diagram (see Annex 7 and Annex 14 sub-section 3.1.7). Applicable national regulations on this matter must be observed. In particular ISO closed containers transported on semi-trailers with the doors at the rear of the vehicle quite often tend to have their centre of gravity forward of the central position. This may lead to an overloading of the articulated truck if the container is loaded toward its full payload.

6.6.6 The boundaries of the loading platform of road vehicles may be designed and made available in a strength that would be sufficient – together with adequate friction – to retain the cargo under the specified external loads of the intended mode of transport. Such advanced boundaries may be specified by national or regional industry standards[6]. However, a large number of road vehicles are equipped with boundaries of less resistivity in longitudinal and transverse direction, so that any loaded cargo must be additionally secured by lashings and/or friction increasing material. The rating of the confinement capacity of such weak boundaries may be improved if the resistance capacity is marked and certified for the distinguished boundary elements of the vehicle.

6.6.7 Road vehicles are generally equipped with securing points along both sides of the loading platform. These points may consist of flush arranged clamps, securing rails or insertable brackets and should be designed for attaching the hooks of web lashings and chains. The lashing capacity of securing points varies with the maximum gross mass of the vehicle. The majority of vehicles is fitted with points of a lashing capacity (LC) or maximum securing load (MSL) of 20 kN. Another type of variable securing devices are pluck-in posts, which may be inserted into pockets at certain locations for providing intermediate barriers to the cargo. The rating of the lashing capacity of the securing points may be improved if their capacity is marked and certified.

6.7 Railway wagons

6.7.1 In intermodal transport, railway wagons are used for two different purposes: First, they may be used as carrier unit to transport other CTUs such as containers, swap bodies or semi-trailers. Second, they may be used as a CTU themselves which is packed or loaded with cargo and run by rail or by sea on a railway ferry (see Annex 6 part 6).

6.7.2 The first mentioned purpose is exclusively served by open wagons, which are specifically fitted with devices for securing ISO containers, inland containers and swap bodies or have dedicated bedding devices for accommodating road vehicles, in particular semi-trailers. The second mentioned purpose is served by multifunctional closed or open wagons, or wagons which have special equipment for certain cargoes, e.g. coil hutches, pipe stakes or strong lashing points.

6.7.3 On board ferries the shunting twin hooks are normally used for securing the wagon to the ship's deck. These twin hooks have a limited strength and therefore some wagons are equipped with additional stronger ferry eyes. These external lashing points should never be used for securing cargo to the wagon.

6.7.4 The maximum payload is generally not a fixed value for the distinguished wagon, but allocated case by case by means of the intended track category and the speed category. More details are provided in Annex 8 sub-section 6.1.2.

6.7.5 In case of concentrated loads a reduction of the payload is required, which depends on the loaded length and the way of bedding the concentrated load. The applicable load figures are marked on each wagon. Also any longitudinal or transverse eccentricity of concentrated loads is limited by the individual axle load capacity or the wheel load capacity. More details are provided in Annex 8 sub-section 6.1.6.

[6] EN 12642:2007

6.7.6 Closed railway wagons are designed for the compact stowage of cargo. The securing of cargo should be accomplished by tight packing or blocking to the boundaries of the wagon. However, wagons equipped with sliding doors should be packed in a way that doors remain operable.

6.7.7 When a railway ferry is operating between railway systems of different gauges, wagons which are capable for changing their wheel sets over from standard gauge to broad gauge or vice versa are employed. Such wagons are identified by the first two figures of the wagon number code.

Chapter 7. CTU suitability

7.1 Suitability in general

7.1.1 ISO containers and some other types of CTU (e.g. swap bodies for rail transport in Europe) require type approval. In addition, depending on the type, the verification of a periodic or continuous examination scheme might be required as well. A CTU requiring approval (and examination) and not bearing a valid approval plate is not suitable for transport (see sub-section 8.2.1).

7.1.2 Containers and swap bodies showing major defects in their structural components

(e.g. top and bottom side rails, top and bottom end rails, door sills and header, floor cross members corner posts and corner fittings) may place persons into danger and are therefore not suitable for transport (see sub-section 8.2.2).

7.1.3 Road vehicles, semi-trailers and railway wagons showing deterioration in major structural components or other obvious defects impede the safe traffic on road or rail and are therefore not suitable for transport.

7.2 Suitability for the cargo

7.2.1 All cargo which is sensitive against weather conditions such as:

- rain,
- snow,
- dust, and
- sunlight; or
- against theft and other consequences of easy access

should be carried in a closed or sheeted CTU. Box containers, closed or sheeted swap bodies, semi-trailers and other road vehicles are suitable for most cargoes.

7.2.2 Single packages such as:

- cartons stacked by hand,
- drums or similar packages stacked by forklift truck or
- any kind of palletized cargo

can be packed and preferably stowed from boundary to boundary. However, it depends on the type of CTU, whether such firm stowage alone provides sufficient cargo securing or whether additional securing is needed (see section 9.4).

7.2.3 Certain cargoes such as cocoa or other agricultural products are sensitive against climatic effects and may be damaged when the humidity within the CTU is condensed due to a decrease of temperature. This effect is specific for long distance sea transport and can be controlled by appropriate ventilation. Standard box containers however allow only restricted air changes. Therefore, specially designed containers with increased ventilation may be preferred for such sensitive cargo (see Annex 6 sub-section 1.2.3).

7.2.4 Certain perishable cargoes such as foodstuffs and, in particular, deep frozen products, require transport at low temperatures. Other products, e.g. certain chemicals, need to be protected from frost. Such commodities should be transported in insulated and temperature controlled CTU which can be refrigerated or heated as appropriate.(See Annex 9)

7.2.5 Heavy items such as granite and marble blocks may also be packed into closed CTUs. However, this cargo cannot be simply stowed from wall to wall. Bracing and blocking against the frame of the CTU and / or lashing to the securing points is necessary (see Annex 14 section 4.3). As the lashing capacity of the securing points in general purpose containers is limited, such standard containers might not be appropriate for certain large and heavy cargo items. Instead, platforms or flatracks could be used.

7.2.6 Cargo items of extreme dimensions may not fit inside a standard CTU as they exceed the inner width, length and perhaps also the height of the unit. Such cargo may be accommodated on a platform or on a flatrack. When the cargo is only “over-height” but not “over-width” an open top CTU may also be suitable.

7.2.7 Heavy cargo items lifted by a fork lift truck may result in a front axle load exceeding the maximum permissible concentrated load inside a CTU. For example modern ISO containers are designed to withstand a force of 0.5 kN/cm^2 which may limit package masses to approximately 3 to 3.5 tonnes depending on the type of fork truck used. For heavy cargo, open top, open side or platform CTUs should be used so that the cargo can be loaded from the top or from the side without a need to drive into the CTU with the forklift truck. For load distribution see Annex 14 section 3.1.

7.2.8 Some cargoes such as scrap metal are usually handled by grabs or by conveyors. When this cargo is to be loaded into a CTU and a conveyor is not available, the only suitable CTU type is an open top CTU capable to be loaded with grabs. Placing the CTU vertically on its end and "pouring" the cargo in through the open doors is not permitted.

7.2.9 General purpose CTUs are not suitable for certain long, heavy and irregular cargo items such as timber logs, as the side walls are not designed to withstand the acceleration forces of such cargo and may suffer bulging damages. Stowage in shape of a pyramid and securing by lashing is extremely difficult in a box container, because the securing points are not accessible after this cargo is loaded, unless the lashings are arranged before loading. Therefore, such cargo should preferably be carried only on platform or flatrack CTUs.

7.2.10 Liquid and solid bulk cargoes should be preferably transported in tank CTUs or solid bulk CTUs. Under certain conditions, liquid bulk cargo may be carried in flexitanks which are stowed in box containers. Similarly, solid bulk may be carried in box containers which are equipped with a liner. However, containers used for such purposes should be suitably re-enforced and prepared, operational restrictions regarding the permissible payload should be observed (see Annex 14 Part 5).

7.3 Suitability for the transport mode

7.3.1 Containers, including swap bodies and regional containers designed for stacking and approved under the CSC convention are basically suitable for all modes of transport. However, containers having an allowable stacking mass of less than 192,000 kg marked on the approval plate (see Annex 8 part 2) require special stowage on board a ship, where the superimposed stacking mass will not exceed the permitted limits as marked on the plate. Furthermore, some ISO containers and swap bodies may have a gross mass of 34 tons or higher for which some road chassis and railcars will not be capable of carrying such heavy units (see Annex 6) Therefore, especially for heavy massed containers, it is of utmost importance to arrange for an appropriate chassis and tractor vehicle or railcar, as applicable.

7.3.2 As the maximum permissible payload of a railcar is not a fixed value for the distinguished wagon but depends in addition on the track category of the railway network (see Annex 8 section 6.1), the railway operator should be contacted when necessary, in order to prevent overloading.

7.3.3 Swap bodies and semi-trailers are designed for an easy change of the means of transport. In most cases this might be an interchange between different carrier vehicles for swap bodies or different tractor vehicles for semi-trailers. When an intermodal change from road to rail is intended, it should be ensured that the swap body or the semi-trailer is capable of being lifted by grappler arms and approved for rail transport.

7.3.4 CTUs on Ferries

7.3.4.1 When road vehicles or semi-trailers are intended to be transported on a RO/RO ship, they should be equipped with securing points of a defined minimum strength in sufficient number according to the table below[7]:

Gross vehicle mass (GVM (tonnes)	Minimum number of securing points on each side of the vehicle	Minimum strength of each securing point (kN)
3.5 ≤ GVM ≤ 20	2	$\frac{\text{GVM x 10 x 1.2}}{n}$
20 < GVM ≤ 30	3	
30 < GVM ≤ 40	4	
40 < GVM ≤ 50	5	
50 < GVM ≤ 60	6	

where *n* is the total number of securing points on each side of the vehicle

[7] See IMO Resolution A.581(14)

7.3.4.2 Road trains, comprising two or more trailers, require each trailer to be considered in isolation and be fitted with, and secured by, the minimum number of securing points for the GVM of that trailer component. Semi-trailer tractor or towing vehicles are excluded from the table and should be provided with two securing points or a towing coupling at the front of the vehicle.

7.3.4.3 When railway wagons are intended to be transported on a railway ferry, they should be capable to pass over the kink angle of the ferry ramp and to pass through the track curves on the ferry vessel. In general, there are more restrictions for wagons equipped with bogies than for wagons equipped with two wheel sets only. The details should be clarified with the ferry line operator.

7.3.4.4 Railway wagons should be equipped with securing points on both sides in sufficient number when used in ferry traffic. The minimum number of securing points and their minimum strength can be calculated as shown in Annex 10. The maximum permitted axle loads and maximum permitted loads per linear meter depend on the properties of the ferry ramp and of the characteristics of the ferry vessels employed in the respective ferry service.

Chapter 8. Arrival, checking and positioning of CTUs

8.1 CTU Arrival

8.1.1 The type of CTU used for the transport will influence:

- the process of confirming that it is fit for use;
- the CTU's positioning to suit the packing operation and timing;
- the planning of the cargo packing.

8.1.2 The CTU provider will advise of the estimated time of arrival and departure. The type of CTU may influence these timings:

- Rigid road vehicles will come with a driver and it would be expected that the time to pack the vehicle will be dictated by any time restrictions that local regulations may impose.
- Detachable CTUs, such as trailers and rail wagons may be left at the packer's facility and the tractor unit / motor unit permitted to depart if the packing procedure is extended.
- Class C swap bodies fitted with legs can be unloaded onto their legs and the tractor unit / engine unit plus trailer (if present) may be driven away.
- Containers and class A and B swap bodies can remain on the trailer or be unloaded and placed on the ground.
- CTUs remaining on trailers may be left for a period of time.

8.1.3 If the consignment requires more than one CTU then it is important to plan what packages go within each unit and how each CTU is managed: multiple units might be delivered all at once and the packer can manage positioning of each unit to suit the facility available. Another option is to deliver the units sequentially so that the container operator delivers an empty unit and picks up a fully packed one.

8.1.4 In both cases planning what packages go into each unit will be important. Demand at the destination may require particular packages to be packed in each CTU. However such demand can have an adverse effect on the load distribution, on possibility to secure the cargo properly, on the segregation of dangerous goods and also on volume utilisation. It is therefore important that a complete plan may be generated for all packages and CTUs prior to the start of packing the first CTU.

8.2 CTU checks

8.2.1 Approval plates

8.2.1.1 Containers and, under certain conditions, also swap bodies and road trailers are required by applicable regulations to bear a safety approval plate. Details of the markings required on swap-bodies and road trailers destined for transport by rail within the European railway network and data plates on containers transported by sea and covered by the International Convention for Safe Containers (CSC) are shown in Annex 8.

8.2.1.2 The safety approval plate should be permanently affixed to the rear of the container, usually the left hand door. On this plate, the most important information for the packer are:

- The date of manufacture, many shippers set maximum age limits to containers. However such restrictions are better described by the condition of the container.
- The maximum gross mass. This is the maximum mass of the packed container and shall never be exceeded.
- The allowable stacking mass (see Annex 8 Part 4 for more information). Containers having an allowable stacking mass of less than 192,000 kg are not unrestrictedly suitable for sea transport (see sub-section 7.3.1).

8.2.1.3 Evidence of maintenance. The CSC requires containers to be thoroughly examined 5 years after manufacture and subsequently at least every 30 months and two methods are used by the container industry for recording that the container is fit for use. Both methods require marks to be shown on or near to the safety approval plate:

8.2.1.3.1. The date of the next periodic examination is stamped on the approval plate or affixed to it in form of a decal. The date of the next examination shown in Figure 8.1 is March 2013.

Figure 8.1 CSC safety approval plate with next examination date

Figure 8.2 CSC safety approval plate with ACEP mark

8.2.1.3.2. As alternative to such periodic inspections, the owner or operator of the container may execute an approved continuous examination programme where the container is frequently inspected at major interchanges. Containers operated under such programme shall be marked on or near to the safety approval plate with a mark starting “ACEP” followed by numerals and letters indicating the approval number of this continuous examination programme (see Figure 8.2).

8.2.1.4 If there is no ACEP mark and if the next examination date is already elapsed, or is before the expected arrival time of the container at its destination, the container should not be used in intermodal or international traffic.

8.2.1.5 The two safety approval plates shown above demonstrate also a particular operational feature of some ISO containers. Figure 8.1 includes values for stacking and racking with one door off, whereas there are no such values in the plate shown in Figure 8.2. Where there are no values for “one door off” operation, the container doors must be both locked closed at all times during transport.

8.2.2 Exterior checks

8.2.2.1 The structural framework, the walls and roof of a CTU should be in good condition, and not significantly distorted, cracked or bent. Acceptable limits of damages in the structural framework of a container are shown in Annex 11 part 5.

8.2.2.2 The doors of a CTU should work properly and be capable of being securely locked and sealed in the closed position, and properly secured in the open position. Door gaskets and weather strips should be in good condition.

8.2.2.3 A folding CTU with movable or removable main components should be correctly assembled. Care should be taken to ensure that removable parts not in use are packed and secured inside the unit.

8.2.2.4 Any component that can be adjusted or moved, or a pin that can be engaged and withdrawn, should be checked to see that it can be moved easily and retained correctly. This is of particular importance for folding flatracks where the end-walls are retained in the upright position by a pin or shoot bolt which should be engaged and retained from accidentally pulling out by a retaining flap.

8.2.2.5 Removable or swinging headers of open top CTUs should be inspected. The header is generally supported by removable pins. Checks should be made to ensure that the pins are of the correct length and freely removable at both ends. Checks should also be made for signs of cracks around the hinges.

8.2.2.6 Road vehicles that are likely to be carried on rail wagons or on RO/RO-vessels should be provided with points for securing them. There should be equal numbers of lashing points on both sides of the vehicle and each point should be intact and free from serious corrosion or damage.

8.2.2.7 For sheeted vehicles or containers the side, top or all round covers should be checked as being in satisfactory condition and capable of being secured. Loops or eyes in such canvas which take the fastening ropes, as well as the ropes themselves, must be in good condition. All lashing strap ratchet tighteners must be able to be engaged and operate correctly.

8.2.2.8 Irrelevant labels, placards, marks or signs should be removed.

8.2.2.9 When undertaking the exterior checks, check the under structure with a torch (flash light) for any signs of re-contamination particularly:

- along bottom rails of containers
- within forklift pockets
- in and around the twist lock fittings
- underside and cross members
- container tops where necessary

8.2.3 Interior checks

8.2.3.1 Before entering a box container, the doors should be opened and at least ten minutes should be elapsed, to allow the internal atmosphere to regularise with the ambient. Care should be taken to ensure that during this period, animals and insects should not enter the CTU.

8.2.3.2 The CTU should be free from major damage, with no broken flooring or protrusions such as nails, bolts, special fittings, etc. which could cause injury to persons or damage to the cargo.

8.2.3.3 The CTU should not show liquids or persisting stains on flooring and side walls. There are a number of different materials and surface treatments used for flooring in CTUs. Sealed surfaces generally can be cleaned with absorbent materials. Where a stain can be transferred by wiping a gloved hand over it, the CTU should not be used and a replace CTU should be requested.

8.2.3.4 A CTU should be weatherproof unless it is so constructed that this is obviously not feasible. Patches or repairs to solid walls should be carefully checked for possible leakage by look for rusty streaks below patches. Repairs to side and roof sheets should have a fully stitched patch covering all of the hole with a substantial overlap.

8.2.3.5 Potential points of leakage may be detected by observing whether any light enters a closed unit. Standard and approved procedures for identifying pin holes and other points of leakage should be adopted.

8.2.3.6 Cargo tie-down cleats or rings, where provided, should be in good condition and well anchored. If heavy items of cargo are to be secured in a CTU, the container operator should be contacted for information about the cleat strength and appropriate action taken.

8.2.3.7 During the interior checks, look for signs of nests or animals particularly in open section at the header over the door and at the front end.

8.2.4 Cleanliness

8.2.4.1 All CTUs should be provided clean and free from contamination, but the type will dictate the standard that can be expected.

8.2.4.2 Closed CTUs should be clean, dry and free of residue and / or persistent odours from previous cargo.

8.2.4.3 Open CTUs should be free from debris and as dry as is possible.

8.2.4.4 Following receipt of the CTU it is the responsibility of the packer to prevent re-contamination. Examples of re-contamination will be the presence of any of the following:

- Soil;
- Plants/ plant parts/debris;
- Seeds;
- Moths, wasps and bees;
- Snails, slugs, ants and spiders;
- Mould and Fungi;
- Frass (insect and bird droppings or waste;
- Egg sacs;
- Animals (including frogs), animal parts / blood / excreta and reproductive components or parts thereof;
- Other contamination that shows signs of harbouring pests or invasive alien species (including alien species which carry risks of becoming invasive at the site of arrival of CTUs).

See Annex 12

8.3 Positioning CTUs for packing

8.3.1 Wheeled operation

8.3.1.1 Road trailers and containers on chassis can be left at the packer's premises for a period of time without a tractor unit. When this happens, the correct positioning of the CTU is particularly important as a safe shifting of the CTU at a later stage might be difficult. After positioning, brakes should be applied and wheels should be chocked.

8.3.1.2 Trailers with end door openings and general purpose containers on chassis can be backed up to an enclosed loading bay or can be positioned elsewhere in the premises. For this type of operation a safe access to the CTU by means of suitable ramps is required.

8.3.1.3 Where the CTU cannot be closed in-situ because of the loading bay structure, or where to secure the area the CTU would need moving then the packer should consider positioning the CTU so that the doors to the facility and / or the CTU can be closed and access is gained by a removable ramp.

8.3.1.4 When a semi-trailer or a container on a chassis is to be packed, care should be taken to ensure that the trailer or chassis cannot tip while a lift truck is being used inside the CTU.

8.3.1.5 For more information on positioning and securing wheeled CTUs see Annex 12 section 2.1

8.3.2 Grounded operation

8.3.2.1 Containers may be unloaded from the delivery vehicle and be placed within secure areas for packing. Proper lifting equipment is required.

8.3.2.2 When landing containers it should be ensured that the area is clear of any debris or undulations in the ground that may damage the under-structure (cross members or rails) of the container.

8.3.2.3 Grounded containers will deform to the ground on which they are placed, therefore it is important that the area should be firm, level and well drained. Failure may result in:

- the container racking if the ground is not level which may result in the doors being difficult to open and, more importantly, close;
- the container sinking into the soft area which may result in serious deformation;
- the container becoming flooded. Where there is a risk of flooding it should be placed on blocks to elevate it.

8.3.2.4 Packers should not position CTUs in such locations where there is a risk of re-contamination. This means that, whenever possible, CTUs should be placed on a hard pavement clear of soil, vegetation, overhanging trees and away from flood lights.

8.3.2.5 Containers should not be positioned where there is mud, vegetation or standing pools of water as these can harbour pests, insects and other animals or under flood lights which attract nocturnal organisms.

8.3.2.6 When a swap-body standing on its support legs is to be packed, particular care should be taken to ensure that the swap-body does not tip when a lift truck is used for packing. It should be checked that the support legs of the swap-body rest firmly on the ground and cannot shift, slump or move when forces are exerted to the swap-body during packing.

8.3.2.7 For more information on grounded operation of containers see Annex 12 section 2.2.

Chapter 9. Packing cargo into CTUs

9.1 Planning of packing

9.1.1 the packers should ensure that:

- the packing process is planned in advance as far as practical;
- incompatible cargoes are segregated;
- special handling instructions for certain cargoes are observed;
- the maximum permitted payload is not exceeded;
- restrictions for concentrated loads are considered;
- restrictions for eccentricity of the centre of gravity are considered;
- the cargo and securing materials complies with the international standards for Phytosanitary Measures[8] when applicable

9.1.2 To carry out effective planning, packers should follow the provisions of Annex 14 part 1

9.2 Packing and securing materials

9.2.1 Packers should ensure that securing materials are:

- strong enough for the intended purpose;
- in good order and condition without tears, fractures or other damages;
- appropriate to the CTU and goods to be carried;
- in compliance with the International Standards for Phytosantitary Measures No.15 (ISPM 15);

9.2.2 More information on packing and securing materials is provided in Annex 14 part 2 and in the Appendices to the Annex.

9.3 Principles of packing

9.3.1 Packers should ensure that:

- the load is properly distributed in the CTU;
- stowage and packing techniques are suitable to the nature of the cargo:
- operational safety hazards are taken into account including correct manual and mechanical handling techniques as described in Annex 15.

9.3.2 In order to comply with the obligations in 9.3.1 packers should follow the provisions of Annex 14 Part 3 and the Appendices to the Annex.

9.4 Securing cargo in CTUs

9.4.1 The packers should ensure that:

- tightly arranged cargoes are so stowed in CTUs that boundaries of the CTU are not overstressed;
- in the case of CTUs with weak or without boundaries sufficient securing forces are produced by the cargo securing arrangement;
- packages of greater size, mass or shape are individually secured to prevent sliding and, when necessary, tilting;
- the efficiency of the cargo securing arrangement is properly evaluated.

9.4.2 In order to comply with the obligations in 9.4.1 the packer should follow the provisions of Annex 14 Part 4 and the Appendices to the Annex.

9.4.3 Additional advice for the evaluation for certain cargo securing arrangements, may be found in Annex 14, Appendix 5 Part 5.

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[8] International standards for phytosanitary measure, No. 15 Regulation of wood packaging material in international trade, 2009.

9.5 Packing bulk materials

9.5.1 Packers should ensure that:

- applicable filling ratios for liquids are complied with;
- tank fittings and valves are compatible with the goods to be carried;
- specific requirements for foodstuffs are observed;
- procedures for the safe transport of liquids in flexitanks are observed;
- CTUs and not overstressed by the carriage of solid bulk cargoes.

9.5.2 When working on the top of CTUs during the preparation, filling or empting of CTUs packers should comply with the requirements of Annex 16.

9.5.3 In order to comply with the obligations in 9.5.1 the packer should follow the provisions of Annex 14 Part 5.

Chapter 10. Additional advice on the packing of dangerous goods

10.1 General

10.1.1 The advice of this section applies to cargo transport units in which dangerous goods are packed. It should be followed in addition to the advice given elsewhere in this Code of Practice.

10.1.2 International (and often national) transport of dangerous goods may be subject to several dangerous goods transport regulations, depending on the origin, final destination and the modes of transport used.

10.1.3 For intermodal transport, involving different modes of transport other than by sea, the rules and regulations applicable depend on whether it is a national movement or international transport or transport within a political or economic union or trading zone.

10.1.4 Transport of dangerous goods by road, rail or inland waterways may be subject to various regulations and agreements. Examples are:

- European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR);
- European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways, (ADN
- Regulations concerning the International Carriage of Dangerous Goods by Rail (RID); and
- Title 49 of the Code of Federal Regulations of the United States.

10.1.5 Most national and international regulations are based on the United Nations Recommendations on the Transport of Dangerous Goods (Orange Book). However, national rules, applicable to domestic transport, may differ from international regulations.

10.1.6 For maritime transport, the provisions of the International Maritime Dangerous Goods Code (IMDG Code) apply. The IMDG Code provides detailed provisions on all aspects of the transport of packaged dangerous goods by sea.

10.1.7 Dangerous Goods are classified into hazard classes. Some of these are subdivided into divisions. All details are set forth in the applicable dangerous goods regulations as mentioned above. The consignor is responsible that packages with dangerous goods bear the appropriate labels and marks.

10.1.8 Under certain conditions, the dangerous goods regulations provide exemptions from some requirements if the dangerous goods are transported in “limited quantities” or “excepted quantities”. Further details are set forth in the applicable dangerous goods regulations.

10.2 Before packing

10.2.1 The IMDG Code and other international and national regulations require that the consignor provides transport information on each dangerous substance, material or article. This information should include at least the following basic items:

- the UN Number;
- the Proper Shipping Name (including the technical name, as applicable);
- the class and/or division (and the compatibility group letter for goods of class 1);
- subsidiary risks when assigned;
- the packing group when assigned;
- the total quantity of dangerous goods (by volume or mass, and for explosives the net explosive content); and
- the number and kind of packages.

Other items of information may be required, depending on the mode of transport and the classification of the goods (e.g., flashpoint for transport by sea). The various items of information required under each regulation and applicable during intermodal transport operations should be provided so that appropriate documentation may be prepared for each shipment.

10.2.2 The consignor should also ensure that dangerous goods are classified, packaged, packed and marked in accordance with the applicable regulations. A declaration by the consignor that this has been carried out is normally required. Such a declaration may be included with the required transport information.

10.2.3 The forwarder/carrier should ensure that the goods to be transported are authorized for transport by the modes to be used during the transport operation. For example, self-reacting substances and organic peroxides requiring temperature control are not authorized for transport by rail under the RID regime. Certain types of dangerous goods are not authorized to be transported on board passenger ships and therefore the requirements of the IMDG Code should be carefully studied.

10.2.4 Current versions of all applicable regulations should be easily accessible and referred to during packing to ensure compliance.

10.2.5 Dangerous goods should only be handled, packed and secured by trained personnel. Supervision is required by a responsible person who is familiar with the legal provisions, the risks involved and the measures that should be taken in an emergency.

10.2.6 Suitable measures to prevent fires should be taken, including the prohibition of smoking in the vicinity of dangerous goods.

10.2.7 Packages of dangerous goods should be examined and any found to be damaged, leaking or sifting should not be packed. Packages showing evidence of staining, etc., should not be packed without first determining that it is safe and acceptable to do so. Water, snow, ice or other matter adhering to packages should be removed before packing. Substances that have accumulated on drum heads should initially be treated with caution in case they are the result of leakage or sifting of contents. If pallets have been contaminated by spilt dangerous goods, they should be destroyed by appropriate disposal methods to prevent use at a later date.

10.2.8 If dangerous goods are palletized or otherwise unitized they should be compacted so as to be regularly shaped, with approximately vertical sides and level at the top. They should be secured in a manner unlikely to damage the individual packages comprising the unit load. The materials used to bond a unit load together should be compatible with the substances unitized and retain their efficiency when exposed to moisture, extremes of temperature and sunlight.

10.2.9 An overpack and unit load should be marked and labelled, as required for packages, for each item of dangerous goods contained in the overpack or unit load unless markings and labels representative of all dangerous goods in the overpack or unit load are clearly visible. An overpack, in addition, should be marked with the word "OVERPACK" unless markings and labels representatives of all dangerous goods as required for packages in the overpack are visible.

10.2.10 The stowage and method of securing of dangerous goods in a cargo transport unit should be planned before packing is commenced.

10.3 Packing

10.3.1 Special care should be taken during handling to avoid damage to packages. However, if a package containing dangerous goods is damaged during handling so that the contents leak out, the immediate area should be evacuated until the hazard potential can be assessed. The damaged package should not be shipped. It should be moved to a safe place in accordance with instructions given by a responsible person who is familiar with the risks involved and knows the measures that should be taken in an emergency.

10.3.2 If a leakage of dangerous goods presents safety or health hazards such as explosion, spontaneous combustion, poisoning or similar danger, personnel should immediately be moved to a safe place and, if appropriate, the Emergency Response Organization notified.

10.3.3 Dangerous goods should not be packed in the same cargo transport unit with incompatible goods. In some instances even goods of the same class are incompatible with each other and should not be packed in the same unit, e.g., acids and alkalis of class 8. The requirements of the IMDG Code concerning the segregation of dangerous goods inside cargo transport units are usually more stringent than those for road and rail transport. Whenever an intermodal transport operation does not include transport by sea, compliance with national relevant regulations and the respective inland transport regulations may be sufficient. However, if there is any possibility that a part of the transport operation will be by sea, the segregation requirements of the IMDG Code should be strictly complied with.

10.3.4 Some dangerous goods have to be segregated from foodstuffs by a certain distance within the cargo transport unit or are even prohibited in the same unit. More advice is to be found in the applicable dangerous goods regulations.

10.3.5 When dangerous goods are being handled, the consumption of food and drink should be prohibited.

10.3.6 Packages marked with the orientation arrows “this way up” should be handled and packed with the arrows pointing upwards. Vented packages should be packed in such a way that the vents will not be blocked (see also Annex 14, Appendix 1).

10.3.7 Drums containing dangerous goods should always be stowed in an upright position unless otherwise authorized by the Competent Authority.

10.3.8 Standard packagings such as drums, jerricans and boxes approved for the transport of dangerous goods are tested for a stacking height of 3 meters. The stacking test is carried out with the static gravity of 1 *g* (9.81 m/s²). In case of sea transport it should be considered that, due to the dynamic variation of vertical acceleration, the maximum value could be up to 1.8 *g* (see section 6.3). Therefore, it may be necessary to ensure stability of such stack by introducing dunnage or solid flooring between tiers of such stow. Intermediate bulk containers (IBC) are not all suitable for stacking. IBC which are manufactured or repaired after 1 January 2011 are marked with a pictogram showing either the maximum permitted stack load or an indication that the IBC cannot be stacked, as follows:

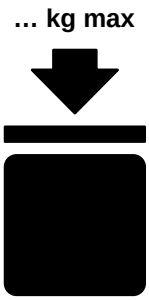

Figure 10.1 : Stacking limited by mass

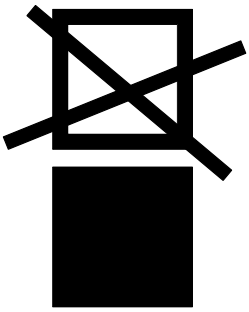

Figure 10.2 : Do not stack

For IBC manufactured before that date, the approval marking on the IBC should be checked to find out whether the IBC can be stacked and, if so, for what stacking load it was tested. More details can be found in the applicable dangerous goods regulations.

10.3.9 Dangerous goods consignments which form only part of the load of a cargo transport unit should, whenever possible, be packed adjacent to the doors with markings and labels visible. Particular attention is drawn to Annex 14 sub-section 3.2.7 concerning the securing of cargo at the doors of a unit.

The number of packages containing dangerous goods in excepted quantities in any cargo transport unit is limited to a maximum of 1,000.

Chapter 11. On completion of packing

11.1 Closing the CTU

11.1.1 After closing the CTU, it should be ensured that all closures are properly engaged and secured. If doors of a cargo transport unit are locked, the means of locking shall be such that, in case of emergency, the doors can be opened without delay. Where cargo transport units have hinged or detachable fittings, a check should be made that they are properly secured, with no loose equipment likely to cause a hazard during transport.

11.1.2 CTUs in international trade should be sealed with a seal bearing a unique identification number when so required. Many countries require by national legislation that such seals shall meet the standard of ISO 17712:2010. This standard establishes uniform procedures for the classification, acceptance and withdrawal of acceptance of mechanical seals on freight containers, bulk railcars and truck trailers. It provides a single source of information on mechanical seals which are acceptable for securing cargo transport units in international commerce. The purpose of mechanical seals is, as part of a security system, to determine whether a cargo transport unit has been tampered with, i.e. whether there has been unauthorized entry into the cargo transport unit through its doors. Seals meeting the standard of ISO 17712:2010 shall comply with certain criteria for strength and durability so as to prevent accidental breakage, early deterioration (due to weather conditions, chemical action, etc.) or undetectable tampering under normal usage.

11.1.3 Where security devices, beacons or other tracking or monitoring equipment are used, they should be securely installed to the CTU and, when equipped with a source of energy, they should be of a certified safe type . It should be noted that the International Convention for the Safety of Life at Sea (SOLAS) requires that during sea transport no sources of ignition shall be present in enclosed cargo spaces where highly flammable dangerous goods are stowed.

11.1.4 See Annex 17 for more information about the types of seals available, methods for fitting and removal and responsibilities in the supply chain.

11.2 Marking and placarding

11.2.1 The applicable dangerous goods regulations require that placards (enlarged labels), marks and other signs are affixed to the surfaces of a cargo transport unit. The specifications of these placards, marks and signs and the locations where they have to be affixed are described in detail in the applicable dangerous goods regulations.

11.2.2 The applicable dangerous goods regulations may require specific warning signs for cargo transport units which contain solid carbon dioxide (CO_2 – dry ice) or other expendable refrigerant used for cooling purposes. The sign aims to warn of the possibility of an asphyxiating atmosphere.

11.2.3 The applicable dangerous goods regulations may require specific warning signs for cargo transport units under fumigation. The details of marking and further instructions for the handling of such cargo transport units are set forth in the applicable dangerous goods regulations and summarised in Annex 18.

11.3 Documentation

11.3.1 [In particular for sea transport, the packer should calculate the correct pay load of the loaded cargo transport unit. When possible the tare weight should be included and the gross mass should be declared. For this purpose he should obtain from the shipper a detailed packing list stating the masses of all packages and other cargo items. The gross mass of the cargo transport unit is the sum of the masses of all cargo items which have been packed, the mass of all stowage and securing material, such as pallets, dunnage or timber used for blocking, and the tare mass of the cargo transport unit. Alternatively, the gross mass of the loaded cargo transport unit may be verified by weighing the unit on a calibrated scale.]

11.3.2 The packer of the CTU should inform the shipper on the identification number of the CTU (container number or vehicle number as appropriate), on the verified gross mass of the unit and on the identification number of the seal (if applicable), thus to ensure that the gross masses and the identification numbers are included in all transport documents, such as bills of lading, way bills, consignment notes or cargo manifests.

11.3.3 Whenever the cargo projects beyond the overall dimensions of the CTU the information described in sub-section 11.3.2 should state the exact over-height, over-width or over-length, as appropriate.

11.3.4 If a container having an allowable stacking mass of less than 192,000 kg marked on the safety approval plate (see sub-section 8.2.1) is intended to be carried by ship, the carrier should be informed on the reduced stacking capability of that container.

11.3.5 In addition, whenever dangerous goods are packed into a CTU for transport by sea or where a maritime leg is included in the transport route, the IMDG Code and other transport regulations require that those responsible for the packing of the cargo transport unit shall provide a “container/vehicle packing certificate” specifying the identification number of the container or the vehicle and certifying that the packing operation was carried out in accordance with the requirements of the applicable dangerous goods regulations. For all details of documentation, the relevant dangerous goods regulations shall be referred to.

Chapter 12. Advice on receipt and unpacking of CTUs

12.1 General

12.1.1 When receiving a CTU (see Annex 12), the consignee should:

- check the CTU identification reference
- Inspect the seal (if fitted)
- check the exterior of, and for any signs of leakage from, the CTU. Specific attention should be paid to:
  - signs of recent damage such as impact dents or punctures where the area of the impact appears cleaner that the surround area, or where expose metal can be seen without rust or corrosion. Such damages should be marked on the interchange document and notified to the carrier.
  - impact or puncture damages that may have altered the condition of the cargo within the unit;
  - liquids leaking from the doors or from the underside. If the CTU is carrying dangerous goods the immediate area should be evacuated, to a safe location upwind, until the hazard potential can be assessed;
  - the underside and recesses where animals or pests could be found. Contact local pest control organisations for removal if required.

12.2 Risks

12.2.1 If a CTU shows signs of abnormally high temperatures[9] it should be moved to a safe place and the fire services notified. Care should be taken to ensure that the fire-fighting methods used are suitable for the cargo in the unit.

12.2.2 Persons opening a CTU should be fully aware of the risk of the cargo falling out. Improperly packed and secured cargoes may have moved or collapsed within the cargo space and may be a hazard as it is opened. CTUs will be accessed through the rear and side doors or sheeted side tarpaulins and each present those opening the CTU with different risks:

12.2.2.1 Rear or side solid swinging doors may have packages or cargo resting against the doors which may fall out or force the doors open when the door locking gear is released.

12.2.2.2 Rear and side swinging doors once opened should be secured back to prevent any accidental injury caused by them swinging unexpectedly, especially bifold side doors.

12.2.2.3 Sheeted tarpaulins may be bulging outwards which may indicate that the cargo has shifted. Care should be taken when releasing the securing clips of tarpaulins as loose cargo may fall. Moving the tarpaulin along the CTU may also present persons with a risk of MSD if the tarpaulin is jammed.

12.2.3 The process of removing seals from the CTU and physically opening the doors can lead to musculoskeletal disorders and care should be taken to ensure that suitable cutting and access equipment is available (see Annex 12 Part 3).

12.2.4 Access to the top of a CTU should only be gained by the use of mobile steps or from a gantry platform (see Annex 16). CTUs which require access to the roof should not be placed so that there is a risk of injury due to the proximity of electrical cable or overhead obstructions. Climbing rungs on the CTU and free standing ladders should only be used in an emergency.

12.2.5 When working with sheeted CTUs, particularly open top units, persons should not climb onto the soft top covering or attempt to walk over the surface. Furthermore removable headers at the door end are secured in place using two pins; both of these should be in place during transport and movement. The best solution for removing the header would be to support the header with the tines of a fork truck or by an overhead crane and remove both pins, then lift the header away and place aside until un-packing has been completed. If a fork truck or crane is not available, remove only one pin and swing the header open. No one should be standing under the header or nearby when either removal method is used.

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[9] Abnormally high temperatures would be a temperature where that the walls of the CTU are hotter than the walls of other CTUs in the vicinity or where there is signs of blistering or heat damage to the walls

12.2.6 When working with folding flatrack CTUs care should be taken to ensure that the end walls are securely locked in place, so that they cannot fall and injure any persons working on or near the CTU.

12.3 Dangerous goods

12.3.1 CTU carrying dangerous goods, or in which expendable refrigerants have been used, or which has been shipped under fumigation or which may contain residue from a previous cargo may present an unacceptable risk of a dangerous atmosphere, which may be flammable, explosive, toxic or asphyxiant. In such a case the CTU should be ventilated by leaving it open for a sufficient time, or other steps taken to ensure that no harmful concentration of gas remains before allowing personnel to enter (see also Annex 19). Where a flammable cargo is concerned, there should be no sources of ignition in the vicinity.

12.3.2 If there is a particular reason to suspect danger, e.g. because of damage to packages or the presence of fumigants, expert advice should be sought before unpacking of the unit is started.

12.3.3 Some general cargo CTUs not labelled as dangerous goods may however contain certain chemical hazards such as adhesives, solvents or paints that might have seeped or emitted into the ambient air inside the CTU. Care should be taken to not expose the workers to these toxic compounds.

12.3.4 For consignments for which a dangerous transport document is required by regulation, appropriate information shall be immediately available at all times for use in emergency response to accidents and incidents involving dangerous goods. This information should be provided on a Material Safety Data Sheet (MSDS) and should accompany the consignment at all times. The MSDS for the cargo should be consulted prior to opening the doors and the necessary Personal Protection Equipment (PPE) and containment facilities on hand should there is a risk of the cargo packages being damaged.

12.4 Unpacking the CTU

12.4.1 Once the doors have been opened (see Annex 12 Part 6) and the container properly ventilated (see Annex 12 Part 7), a visual inspection should be made of the interior of the cargo looking for signs of cargo movement and / or damage. If there are such signs then photographs should be taken for evidence before any unpacking starts. More photographs may be taken as packages are removed and signs of damage and movement become clearer.

12.4.2 Access to the CTU should be made using ramps, platforms or mobile steps. Climbing up the trailer should be avoided. Proper un-packing equipment should be used so that persons involve are not placed at risk of injury.

12.4.3 When removing lashings, straps and blocking care should be taken to ensure that the packages do not move when released.

12.4.3.1 The valve on inflatable dunnage bags should be opened and the air released from within. Single use inflatable dunnage bags should be carefully deflated by piercing with a safety knife. By releasing the air slowly un-packers will have the opportunity to watch for any movement. However, no-one should place themselves in danger while undertaking such a task.

12.4.3.2 Items with low friction, such as piles of steel plate may suddenly move as retaining straps are removed.

12.4.3.3 Unstable items, items with a small or narrow footprint and a high centre of gravity, may topple when released.

12.4.4 As un-packing progresses ensure that all materials are removed from the CTU to avoid a tripping or other hazard to those involved.

12.4.5 Ensure that all packages are recorded as they are un-packed from the CTU and any deficiencies notified to the shipper as soon as practicable. Note any signs of damage to individual packages and photograph as required.

12.5 Returning CTUs and disposal of materials

12.5.1 The consignee or the un-packer of the CTU should consider his obligation to return the CTU, after unpacking, clean and suitable for the transport of any kind of cargo. This requires all cargo residues to be swept out, all packing, lashing and securing material to be removed and all debris to be cleaned up.

12.5.2 When disposing of cargo residues and cargo associated waste, the applicable environmental regulations should be considered. Wherever practicable, dunnage bags and other securing materials should be recycled. When wood quarantine requirements apply, timber bracings and packing/securing material of natural wood, not bearing the appropriate IPPC marking, (see Annex 14 section 1.14) should be disposed of as especially required by national or local plant protection regulations.

12.5.3 After a CTU with dangerous goods has been unpacked, particular care should be taken to ensure that no hazard remains. This may require special cleaning, particularly if spillage of a toxic or corrosive substance has occurred or is suspected. In case of doubt with regard to appropriate cleaning measures, the owner or operator of the CTU should be contacted.

12.5.4 When the CTU offers no further hazard, the dangerous goods placards, orange plates and other markings referring to dangerous goods should be removed, masked or otherwise obliterated.

12.5.5 CTUs should be returned to the owner in line with Annex 12 Part 8.

Chapter 13. Training in packing of cargo transport units

13.1 Qualification of planners and packers

13.1.1 Persons responsible for planning and supervision of packing should be fully knowledgeable about all technical, legal and commercial requirements of this task and on all risks and dangers involved. They should know the customary terminology in order to communicate effectively with consignors, forwarders and the persons who do the actual packing.

13.1.2 Personnel engaged in the actual packing should be trained and skilled in doing this work and understand the relevant terminology in order to comply with the instructions of the planner. They should be aware of the risks and dangers involved.

13.1.3 Persons responsible for planning and supervision of packing as well as personnel responsible for the actual packing should receive appropriate education and training for their tasks before they do the work with immediate responsibility.

13.1.4 The management of a facility where CTUs are packed is responsible to ensure that all personnel involved in the packing of cargo in CTUs or in the supervision thereof are adequately trained and appropriately qualified, commensurate with their responsibilities within their organization.

13.2 Regulatory authorities

13.2.1 The regulatory authority should establish minimum requirements for training and, where appropriate, qualifications for each person involved, directly or indirectly, in the packing of cargo in CTUs, particularly in relation to dangerous cargoes.

13.2.2 Regulatory authorities involved in the development or enforcement of legal requirements relating to the supervision of the safety of the transport by road, rail and sea should ensure that their personnel are adequately trained, commensurate with their responsibilities.

13.3 Training

13.1 All persons should receive training on the safe transport and packing of cargo, commensurate with their duties. The training should be designed to provide an appreciation of the consequences of badly packed and secured cargo in CTUs, the legal requirements, the magnitude of forces which may act on cargo during road, rail and sea transport, as well as basic principles of packing and securing of cargoes in CTUs.

13.2 All persons should receive detailed training concerning specific requirements for the transport and packing of cargo in CTUs which are applicable to the functions that they perform. Such training should be followed by a sufficient period of practical assistance to experienced planners and packers.

13.3 The adequacy of the knowledge of any person to be employed in work involving the packing of cargo in CTUs should be verified or appropriate training provided. This should be supplemented by periodic training, as deemed appropriate by the regulatory authority.

13.4 Topics for consideration, to be included in the training as appropriate, are specified in Annex 20.