3.2 General stowage/packing techniques

3.2.1 Stowage and packing techniques should be suitable to the nature of the cargo with regard to weight, shape, structural strength and climatic conditions. This includes the proper use of dunnage material (see section 2.1 of this annex), the selection of the appropriate method of mechanical handling and the proper stowage of vented packages. The concept of stowage should incorporate the feasibility of smooth unloading.

3.2.2 Any marking on parcels should be strictly observed. Cargoes marked "this way up" should not only be stowed upright but also kept upright during entire handling. Goods which may be subject to inspection by the carrier or by authorities, like dangerous goods or goods liable to Customs duty, should, if possible, be stowed at the door end of the CTU.

3.2.3 When packing mixed cargoes, their compatibility should be considered. Irrespective of the regulations for the stowage of dangerous goods (see chapter 10 of this Code) the following general rules are applicable:

- Heavier cargoes should not be stowed on top of lighter cargoes. This will also provide for the centre of gravity of the CTU in a level not exceeding half the height of the CTU;
- Heavy units should not be stowed on top of fragile parcels;
- Sharp-edged pieces should not be stowed on top of units with weak surfaces;
- Liquid cargoes should not be stowed on solid cargoes;
- Dusty or dirty cargoes should not be placed near to clean and easily soiled cargoes like foodstuff in porous packaging;
- Cargoes emitting moisture should not be stowed on or near to cargoes sensitive to moisture;
- Odorous cargoes should not be stowed in the vicinity of cargoes easily absorbing odour;
- Incompatible cargoes should be packed into the same CTU only if their stow is appropriately separated and/or the goods are effectively protected by suitable sheathing material.

3.2.4 Stacking of sensitive cartons of uniform size and shape should be precise in a way that the mass from above is transferred to the vertical boards of the cartons below. If necessary, e.g. due to lateral leeway of the stack in the CTU, intermediate sheets of fibreboard, plywood or pallets should be placed between layers of the stack (see figures 7.24 and 7.25). Cartons of irregular shape and/or size should be stacked only with due consideration of their structural hardiness. Gaps and irregularities of level should be stuffed or equalized by means of dunnage.

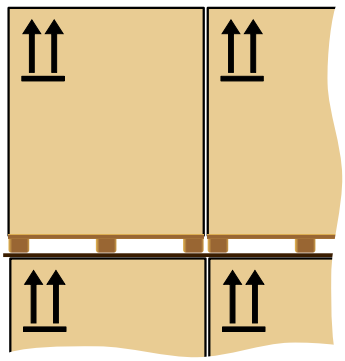

Figure 7.24 With intermediate board

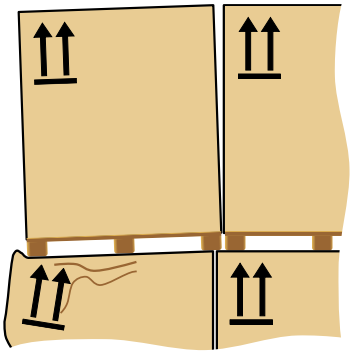

Figure 7.25 Without intermediate board

3.2.5 Packages with a less defined shape like bags or bales may be stacked in an interlocking pattern, also called cross-tie, thereby creating a solid pile that may be secured by blocking or fencing (see figure 7.26). Round longish units like pipes may be stacked into the grooves of the layer below. However, care should be taken of the lateral forces produced by top layers in the grooves of the bottom layers, which may locally overload the side walls of the CTU if the friction between the pipes is low.

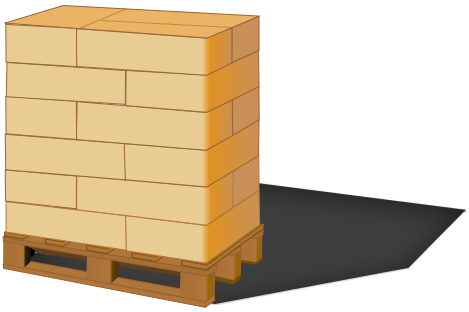

Figure 7.26 Cross-tie stowage

3.2.6 Uniform parcels like drums or standardized pallets should be packed in a way that minimizes lost space and provides a tight stow at the same time. Drums may be stowed either in regular lines, also called "soldier stowage", or into the vertical grooves, also called "offset stowage" (see figures 7.27 and 7.28). With small drums the offset packing is more effective, while with greater drum diameters the advantage may be with the soldier stow. Pallet dimensions are widely standardized and adapted to the inner width and length of cargo spaces in road trucks, road trailers and swap bodies, but not throughout to the inner dimensions of freight containers.

Figure 7.27 Mixed stow, dry over wet goods

Figure 7.28 Mixed stow, use of pallets

3.2.7 Near to completion of packing a CTU, care should be taken to build a firm face of the cargo so as to prevent a "fall out" when the CTU is opened. If there is any doubt about the stability of the face, further steps should be taken such as strapping top layers of cargo back to securing points or building a timber fence between the rear posts in a CTU (see subsection 2.3.4 of this annex). It should be borne in mind, that a freight container on a trailer usually inclines towards the doors aft and that cargo may move against the doors due to vibration induced shift or by jolts during transport.

3.3 Cargo handling

3.3.1 Relevant regulations on the use of personnel protection equipment (helmet, shoes, gloves and clothing) should be adhered to. Personnel should have been instructed on ergonomic aspects of manual lifting of weighty parcels. Weight limitations of parcels to be lifted and carried by persons should be observed.

3.3.2 Forklift trucks, used for driving inside roofed CTUs, should have a short lifting mast and a low driver's overhead guard. If the lift truck operates inside a CTU care should be taken of the exhaust gases and equipment with electric power supply or similar should be used. The truck should be equipped with adequate lighting so that the operator can place packages accurately. Forklift trucks s operated by a combustion engine should comply with national combustion emission standards. Forklift trucks s with engines burning LPG fuel should not be used in enclosed space, in order to prevent the accumulation of explosive gas mixtures from unexpected leaks.

3.3.3 Where there is a risk of explosion due to the vapours, fumes or dust given off by the cargo, all electrical equipment mounted on the forklift trucks should be evaluated to ensure that they are safe for flammable and explosive atmospheres.

3.3.4 Driving forklift trucks into swap bodies, semi-trailers or other supported CTUs should be done slowly, in particular with careful starting and braking, in order to avoid dangerous horizontal forces to the supports of the CTU.