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**MONITORING OF WEIGHTS AND DIMENSIONS OF LOADING UNITS USED IN  
COMBINED TRANSPORT\***

**Intermodal Loading Units, Harmonization and Standardisation Initiative**  
**European Commission consultation paper**

**Transmitted by the European Commission (EC)**

Note: The secretariat reproduces below a document transmitted by the European Commission.

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**INTRODUCTION AND SUMMARY**

1. With this consultation paper, the services of the Directorate General for Energy and Transport of the European Commission are seeking the views of interested parties on an initiative to harmonize and standardize certain characteristics of intermodal loading units.

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\* The present documentation has been submitted after the official documentation deadline by the Transport Division due to personnel constraints.

2. The Community has an interest in making intermodality more attractive to transport users and endorsing it as a sustainable alternative to congested road transport. The European Parliament, Council and Commission have identified the lack of harmonization and standardization of loading units as an area that hampers the development of intermodality from reaching its full potential.

3. Currently the handling characteristics of intermodal loading units differ considerably from standardized characteristics of containers to swap bodies and to diverse characteristics of purpose-build units. Considerable effort is required to identify, on a case-by-case basis, the handling requirements of any single intermodal loading unit. Also the handling equipment has to be frequently adjusted or even changed for certain configurations. This complicates and delays handling operations and adds unnecessary friction costs to intermodality. To solve this problem, intermodal loading units need to be made more uniform in the Community.

4. A degree of uniformity can be introduced in the current situation by harmonizing certain characteristics of intermodal loading units. Such characteristics could include the location and design of fittings and other accessories of the intermodal loading units that relate to handling and transportation. This harmonization would decrease transfer friction costs, speed up handling and decrease the risks during transportation. The technical specifications for the harmonized characteristics would be mandated to the European Committee for Standardisation (CEN) to elaborate.

5. Apart from harmonization, Europe needs an optimal intermodal loading unit that combines the benefits of containers and swap bodies. Such a unit should be able to move freely in all land and waterborne modes of transport and between them to offer the prerequisites for maximum intermodality. Consequently, it should be stackable, suitable for top lifting and seaworthy. The unit should offer the maximum allowable space for transporting pallets, and it should also offer simple and fast charging and discharging of pallets to decrease friction costs and delays. To begin with, this European Intermodal Loading Unit could be a pallet-wide general-purpose dry-cargo box having a length of 13600 mm or 7450 mm and height of 2670 mm. Such loading units do not exist today in any significant numbers. Therefore, European standards would have to be developed under a mandate to be given to CEN.

6. To ensure safety and minimize the risks to persons and property, all intermodal loading units in use in Europe should be subject to a maintenance obligation and periodic inspections. The procedures for those measures should be uniform and follow European standards to be designed by CEN. Obligations for maintenance and periodic inspections regarding containers in international traffic also arise from the 'Convention for Safe Containers' adopted at international level.

7. Conformity of intermodal loading units with the relevant standards should be assessed or reassessed by notified or approved bodies. The designation of those bodies and the necessary assessment measures could follow the standard procedures arising from EN standards and earlier Community legislation. Corresponding procedures could be chosen for the periodic inspections.

8. Recognition of conformity assessment, reassessment and periodic inspections and their markings would help the free movement of intermodal loading units all around Europe.

### **THE PROBLEM: DIVERSITY OF TECHNICAL CHARACTERISTICS**

9. For multimodal transport to become attractive to customers, it needs to be simple to use and fulfil the customer requirements. It has to offer the same - or better - advantages than single road transport. This could be achieved by single modes complementing each other and linking their strengths in door-to-door supply chains. Interconnections between the modes should be seamless and offer a high degree of interoperability. However, smooth transfers between modes are endangered by lack of standardization and harmonization in intermodal loading units.

10. The commonly used containers in Europe (20' and 40') follow the standards of the International Standardisation Organisation (ISO). Also other container types and sizes are in circulation, and their widths and heights and construction strengths differ. These containers can generally be used in all land and waterborne modes of transport. They are usually stackable and can be lifted with spreader. However, they do not generally offer optimum loading capacity for ISO pallets<sup>1</sup> or fully utilise the maximum dimensions available in land transport. Therefore, they are not widely used in European land transport.

11. Swap bodies are primarily designed for transfer between land modes. They allow good utilization of capacity on road and rail vehicles, but they do not offer economic solutions for inland waterways or short sea shipping. They are usually not stackable owing to their weak wall construction, cannot withstand the sea movements and cannot be lifted with spreader. They come in different sizes and have a number of different characteristics. The European Committee for Standardisation (CEN) has elaborated certain European standards for swap bodies.

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<sup>1</sup> 800x1200 mm and 1000x1200 mm (cf. ISO 6780).

12. This diversity of designs, sizes and technical characteristics complicates intermodality and deprives it of interoperability of loading units. Handling operations are being delayed because every box has to be identified separately to choose the correct handling technique. The lifting equipment has to be frequently fine-tuned or changed. This causes unnecessary friction costs in the transport chain. Swap bodies are confined to land transport (and short Ro-Ro<sup>2</sup> journeys) while containers are mainly used in waterborne modes. This situation also complicates investments in intermodal loading units. The full capacity of the transport system cannot be utilized, and seamless intermodality does not become reality.

### **The Problem Recognized**

13. The Commission Communication of 1997 on Intermodality and Intermodal Freight Transport in the European Union<sup>3</sup> acknowledged that harmonization of standards for sizes, weights and other features of loading units would facilitate intermodal transfers. Lack of interoperability of loading units was also emphasized in the White Paper on European Transport Policy for 2010<sup>4</sup>. That Paper foresees measures to be taken to design and standardize new loading units offering the advantages of both containers and swap bodies plus optimum intermodal transshipment.

14. Also the European Parliament<sup>5</sup> has emphasized a need for a better level of intermodal interoperability of equipment. This could be achieved by, *inter alia*, harmonizing or coordinating standards to ensure interoperability and the free flow of goods and loading units in the intermodal transport chain.

15. In addition, the Council, in its Resolution of 14 February 2000 on the promotion of intermodality and intermodal freight transport in the European Union<sup>6</sup>, invited the Commission, in co-operation with the Member States, to focus, *inter alia*, on harmonizing the standards related to transport units.

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<sup>2</sup> “Roll-on-Roll-off” means that a seagoing vessel has facilities to enable road or rail vehicles to roll on and roll off the vessel.

<sup>3</sup> COM(97) 243 final, 29.5.1997.

<sup>4</sup> COM(2001) 370, 12.9.2001.

<sup>5</sup> Reports by Mr. U. Stockmann of 21.1.1999 and by Mrs. A. Poli Bortone of 27.11.2000.

<sup>6</sup> OJ C 56, 29.2.2000, p. 1.

16. The complexity of loading units has also been an issue in other contexts. For instance, there was hesitation as to their optimal size and characteristics in the inventory of bottlenecks in short sea shipping carried out by the Commission in 2000. Under research and technological development (RTD) activities, the 'Task Force Transport Intermodality' set up under the 4th Framework Programme for RTD identified a need for standardization to improve the interchangeability of loading units. Other research activities, such as X-MODALL and UTI-NORM examined innovative loading unit design to find alternatives to the current situation.

### **THE SOLUTION: HARMONIZATION AND STANDARDISATION**

17. The problem can be subdivided into two subgroups:

- Complexity of handling operations and lack of interoperability,
- Lack of optimal intermodal loading units that can be used in all land and waterborne modes.

18. These subgroups of problems require separate solutions. The first could be overcome by harmonizing certain characteristics of new intermodal loading units so that they could be handled in a more uniform way. The second subgroup could be overcome by standardizing an optimal intermodal loading unit suitable for transport in all land and waterborne modes.

### **Harmonized Interoperability Characteristics of Intermodal Loading Units**

19. Intermodal loading units have a number of different characteristics. Some of them require bottom lifting (e.g. by forklift); others can be lifted from the top (e.g. by spreader). They have their points of fixing in different places, and the strength of their constructions also differs. Such problems could be overcome by introducing a set of harmonized, common characteristics for these loading units for them to be handled in a more uniform way.

20. Such harmonized characteristics could include the fittings and other accessories of the intermodal loading units that relate to handling and transportation. For instance, harmonizing the locations and designs of corner fittings, openings for sling handling and forklift pockets would contribute to uniformity in lifting the units. Harmonization of the characteristics of intermediate supports, such as supporting legs, would facilitate intermediate storage between transport operations. A common definition of the areas that are strong enough to support the weight of the unit during transportation (load transfer areas) would decrease the risk of damage and facilitate placing the unit in position.

21. Further, securing cargo on vehicles, wagons and vessels in a safe and efficient way could be assisted by harmonizing the interfaces for load securing devices.

22. The exact definitions, designs and locations of such harmonized characteristics would differ between loading units on the basis of, for instance, their length and configuration (such as wall strength). To reach a full set of harmonized characteristics, the Commission could introduce a mandate to the European Committee for Standardisation (CEN) to define the exact harmonized criteria in CEN standards by class and category of intermodal loading units. Intermodal loading units manufactured, put into service or circulation after the date of implementation of these standards, would have to comply with the relevant harmonized common specifications.

23. The intermodal loading units with harmonized characteristics would bear a mark, or a set of concurring marks by category or class, affixed to them to show their compatibility with the requirements and to help their detection in the handling process. This mark could be affixed only after the intermodal loading unit has been verified to be in conformity with the criteria in the relevant CEN standards (cf. chapter 2.4).

24. If the intermodal loading units were equipped with these harmonized characteristics, handling operations would become simpler. However, a certain degree of diversity would remain for two reasons:

- It would not be economically justifiable to require existing intermodal loading units to be altered or refurbished with the harmonized characteristics. Therefore, as long as such units remain in circulation, the current, diversifying situation would partly remain. However, these old units would gradually disappear from the market with time (on average in 5 years for weaker swap bodies and 10-15 years for stronger containers).
- It would also not be justifiable to require all intermodal loading units to have the construction strength of a stackable ISO container. ‘Weak containers’ and ‘weak swap bodies’ would remain in the market because they are less expensive to construct and suitable for a number of purposes (e.g. where waterborne transport is not a viable option).

### **Standardized European Intermodal Loading Unit**

25. An optimal intermodal loading unit for Europe should combine the benefits of containers, in particular stackability, top lifting and capability to withstand forces at sea, and of swap bodies, in particular their more feasible dimensions. It should be able to move freely in all land and waterborne modes of transport and between them to offer the preconditions for maximum intermodality. To

begin with, such an intermodal loading unit could be a general-purpose dry-cargo box with end opening, side opening or top opening.

26. Such loading units do not exist today in any significant numbers. Therefore, European standards would have to be developed for them under a mandate to be given to CEN.

27. A considerable amount of work has already been done towards this aim both in CEN and in RTD:

- CEN has produced EN standards for swap bodies of class A<sup>7</sup> (EN 452:1995) and class C<sup>8</sup> (EN 284:1992). However, those swap bodies are not stackable. CEN is also working on stackable class C swap bodies (prEN 13853). In addition, CEN has produced a number of related standards for swap bodies, such as securing cargo on road vehicles (EN 12640 series), testing swap bodies (EN 283:1991), coding, identification and marking (EN ISO 6346:1995 and EN 13044:2000), and automatic identification (EN ISO 10374:1997).
- The research project UTI-NORM<sup>9</sup> (4th Framework programme) examined the optimal size of loading units. It came to the conclusion that - under the EU legislation on the dimensions of road vehicles (Council Directive 96/53/EC<sup>10</sup>) - a new, stackable 2550x2900x13600 mm container/swap body would be an optimal compromise for Europe. It would use optimally the maximum measurements and capacity allowed on the road for the first and final leg of an intermodal journey. The shorter version for road trains (2550x2900x7450 mm) would also have corresponding benefits. While acknowledging the problems that this new type of unit would create, in particular, on cellular ships and barges and on some rail connections, the study considered that the benefits<sup>11</sup> outnumbered the difficulties.

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<sup>7</sup> 12192, 12500 or 13600 mm of length, 2500 mm of width and 2670 mm of height with gross mass of 34 t or less and with bottom fittings positioned according to the specification for 1A (40') ISO Containers.

<sup>8</sup> 7150, 7450 or 7820 mm of length, 2500 mm of width and 2670 mm of height with gross mass of 16 t or less and with bottom fittings positioned according to the specification for 1C (20') ISO-Containers.

<sup>9</sup> Current State of Standardisation and Future Standardisation Needs for Intermodal Loading Units in Europe (UTI-NORM), Final Report, September 1999, Bruxelles, Frankfurt/Main, Hanover, London, Paris.

<sup>10</sup> OJ L 235, 17.9.1996, p. 59.

<sup>11</sup> According to the study, these benefits include usability in all surface modes of transport, improved transport economics for waterborne transport while keeping full compliance with road/rail swapbodies, stackability, pallet-wide width, simplified charging and discharging patterns, optimal use of allowable road dimensions, rather cheap construction, overall economic benefits by decreasing the great variety of different shapes and sizes used today, compatibility with the most common lifting equipment, and compatibility with the 'Convention for Safe Containers' (cf. chapter 2.3).

28. The work undertaken by CEN and UTI-NORM could form the base for the standard of an optimal European Intermodal Loading Unit in two versions of length: 13600 mm and 7450 mm. The first length would be chosen because of its optimal character in relation to ISO pallets and maximum allowable loading length in road transport. The latter because it is close to the maximum that can be transported in pairs on road trains without special construction of the vehicle (such as short coupling). Both lengths can be transported also by rail, short sea shipping and inland waterways. Some problems could occur on cellular ships and barges that would need to adjust their cell guides to a new length entailing marginal friction costs (even though adjusting those guides between different lengths happens already today). In some cases when ships are designed for certain container lengths, the structural requirements might result in less optimum use of cargo space. Also the capacity of current standard rail wagons, which is designed for 40' and 20' ISO containers or 7150 - 7820 mm swap bodies, could not be fully utilized with the 13600 mm unit.

29. The inner width of the European Intermodal Loading Unit would have to allow two pallets to be accommodated side by side (i.e. 2x1200 mm plus the necessary margin for manoeuvre). Apart from allowing better use of capacity than an ISO container, such a pallet-wide solution would speed up and simplify charging operations. The outside width could not exceed the maximum allowable width in road transport (2550 mm). A unit width above 2500 mm could create some problems, for instance, on cellular ships where the cell width is maximally 2500 mm and would require adjustment of the cell guides. There might be some loss of cargo space on certain inland waterway vessels, in particular, those that are constructed to take four ISO containers side by side without a margin. However, the possibility of accommodating two pallets side by side in the loading unit, thereby increasing the loading capacity and facilitating charging and discharging operations, would have to outweigh these problems.

30. A pallet-wide intermodal loading unit having a length of 13600 mm could accommodate 23 – 33 per cent more pallets (depending on pallet size) than an ISO 40' container. Utilizing the new capacity in full could lead to decongestion of the roads and a decrease in heavy vehicle kilometers, because fewer vehicles would be needed to carry the same amount of goods.

31. Loading units having a length of 45' (13720 mm) are allowed on the European roads until the end of 2006 under national rules<sup>12</sup>. However, even after that date 45' long units can be carried on road if their front corners are rounded at the 13600 mm length distance. Such a unit offers an additional 120 mm inside loading length in comparison with the 13600 mm unit. However, this additional space is reduced in width in the front because the front corner posts would have to follow the 13600 mm length concept. Manufacturing such a special unit would be complicated and create

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<sup>12</sup> Article 4(6) of Directive 96/53/EC, OJ L 235, 17.9.1996, p. 59.

additional costs. In practice it would not allow any additional pallets to be loaded. Only with a most complicated stowage pattern might one additional pallet be accommodated. On the other hand, using such a complex pattern would complicate and delay charging and discharging operations which is not the case with the pallet-wide 13600 mm solution described above. Consequently, the Commission did not base the European Intermodal Loading Unit on the 45' concept.

32. A usual height for swap bodies is 2670 mm<sup>13</sup>. This could be the height of the European Intermodal Loading Unit. It is higher and allows more space than the standardized heights of ISO 668 and 650 Series 1 containers (2438 mm and 2591 mm), and it can be accommodated on the main railway lines using standard rail car height. The United Kingdom has a lower rail gauge, which allows maximum loading unit height of 2540 mm. However, many important lines from and to the Channel tunnel have a rail gauge, which allows 2670 mm loading unit height with a lowered railcar platform height of 1045 mm.

33. The European Intermodal Loading Unit would have to be stackable in order to attract the interest of short sea shipping and inland waterways. Ro-Ro ships can utilize their capacity more economically, if at least 2 units can be transported in stack. Lo-Lo<sup>14</sup> ships use higher stacks (up to 6 units). Also for intermediate storage in terminals and ports, stackability is a clear requirement and offers economic advantages in utilizing the available space. As the draft EN standard prEN 13853 shows, a 7450 mm unit can have stackability corresponding to that of the ISO 20' container. This is mainly due to the fact that it can bear the vertical forces of the stack through the strong part of its construction (the corner posts). For 13600 mm units, an acceptable compromise between stacking capability and tare would have to be found. The top corner fittings of a 13600 mm unit would probably not be in the corners but - owing to the above harmonized characteristics - attached to the side walls. In such a case full ISO series 1 container stacking capability would require reinforcing the walls to an extent that would make the tare too heavy and too expensive to build. A stacking capability of 4 layers fully loaded in sea conditions might be a more realistic option than the full ISO 40' container stackability.

34. The European Intermodal Loading Unit would bear a mark affixed to it to show its compatibility with the requirements and to enable its easy detection in the handling process. This mark could be affixed only after the unit has been verified to be in conformity with the criteria in the relevant EN standards (cf. chapter 2.4).

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<sup>13</sup> Cf. COST 339 - Small Containers, chapter 5.2.4 of the final report, 2001.

<sup>14</sup> "Lift-on-Lift-off" means that intermodal loading units are loaded and unloaded with lifting equipment.

35. Contrary to the harmonized characteristics of intermodal loading units, the use of the European Intermodal Loading Unit would not become mandatory. Instead, it would be left for the European industry to discover its benefits and have such units assessed for affixing the specific mark to be elaborated by CEN showing interoperability of the units for all land and waterborne modes of transport.

### **Safety of Intermodal Loading Units**

36. Because safety of transport and equipment is one of the main goals of the European transport policy, intermodal loading units in Europe should fulfill stringent safety requirements. They would have to, for instance, be maintained efficiently and be subject to periodic safety inspections to avoid any safety hazards.

37. The United Nation's 'International Convention for Safe Containers (CSC)' was adopted on 2 December 1972 in Geneva. It provides an international instrument aiming to maintain a high level of safety of human life in the transport and handling of containers by providing generally acceptable test procedures and related strength requirements. It also facilitates the international transport of containers by providing uniform international safety regulations, equally applicable to all modes of surface transport. Most EU Member States have ratified the Convention. The CSC includes obligations for maintenance and periodic inspections. Corresponding standards could be elaborated by CEN.

38. The CSC covers only international transport. However, safety considerations affect intermodal loading units in any transport operation. Therefore, the requirements for maintenance and periodic inspections in the European Union should cover intermodal loading units used both in domestic and international transport operations.

39. The basic periods for periodic inspections of all intermodal loading units could be:

- First inspection within 5 years from the date of manufacture.
- Subsequent periodic inspections every two years thereafter.

40. Further, there does not seem to be any reason to exclude intermodal loading units manufactured prior to the implementation of the new legal act from the maintenance obligation or from the periodic inspections. Therefore, these obligations could cover all intermodal loading units that are in circulation in the Community.

**Procedures for Assessing or Reassessing Conformity of Intermodal Loading Units and their Periodic Inspection**

41. The above approach should contain procedures for assessing or reassessing the conformity of intermodal loading units with the relevant characteristics. These procedures would follow the standard modules used in Community legislation. Such assessment or reassessment would have to be carried out by bodies assigned for this purpose by the Member States. They should be designated based on the standard EN 45004 elaborated by CEN in 1995. Procedures for the periodic inspection of the intermodal loading units could follow the same principle.

42. Relevant mark(s) of conformity with the European standards and a marking relating to the periodic inspection should be affixed to the units that have been approved after having undergone these procedures.

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