

Title	IMDG Code 2016 / SUPPLEMENT / IMO/ILO/UNECE Guidelines for Packing Cargo Transport Units / 3
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Note	Incorporating Amendment 35-10

3 PACKING AND SECURING OF CARGO

3.1 Before packing

3.1.1 Before packing a CTU, careful consideration should be given as to how the unit will be presented during the packing operation.

The same applies for unpacking. The CTU may be presented for packing or unpacking as follows:

loaded on a semi-trailer chassis together with a truck;

loaded on a semi-trailer chassis, but without a truck;

loaded on a rigid truck or chassis;

standing on the ground;

standing on its supporting legs (in case of class C swap-bodies);

loaded on a rail-car;

loaded on an inland barge; or

loaded on a seagoing vessel.

Any of these configurations is possible. The actual packing or unpacking situation often depends on site and facility considerations. However, whenever the CTU is presented on a chassis or on supporting legs, special care should be taken in planning the packing or unpacking operation.

3.1.2 A CTU to be packed should rest on level and firm ground or on a trailer or a rail-car. If a CTU is on a trailer, care should be taken to ensure the trailer cannot tip while the container is being packed, especially if a lift truck is being used. If necessary, the trailer should be propped. Brakes should be securely applied and the wheels chocked.

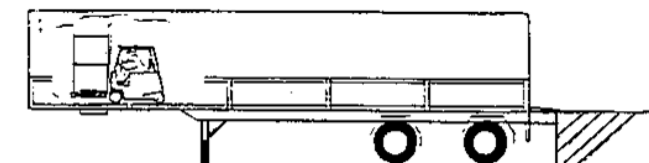


Figure 7 - Inadequate support of the trailer when working in the forward part

3.1.3 When a swap-body standing on its supporting legs is 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 supporting 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.

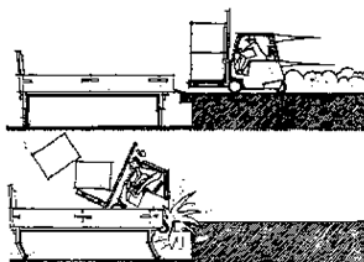


Figure 8 - Don't drive a lift truck onto a swap-body too fast

3.1.4 Packing should be planned before it is started. This should make it possible to segregate incompatible cargoes and produce either a tight or secured stow, in which the compatibility of all items of cargo and the nature, i.e. type and strength, of any packages or packaging involved are taken into account. The possibility of cross-contamination by odour or dust, as well as physical or chemical compatibility, should be considered.

3.1.5 The planned cargo should not weigh more than the maximum payload of the CTU. In the case of containers, this ensures that the permitted maximum gross weight of the container (which includes the payload) marked on the CSC Safety Approval Plate* will never be exceeded (see also annex 3). For CTUs not marked with their maximum permissible gross weight, tare weight or other features, any of these values should be known before packing starts. According to CEN** standards, a swap-body of class C (7.15m to 7.82m) will have a maximum gross mass of 16,000 kg and a swap-body of class A (12.2m to 13.6 m) will have a gross mass of up to 32,000 kg.

* International Convention for Safe Containers (CSC), published by the International Maritime Organization (IMO).

** European Standardization Committee (CEN).

3.1.6 Notwithstanding the foregoing, any height or weight limitation along the projected route that may be dictated by regulations or other circumstances (such as lifting, handling equipment, clearances and surface conditions) should be complied with. Such weight limits may be considerably less than the permitted gross weight already referred to.

3.1.7 Stowage planning should take account of the fact that CTUs are generally designed and handled assuming the cargo to be evenly distributed over the entire floor area. Where substantial deviations from uniform packing occur, special advice for preferred packing should be sought.

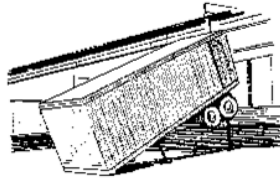


Figure 9 - Nose-heavy trailer

3.1.8 When a heavy indivisible load is to be shipped in a CTU, due regard should be given to the localized weight-bearing capability of the unit. If necessary, the weight should be spread over a larger area than the actual bearing surface of the load, for example by use of properly secured baulks of timber. In such a case the method of securing the load should be planned before packing is started and any necessary preparations should be made.

3.1.9 If the planned cargo of an open-topped or open-sided CTU will project beyond the overall dimensions of the unit, special arrangements should be made. It should be borne in mind that road traffic regulations may not allow such overhangs. Furthermore, CTUs are often loaded door-to-door and side by side, thus not permitting any overhang.

3.1.10 The centre of gravity of the packed cargo should be at or near the longitudinal centreline of the CTU and below half the height of the cargo space of the unit (see also 3.2.5 and 3.2.6).

3.1.11 When planning the packing of a CTU, consideration should be given to potential problems which may be created for those who unpack it, e.g. cargo falling when doors are opened.

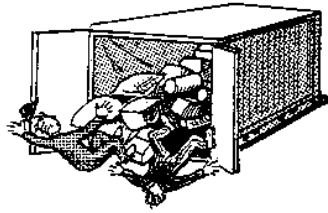


Figure 10 - Secure the cargo to prevent it falling when the doors are opened

3.1.12 Before a CTU is packed, it should be ensured that the personnel responsible for the packing are fully informed about all the risks and dangers involved. As a minimum requirement some sketches showing the basic rules of CTU packing should be available. The present Guidelines should also be readily available. If necessary, the shipper and the packing personnel should consult each other regarding any special feature of the cargo to be packed into the units. In particular, information on possible dangerous cargoes should be considered very carefully. Consideration should also be given to the provision of appropriate training for personnel involved in packing CTUs.

3.1.13 When packing a CTU, the shipper and persons responsible for packing should bear in mind that any failure to pack and secure the cargo correctly may result in additional costs that they will have to bear. If, for example in railway transport, a unit is found not to be properly packed and secured, the rail-car may be marshalled out of the train into a siding and the transport can only be continued once the cargo has been properly secured. The shipper may have to pay for this work, especially for the repacking and resecuring operation, as well as for the additional time during which the rail-car has been used. In addition, he may be held responsible for any delay of the transport operation.

3.1.14 Not all handling equipment is suitable for container packing. Lift trucks used for container packing and unpacking should have a short lifting mast and a low driver's overhead guard. If the lift truck operates inside the container, equipment with electric power supply should be used. Container floors are built to withstand a maximum wheel pressure corresponding to an axle load of a lift truck of 5,460 kg or 2,730 kg per wheel. Such an axle load is usually found on lift trucks with a lifting capacity of 2.5 t.

3.1.15 If the CTU floor is at a different height level than the loading ramp, a bridging unit may need to be used. This may result in sharp bends between the loading ramp and the bridging unit as well as between the bridging unit and the CTU floor. In such cases the lift truck used should have sufficient ground clearance to ensure that the chassis does not touch the ramp when passing these bends.

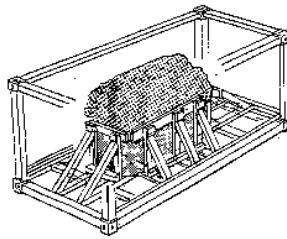


Figure 11 - Blocking against the framework in a container

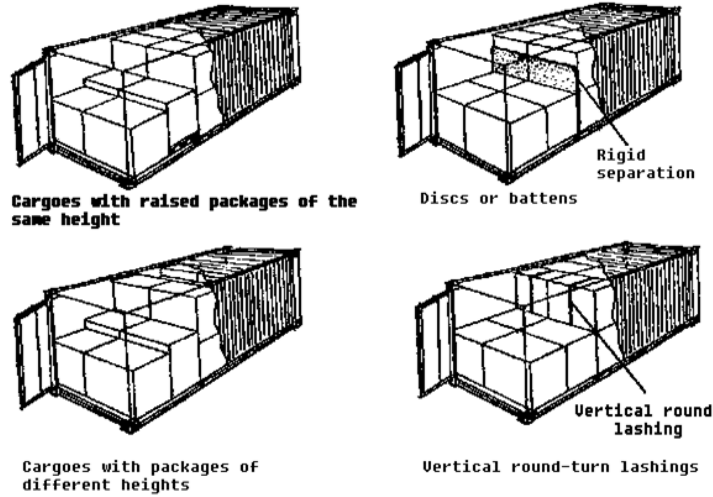


Figure 12 - Blocking a second layer

3.2 Packing and securing

3.2.1 It is essential to make the cargo in a CTU secure to prevent cargo movement inside the unit. However, the method of securing the cargo should not itself cause damage or deterioration to the cargo or the unit. A number of 'DO's' and 'DON'Ts' relating to cargo packing are illustrated in annex 5.

3.2.2 It should not be assumed that because cargo is heavy it will not move during transport. All items of cargo should be secured to ensure they cannot move during transport.

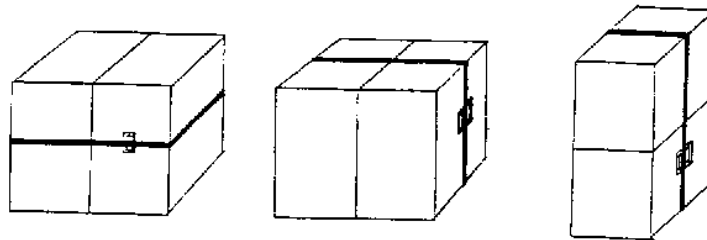


Figure 13 - Round-turn lashing

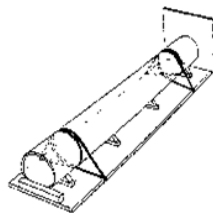


Figure 14 - Loop-lashing

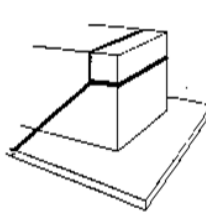


Figure 15 - Spring lashing

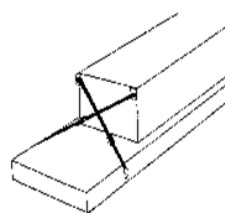


Figure 16 - Cross lashing

3.2.3 Where cargo of regular shape and size is loaded, a tight stow from wall to wall should be sought. However, in many instances some void spaces may occur. If the spaces between the packages are too large, then the stow should be secured by using dunnage, folded cardboard, air bags or other suitable means.

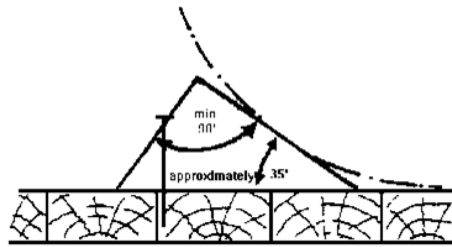


Figure 17 - Blocking rolling cargo by wedges

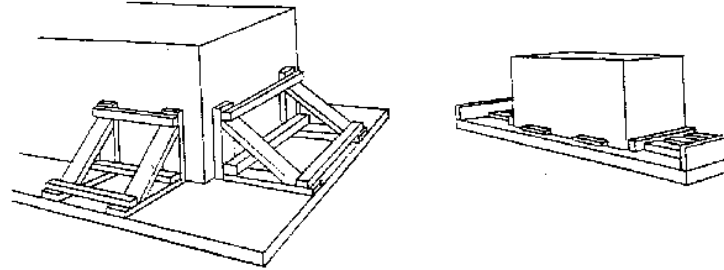


Figure 18 - Blocking by battens

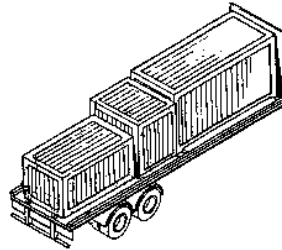


Figure 19 - Blocking against the headboard in a trailer

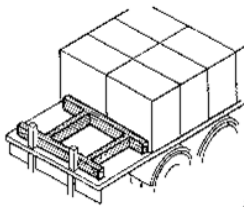


Figure 20 - Blocking by an H-block

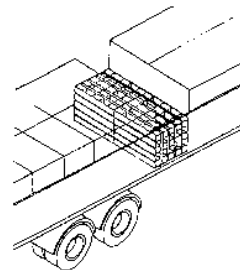


Figure 21 - Blocking by empty vertical pallets

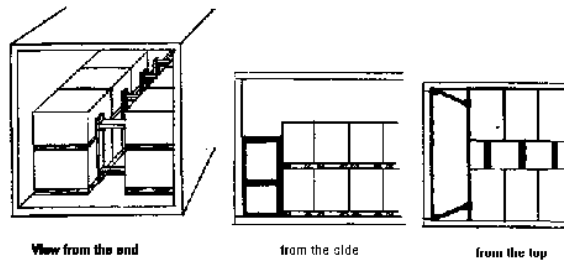


Figure 22 - Blocking cargoes in a strong-walled cargo unit

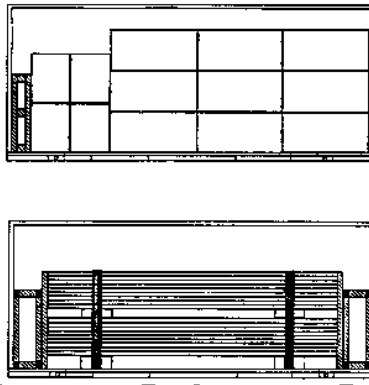


Figure 23 - Fill all spaces between load and unit wall, e.g. by blocking

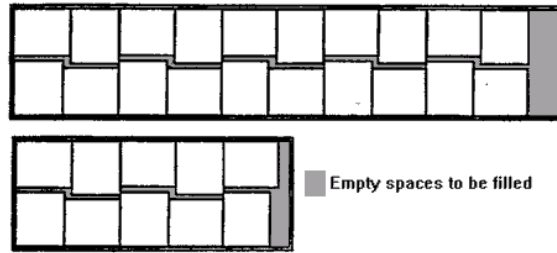


Figure 24 - Packing 1000 x 1200 mm unit loads in 20 ft and 40 ft containers

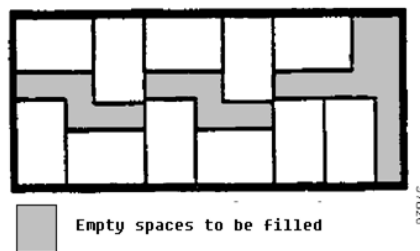


Figure 25 - Packing 800 x 1200 mm unit loads in 20 ft containers

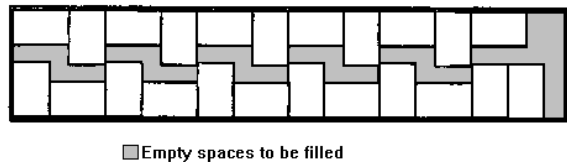


Figure 26 - Packing 800 x 1200 mm unit loads in 40 ft containers

3.2.4 If air bags are used, the manufacturer's instructions on filling pressure should be scrupulously observed. Allowance should be made for the possibility of a considerable rise in the internal temperature of the CTU above the temperature at the time of packing. This may cause the bags to expand and burst, thereby making them ineffectual as a means of securing the cargo. Air bags should not be used as a means of filling space at the doorway unless precautions are taken to ensure that they cannot cause the door to open violently when the locking bars are released (see also 3.3.1).

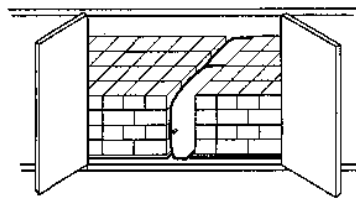


Figure 27 - Blocking by air bags

3.2.5 The weight of the cargo should be evenly distributed over the floor of a container. Where cargo items of a varying weight are to be packed into a container or where a container will not be full (either because of insufficient cargo or because the maximum weight allowed will be reached before the container is full), the stow should be so arranged and secured that the approximate centre of gravity of the cargo is close to the mid-length of the container. If it is not, then special handling of the container may be necessary. In no case should more than 60% of the load be concentrated in less than half of the length of a container measured from one end. For vehicles, special attention should be paid to axle loads.

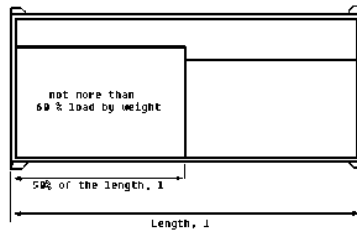


Figure 28 - Even load distribution: not more than 60% in one half of the container

3.2.6 Heavy cargoes should not be placed on top of lighter cargoes and liquids should not be placed on top of solids. When it is intended that packages are to be stacked on top of each other, attention should be paid to the strength of pallets and the shape and condition of the packages. Attention is drawn to part 6 of the IMDG Code on stacking tests*. It may be necessary in some cases to ensure stability of such a stack by introducing dunnage or solid flooring between tiers of the stow. When doubt exists, especially with heavier packages such as intermediate bulk containers (IBCs) for liquids, it should be ascertained from the shipper or manufacturer of such packages whether or not they are designed and strong enough to be stacked on top of one another, especially where part of the transport will involve a sea voyage. The centre of gravity should be below the half-height of the cargo space.

* The stacking test requires that test samples be stacked with a load equal to that which they would be subjected to in transit, with a stacking height of at least 3m. The packages must not leak or show deterioration or distortion after a specified time. The minimum time is 24 h, with 28 days being required for some types of packages. The test is intended for all types of packages other than bags.

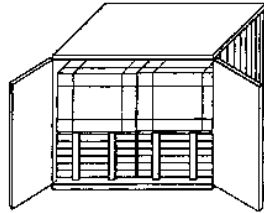


Figure 29 - Do load lightweight items on top of heavy ones

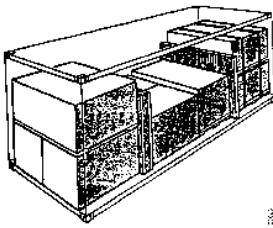


Figure 30 - Securing load by vertical separator

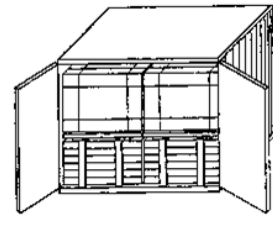


Figure 31 - Securing load by intermediate floor layers

3.2.7 In order to avoid cargo damage from moisture, wet cargoes, moisture-inherent cargoes or cargoes liable to leak should not be packed with cargoes susceptible to damage by moisture. Wet dunnage, pallets or packaging should not be used. In certain cases, damage to equipment and cargo can be prevented by the use of protective material such as polythene sheeting.

3.2.8 Damaged packages should not be packed into a CTU unless precautions have been taken against harm from spillage or leakage (see 4.2.7 and 4.3.1 for dangerous cargoes).

3.2.9 Permanent securing equipment incorporated into a CTU should be used wherever necessary to prevent cargo movement.

3.2.10 Where open or curtain-sided units are concerned, particular care should be taken to secure cargo against side forces, including those likely to arise from the rolling of the ship or in traffic. A check should be made to ensure that all side battens are fitted where appropriate or other adequate precautions are taken.

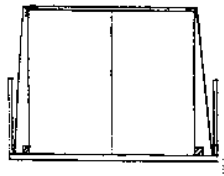


Figure 32 - Over-top lashing

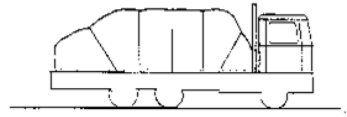
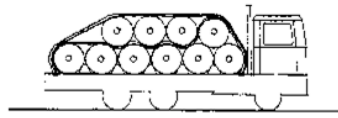


Figure 33 - Conventional securing by tarpaulin

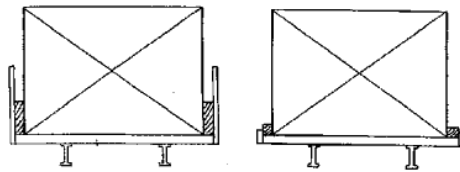


Figure 34 - Blocking against sideboards or side edges

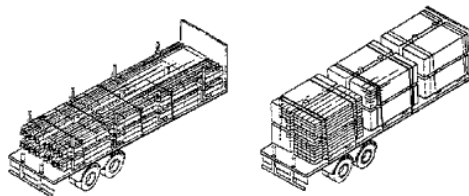


Figure 35 - Blocking by stanchions

3.2.11 Any special instructions on packages, or otherwise available, should be followed, e.g.:

cargoes marked 'protect from frost' should be packed away from the walls of a CTU;

cargoes marked 'this way up' should be packed accordingly;

maximum stacking height marked should not be exceeded; and

where practicable, markings on packagings should conform to ISO 780:1985.

3.2.12 When deciding on packaging and cargo-securing material, it should be borne in mind that some countries enforce a garbage- and litter-avoidance policy. This may lead to limitations on the use of certain materials and imply fees for the recovery of packaging at the reception point as well as similar problems for the shipper of the cargo. In such cases, reusable packaging and securing material should be used. Increasingly, countries are requiring timber dunnage and packaging materials to be debarked.

3.3 On completion of packing

3.3.1 During the final stages of packing a CTU, care should be taken, so far as is practicable, to build a secure face of the cargo so as to prevent 'fall out' when the doors are opened. Where there is any doubt as to the security of the cargo, further steps should be taken to ensure security, e.g. by weaving strapping between securing points or placing timber between the rear posts.

Two factors should be borne in mind:

that a container on a trailer usually inclines towards the doors; and

that cargo may move against the doors due to jolts, etc., during transport.

3.3.2 If a CTU is destined for a country with wood treatment quarantine regulations, care should be taken that all wood in the unit, packaging and cargo complies with the regulations. It is a useful practice to place a copy of the wood treatment certificate in a conspicuous place inside and, where appropriate, outside the unit in a weatherproof pouch.

3.3.3 After closing the doors, it should be ensured that all closures are properly engaged and secure. Usually a seal is applied to a container. Care should be taken that sealing procedures are carried out properly.

3.3.4 Where CTUs 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.