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Inland Transport Committee

**Working Party on the Transport of Dangerous Goods**

**Joint Meeting of the RID Committee of Experts and the  
Working Party on the Transport of Dangerous Goods**

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Item 5(b) of the provisional agenda

**Proposals for amendments to RID/ADR/ADN:  
new proposals**

4 December 2013

**Replacement of UIC leaflets 592-2 and 592-4 by UIC leaflet  
592**

**Transmitted by the International Union of Railways (UIC)**

# UIC CODE

# 592

2nd edition, October 2013

*Translation*

# OR

## **Intermodal Loading Units (other than semi-trailers) for vertical transshipment and suitable for carriage on wagons - Minimum requirements**

*Unités de Transport Intermodal à transbordement vertical, autres que semi-remorques, aptes au transport sur wagons - Exigences minimales*

*Intermodale Ladeeinheiten für Vertikalumschlag, außer Sattelanhänger, zur Beförderung auf Wagen - Mindestanforderungen*



INTERNATIONAL UNION  
OF RAILWAYS

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All members of the International Union of Railway

**Record of updates**

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Replacing Railway Undertaking by Competent Authority  
Reference to EN 13044 whenever necessary  
Removal of IT marking  
Suppression of ISO containers which are defined in ISO 1496  
Added tests for swap-bodies suitable for concentrated loads  
(pending EN 283)  
Added code lengths 29 and 98 (asymmetric swap-bodies)

*The person responsible for this leaflet is indicated in the UIC Code*

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## Summary

The present leaflet is a handbook on intermodal transport units (ITUs) other than semi-trailers which may be carried by rail.

It lists the references for standardised ITUs and sets minimum requirements for specific ITUs.

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## 1 - Introduction

The present leaflet is a handbook on intermodal transport units (ITUs) other than semi-trailers which may be carried by rail.

It lists the references for standardised ITUs and sets minimum requirements for specific ITUs.



## 2 - Inventory of ITUs

The following table lists the reference texts and requirements to be complied with for each type of ITU (see [List of abbreviations - page 38](#)) for references to standards (see [Bibliography - page 39](#)) and points in the present leaflet).

Type		Dimensions and maximum loads	Markings	Strength <sup>a</sup>
2.1.	ISO container	ISO 668	ISO 6346	ISO 1496-1 to 5
2.2.	EN 283 containers	point 5	point 8	EN 283
2.3.	Class C ITUs	EN 284	point 8	EN 283
2.4.	Stackable class C ITUs	EN 13853	point 8	EN 13853
2.5.	Refrigerated class C ITUs	EN 12406	point 8	EN 12406
2.6.	Class A ITUs	EN 452	point 8	EN 452
2.7.	Stackable class A ITUs	EN 14993	point 8	EN 14993
2.8.	Refrigerated class A ITUs	EN 12410	point 8	EN 12410
2.9.	Tank ITUs	EN 1432 - point 5.3	point 8	EN 1432
2.10.	ITUs which do not fall under points 2.2 to 2.9 but whose dimensions allow them to be coded using UIC Leaflet 596-6	Must be suitable for carriage on wagons with compatibility code C	point 8	point 6.2
2.11.	ITUs with a base width of > 2 600 mm	Appendix A	point 8 <sup>b</sup>	point 6.2
2.12.	ITUs which, due to their dimensions or weight, may not be freely loaded onto carrying wagons with compatibility code C	Appendix B	point 8	point 6.2
2.13.	"Flat"-type ITU	ISO 1496	point 8	point 6.2
2.14.	Non-standardised ITUs carried stacked	Reserved		

a. Demonstration of strength is recognised by means of a CSC plate and/or code plate.

b. Specific marking.

### 3 - Requirements of the ITU/wagon interface

During its conveyance on the carrying wagon, the ITU shall be placed on the 4 lower corner fittings. The corner fittings shall comply with the distances indicated under [point C.1 - page 17](#). The dimensions of the corner fittings shall match those in [Appendix D - page 18](#).

The corner fittings shall be assembled such that in any loading situation, they lie with their entire surface in contact with the carrying wagon, and that this support is visible from the outside.

ITUs with a width greater than 2 500 mm but with an indent next to the securing devices thus giving a width of 2 500 mm, in accordance with [Appendix E - page 19](#), may be loaded on pocket wagons as per *UIC Leaflet 571-4* (see [Bibliography - page 39](#)) and shall be marked with an additional plate in accordance with [Appendix F - page 20](#) to be positioned next to the code-number plate.

If the lower part of the ITU has more than 4 corner fittings, those parts shall be marked in accordance with [Appendix G - page 21](#).

During their conveyance on pocket wagons or wagons which do not provide for any other support for swap bodies between the anchor points on the carrying wagon, ITUs shall be laid with their lower anchor points only on the support brackets. Pocket wagons as per *UIC Leaflet 571-4, point. 3.1.3.2* are fitted with support brackets which support the ITU in the area of the main beams in the centre to limit vertical oscillations.

If due to their design ITUs in groups 40 to 45 and 91 to 98 also require an intermediate bearing during carriage by rail, provision shall be made for this specificity during construction (positioning and strength of support points).

The positioning and dimensions of intermediate bearings shall comply with [Appendix H - page 22](#).

The length codes with regard to the positioning of corner fittings are set out in [Appendix I - page 23](#).

## 4 - Requirements for the ITU/transshipment device interface

In order to enable handling by crane or other means of transshipment, all ITUs shall be suitable for grab-handling and be fitted with:

- upper corner fittings in accordance with *ISO 1161* (see [Bibliography - page 39](#) and [List of abbreviations - page 38](#)) or [Appendix J - page 25](#);
- and/or grab zones in accordance with [point C.2 - page 17](#) and *EN 284* or *EN 452* (see [Bibliography](#)) depending on the length of the ITU.

## 5 - Minimum requirements for certain types of ITU

ITUs may be built to various types as provided for by the relevant ISO and/or CEN standards (see [List of abbreviations - page 38](#)).

Other ITUs are subject to the following provisions apply.

### 5.1 - All ITUs

As ITUs can be conveyed in both directions in the SS regime (120 km/h), their superstructures (in particular doors, shutters, collapsible sides/ends and their fittings) shall withstand wind pressure, in particular pressure increases and drops occurring when traversing tunnels or passing another trains.

When an ITU of any type is fitted with a ladder, each rung of the ladder shall be able to withstand a load of at least 200 kg.

All the external mobile parts of the ITU likely to foul the railway loading gauge shall be equipped with a double locking system.

Maximum permitted mass for ITUs (unless otherwise defined in other standards).

Length (feet)	Maximum permitted mass (kg)
10	10 260
≥ 20	36 000

The maximum mass may be higher if the features of the wagon and the loading equipment allow.

### 5.2 - Refrigerated ITUs

ITUs suitable for temperature-controlled carriage shall comply with the provisions of the ATP (see [List of abbreviations](#)) if the rolling stock is intended for use on services subject to said agreement, and in particular shall bear the marks provided for *in Annex 1, Appendix 4 of the ATP*.

### 5.3 - Tank ITUs

**5.3.1** - The tanks shall withstand an internal pressure of 0,3 bar, unless a more restrictive value is prescribed by RID/ADR (see [List of abbreviations](#)).

**5.3.2** - Tank units intended for the carriage of dangerous goods listed in the RID/ADR shall comply with the provisions of those documents. The prescriptions of the present leaflet shall also be complied with, so long as they do not contradict the RID/ADR.

**5.3.3** - Tank units may have upper corner fittings and/or grab zones.

**5.3.4** - Tank units may be built to lengths different from those stipulated by *EN 1432* (see [Bibliography - page 39](#)).

## 5.4 - ITUs with a rigid closed superstructure

These ITUs are not subject to any specific additional requirements.

## 5.5 - ITUs with a flexible closed superstructure and curtainsiders

In the case of ITUs covered by tarpaulins, the strength and securing of the tarpaulin to the superstructure shall meet the requirements of *EN 12641-1* (flexible closed superstructure) or *EN 12641-2* (curtain sider) (see Bibliography - page 39).

From 1 January 2016, all new-build ITUs fitted with a tensioned sheeting system must also be fitted with an additional securing device preventing accidental opening.

When all or parts of the walls are missing or not rigid, adjustments shall be made to ensure that the load may be fastened to the floor of the swap body. The number, configuration and positioning of lashing points are specified in *EN 12640* (see Bibliography - page 39).

## 5.6 - ITU beds with tarpaulin-covered sides (unit with side boards, tarpaulins and hoops)

The roofing shall be designed such as to avoid the formation of pools of water. The hoops and removable boards shall be correctly held in place in order not to come loose.

The equipment securing the tarpaulins on the ITU shall be designed to prevent any loosening or slackening during carriage, including under dynamic and aerodynamic influences.

The quality and securing of tarpaulins are defined in *EN 12641-1*.

## 5.7 - ITU beds with end walls

The floor of this type of ITU shall be fitted with lashing equipment as per *EN 12640*.

During carriage by rail, the end walls are generally raised. Loads placed on this type of ITU bed shall not foul the loading gauge of the longitudinal and transverse planes formed by the raised end walls and/or stanchions.

If this type of ITU is carried in the form of a homogenous stack, the number of beds shall be determined on the basis of the information provided by the manufacturer during the approval process. A specific marking providing an indication of the coding for the stack shall then be defined.

If this type of ITU is carried empty in the form of a non-homogenous stack, the conditions of the UIC Loading Guidelines shall apply; there shall be no specific marking providing an indication of the coding.

In all cases, the ITUs shall be locked together; the mobile components of the upper part of the stack shall also be double locked and it shall be easy to check they have been locked.

See code plate (see point 8 - page 12) on dynamic tests (see point 6 - page 9).

## 5.8 - ITU beds without end walls

The floor of this type of ITU shall be fitted with lashing equipment as per *EN 12640*.

This type of ITU shall not be given a code plate but an identification plate. The latter shall not contain the permitted profile number, to be replaced by the inscription "Flat". Carriage on this type of ITU shall be subject to geometric profiling beforehand. [Appendix K - page 26](#) provides an example of an identification plate.

If this type of ITU is carried empty in stacked form, the conditions of the UIC Loading Guidelines shall apply.

If this type of ITU is carried in combined transport in stacked form, the conditions of [point 5.7 - page 7](#) shall apply to the extent that they are applicable.

Stacking rules shall be the same as those set out for ITUs under [5.7](#).

## 5.9 - ITUs suitable for the carriage of concentrated loads

ITUs suitable for the carriage of concentrated loads shall bear the relevant marking on the side walls near the code plate, as depicted in [Fig. 14 - page 27](#).

ITUs specially upgraded to carry sheet metal coils or similar concentrated loads shall bear an inscription including a loading diagram and specifying the maximum and minimum diameters as well as the maximum permissible load for each cradle, as depicted in [Fig. 15 - page 27](#).

## 6 - ITU strength tests

The ITU subject to tests shall be considered satisfactory on condition that after each test it presents no anomalies or deformation rendering it unsuitable for use or unable to comply with the dimensional prescriptions of the present leaflet concerning handling, securing and interchangeability.

For all static load tests, the test load shall be applied for a minimum of 5 minutes.

In the following tests the letters R, P and n signify:

- R = maximum gross mass
- P = payload
- n = number of units forming the stack during the stacking test.

### 6.1 - Strength tests for standardised ITUs

ITUs standardised by ISO and/or CEN are satisfactory so long as they meet the stated conditions.

### 6.2 - Strength tests for non-standardised ITUs

Non-standardised ITUs shall meet the requirements indicated in [Appendix M - page 28](#).

### 6.3 - Additional tests for ITUs suitable for carriage of concentrated loads

#### 6.3.1 - Concentrated loads on large surfaces

For units designed to carry concentrated loads, every load case shall be tested on the basis of load x 1.5.

Concentrated load dimensions	1	2	3
∅ min. (mm)	1 130	1 130	1 130
∅ max. (mm)	1 900	1 900	1 900
Distribution of permissible loads			
Max. masses (t)	X	30,5	X
	30,5	X	30,5
	30,5	30,5	30,5

### 6.3.2 - Ground tests for permissible loads

These tests are to be performed in accordance with *EN 238* (see [Bibliography - page 39](#)) or with the method described below.

These tests are aimed at checking the permissible ground load per metre resulting from the securing of the load.

The swap body, loaded with a force control system in accordance with [Appendix E - page 19](#), rests on 4 rigid stands placed below each of the lower securing devices. These stands shall be on the same level, centred under the securing devices, and shall have approximately the same dimensions as the latter. The swap body shall be able to sag freely. It shall remain in the aforementioned position for at least five minutes.

Ancillary load securing devices shall be tested in accordance with the standards and directives in force.



#### Option 1

Test load plus load securing devices as per *EN 12195, Part 1* (see [Bibliography](#))



#### Option 2

Test bench



## 7 - Approval and coding of ITUs

Every ITU used in combined transport shall meet the following requirements.

### 7.1 - Approval

All ITUs other than those mentioned in point 2.1 of the table (see point 2 - page 3) shall be approved in accordance with the following procedure:

#### 7.1.1 - Prototype of prototype variant

The approval procedure for the prototype or prototype variant is described in Appendix N - page 34.

#### 7.1.2 - ITU series

The approval procedure for ITUs in series is described in Appendix O - page 35.

### 7.2 - Coding

ITUs as described in points 2.2 to 2.10 of table (see point 2) shall be coded in accordance with *UIC Leaflet 596-6* (see Bibliography - page 39) by any designated or recognised competent authority.

- Authorisation to affix code plates shall be delivered in accordance with the prescriptions of *UIC Leaflet 596-6* on the basis of the technical documents and the approval certificate for the prototype ITU and/or series ITU.
- The code-allocating body shall keep a record of the allocated codes and make them available to other parties if necessary.

## 8 - ITU markings

The markings for these ITUs are provided by the relevant competent authority and may be affixed by the manufacturer or any other authorised party. They are affixed in accordance with the provisions of *UIC Leaflet 596-6* or *EN 13044* (see [Bibliography - page 39](#)).

Any ITU fitted with access ladders shall feature a "Warning: high voltage" marking (an arrow in the shape of a lightning bolt) next to each ladder in accordance with [Appendix P - page 36](#).

### 8.1 - ITUs as per points 2.2 to 2.10 of the inventory

New ITUs must bear a coding plate in accordance with *EN 10344-2* (see [Bibliography](#)). ITUs which are already certified must bear a coding plate in accordance with *EN 10344-2* or *UIC Leaflet 596-6*.

The owner of the ITU must be identifiable, preferably using the ILU code (*EN 13044-1*) or the BIC code (*ISO 6346*) (see [Bibliography](#)).

### 8.2 - ITUs as per point 2.11 of the inventory

Markings for these ITUs shall comply with [Appendix A - page 13](#).

### 8.3 - ITUs as per point 2.12 of the inventory

These ITUs shall be marked by the relevant competent authority/authorities in accordance with bilateral or multilateral agreements, as described in [Appendix B - page 15](#).

### 8.4 - ITUs as per point 2.13 of the inventory

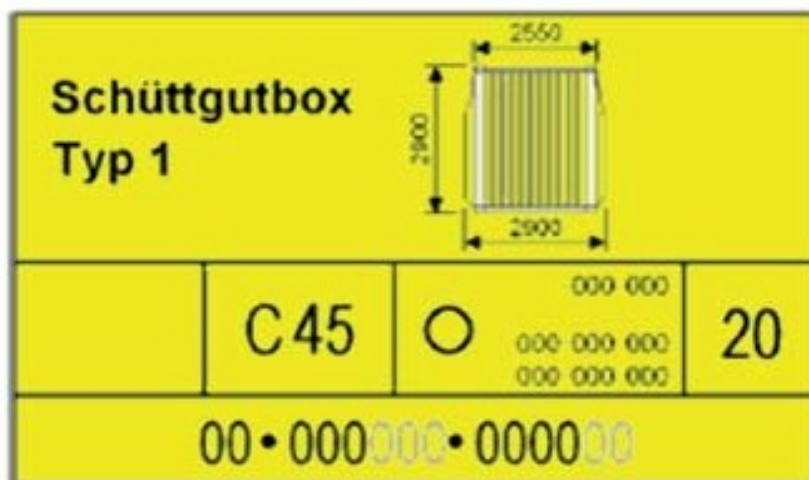
The marking of these units shall comply with [Appendix K - page 26](#).

## Appendix A -ITUs with a base width > 2 600 mm - Envelope of the lower part of ITUs described in point 2.11 of the table

(see point 2 - page 3)

These ITUs can allow for a higher base width than the base profiles defined in *UIC Leaflet 596-6*. The following envelope enables strict compliance with the international loading gauge as defined in the UIC Loading Guidelines, volume 1, table 11.

- These ITUs are prohibited in Great Britain and Iran.
- These ITUs shall carry a code plate without compatibility code S.



- These ITUs shall be loaded on wagons as defined by *UIC Leaflet 596-6* and marked in accordance with *GCU Appendix 11, point 3.2* (see [List of abbreviations - page 38](#)).

Only marked wagons shall be accepted.

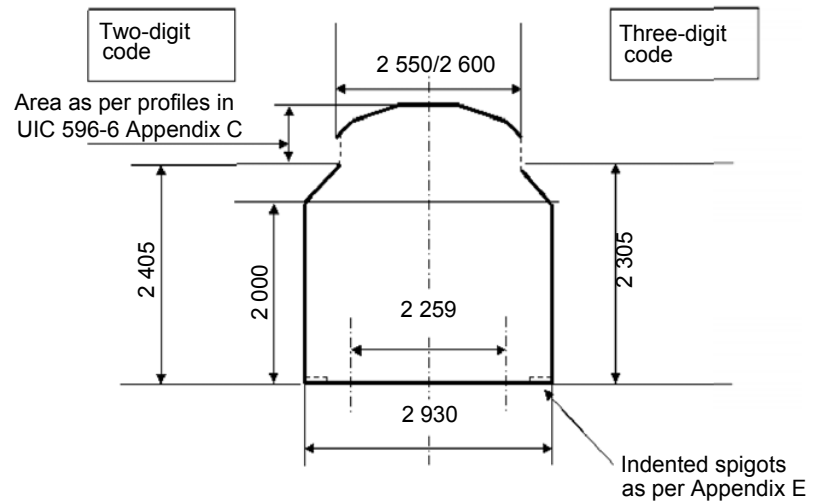
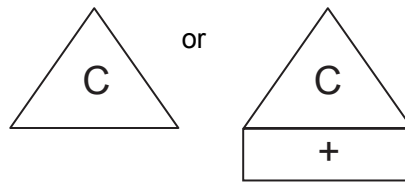


Fig. 1 - Permissible outsize profile

## Appendix B - Particularities of ITUs requiring modified wagons (ARCUS), point 2.12 of the table

### B.1 - General

In addition to the requirements of the present leaflet, the following provisions are to be complied with:

- ITUs requiring modified wagons are referred to as 1 or 2-type ITUs.
- Use of these ITUs is subject to the signature of a multilateral agreement by all parties involved in their carriage (IM, RU - see [List of abbreviations - page 38](#)).

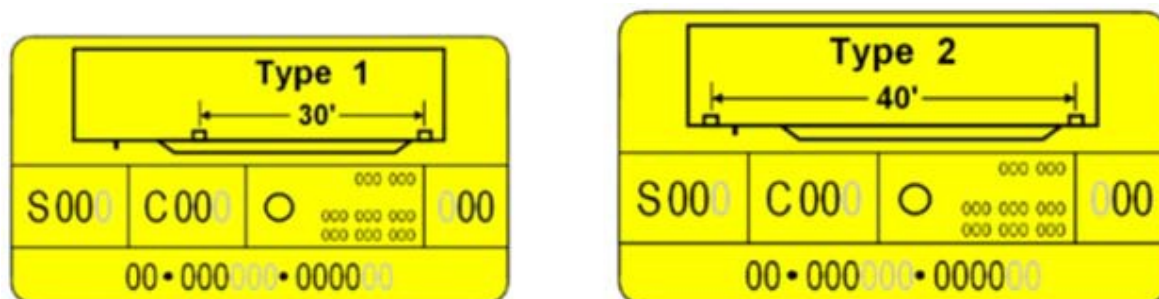
### B.2 - Conditions of carriage

- The ITUs shall be fitted with plates on both sides as per [point B.4 - page 15](#).
- The ITUs may only be conveyed on rail vehicles suitable for this type of carriage and which possess a type of marking as specified in [point B.5 - page 16](#).

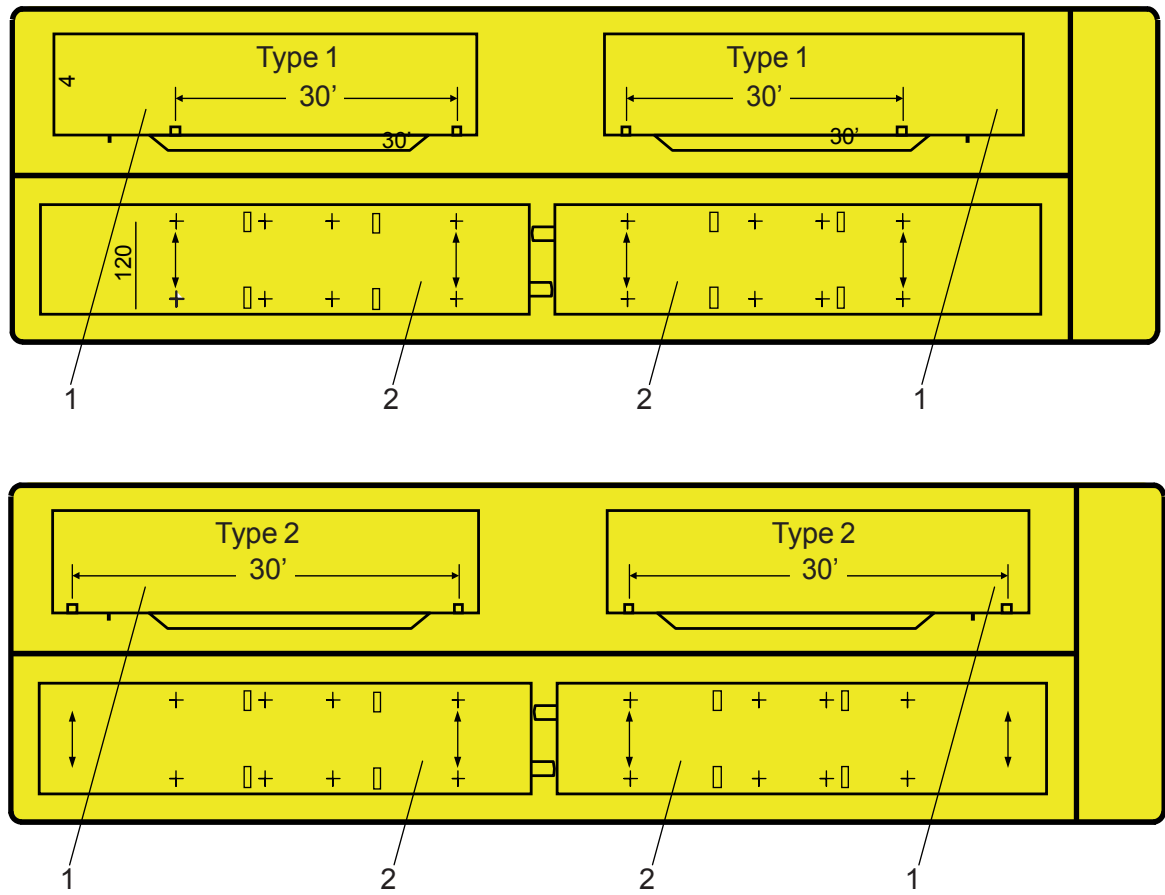
### B.3 - Markings

- These ITUs are coded in accordance with the procedure in *UIC Leaflet 596-6* but are given a type of marking as specified in [point B.4](#).
- Wagons to be used for these purposes are also given a type of identification plate as specified in *UIC Leaflet 571-4* on either side.

### B.4 - Identification plate for ITUs requiring modified wagons



**B.5 - Wagon marker plate**



*Fig. 2 - Wagon marker plate*

- 1 Type of ITU provided for in multilateral agreement
- 2 Loading guidelines

## Appendix C - Positioning of corner fittings and grab-handling grooves for ITUs (cf. EN 283 and 284)

### C.1 - Positioning of corner fittings

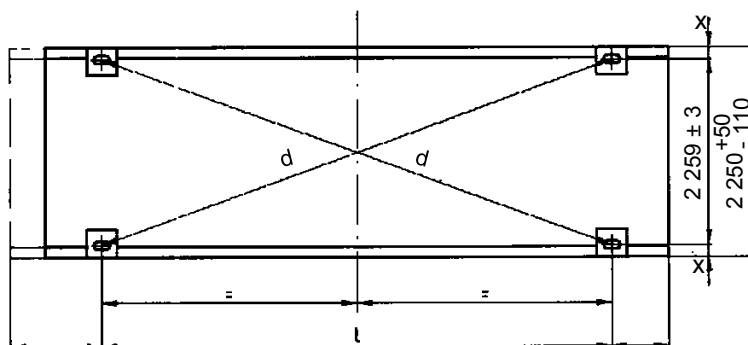


Fig. 3 - Positioning of corner fittings

Group Nos.	Max. L.	l <sup>a</sup>	Max. d <sub>1</sub> - d <sub>2</sub> <sup>a</sup>
20 to 29 60	see UIC Leaflet 596-6	5 853 ± 3 mm	13 mm
30 to 39 81 to 89		8 918 ± 4 mm	16 mm
40 to 45 91 to 98		11 985 ± 5 mm	19 mm

a. the values "l" and "max. d<sub>1</sub> - d<sub>2</sub>" also apply to ITUs with asymmetrical sides (see UIC Leaflet 596-6)

### C.2 - Positioning of grab-handling grooves

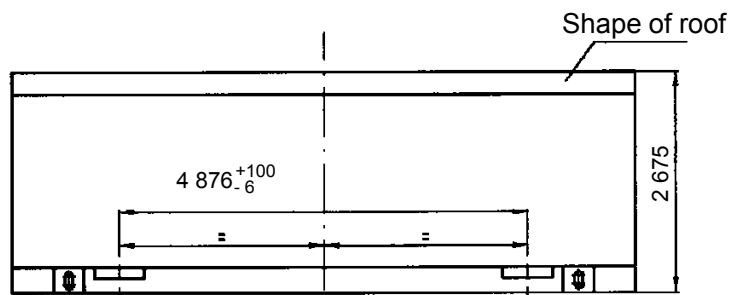


Fig. 4 - Positioning of grab-handling grooves

## Appendix D - Dimensions of lower securing devices on ITUs (cf. ISO 3874)

(see Bibliography - page 39)

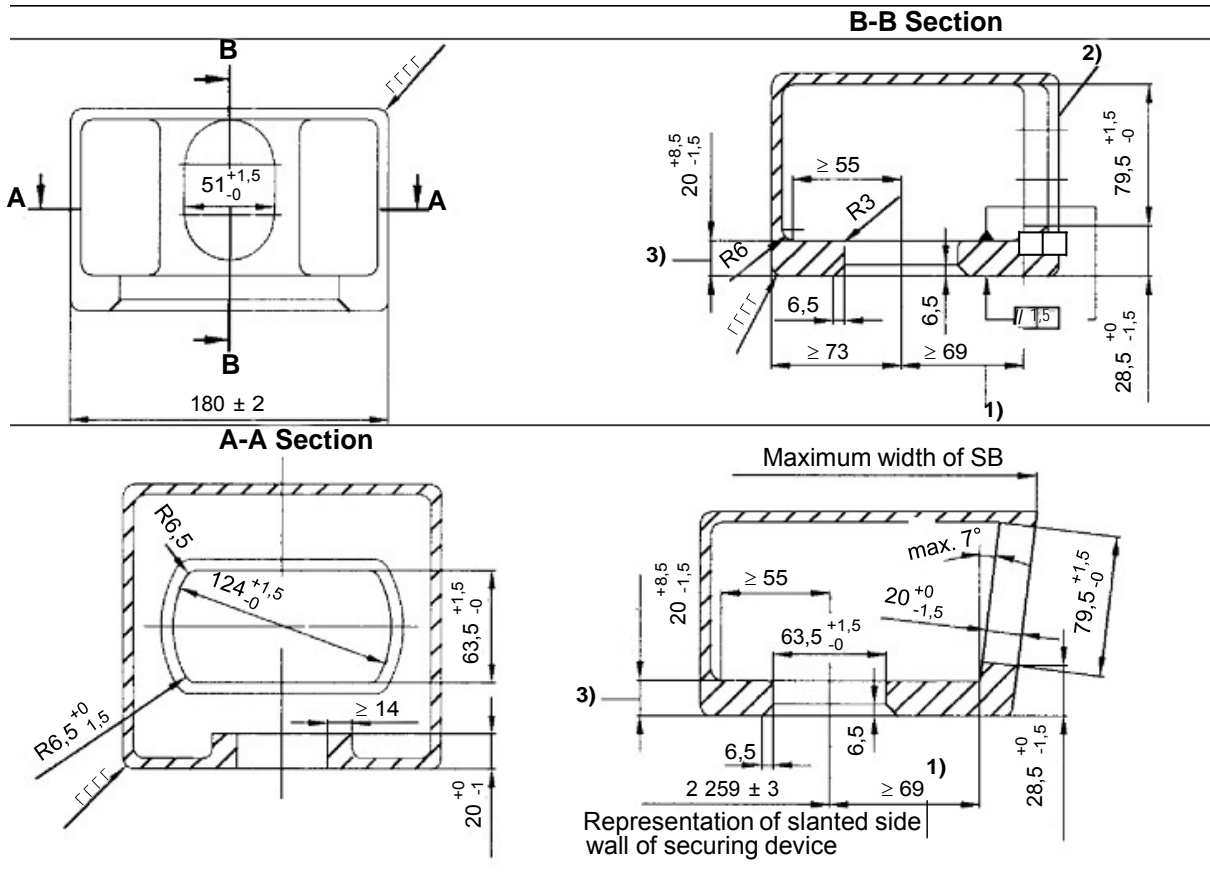


Fig. 5 - Dimensions of lower securing devices on ITUs

- 1) This dimension is a function of other factors. The required width shall thus depend on the design.
- 2) The configuration of the side wall depends on the ITU's external contour. For inclining walls, the angle of inclination may not exceed 7°.
- 3) For swap bodies with a maximum gross mass > 16 000 kg, it is recommended that this dimension of  $28,5^{+0}_{-1,5}$  mm be observed.



## Appendix E - Indent next to securing devices for the carriage of ITUs with a width between 2 500 mm and 2 930 mm on pocket wagons

(UIC Leaflet 571-4 - see [Bibliography - page 39](#))

Measures in mm

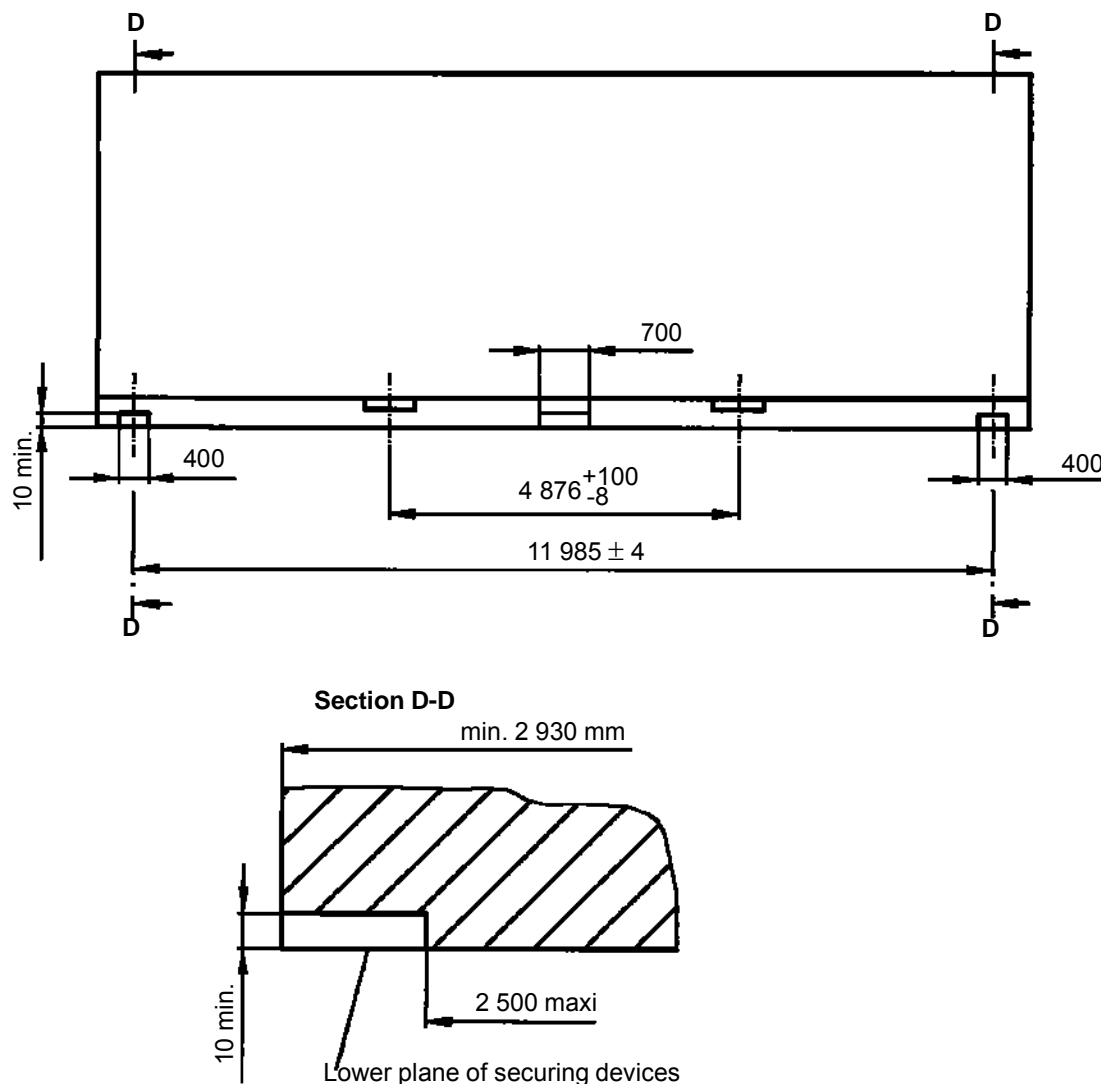
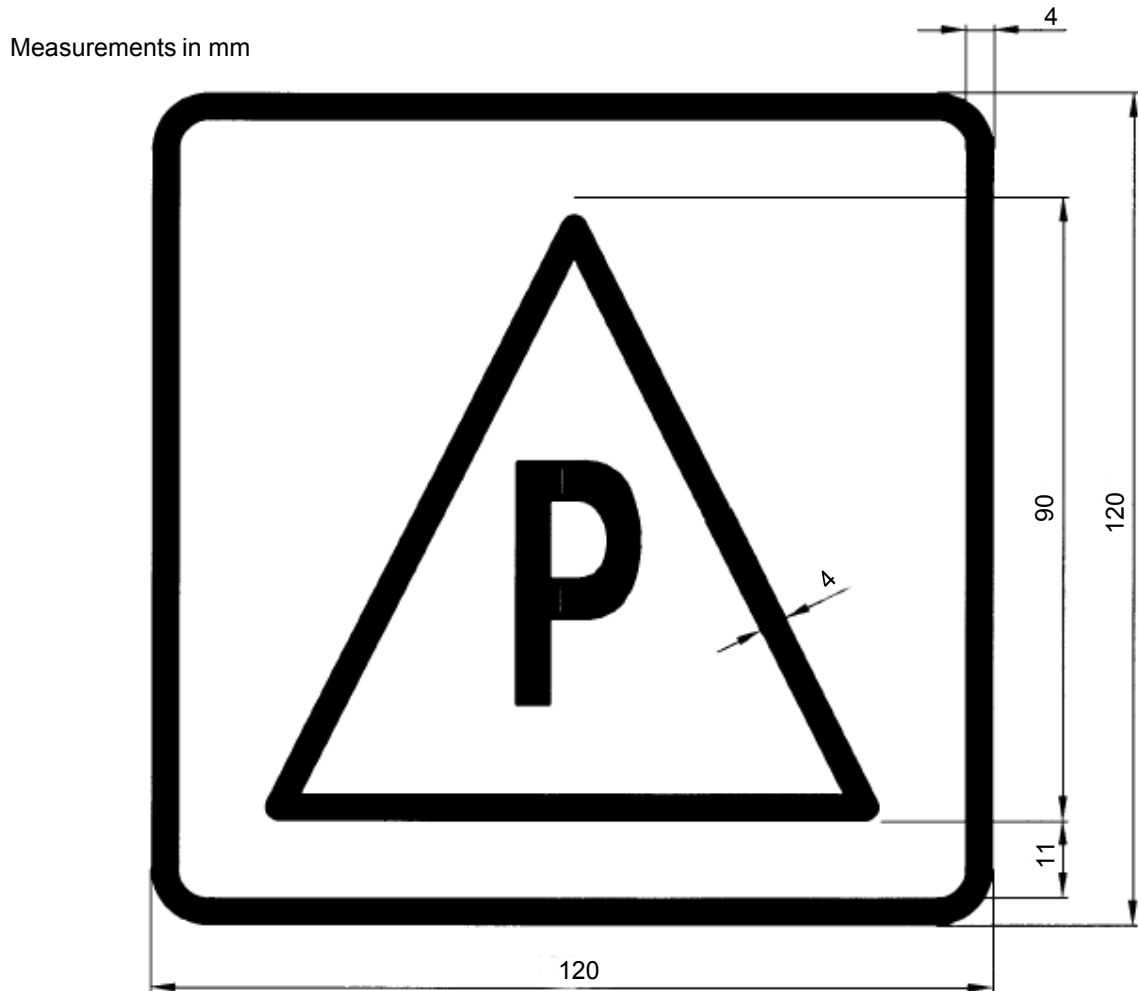


Fig. 6 - Indent next to securing devices for the carriage of ITUs with a width between 2 500 mm and 2 930 mm on pocket wagons

## Appendix F - Marking for ITUs suitable for loading on pocket wagons



*Fig. 7 - Markings for ITUs suitable for loading on pocket wagons*

## Appendix G - Marks and markings for securing devices to be used in rail transport

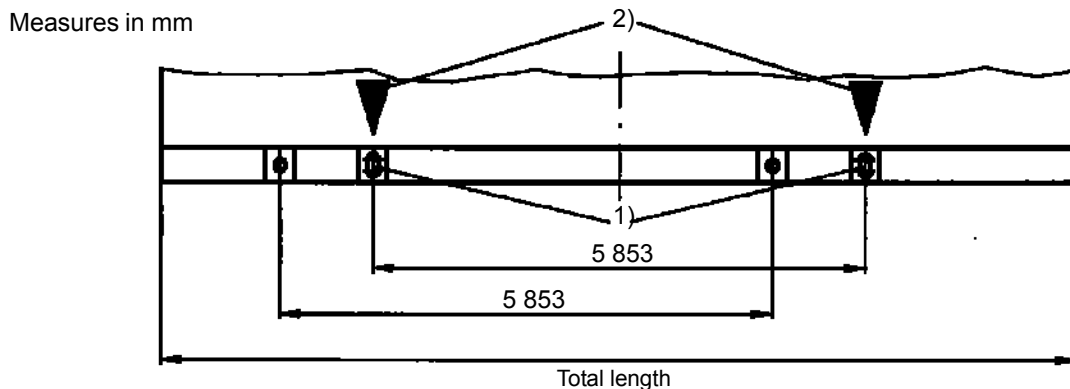


Fig. 8 - ITUs fitted with over 4 securing devices in the floor

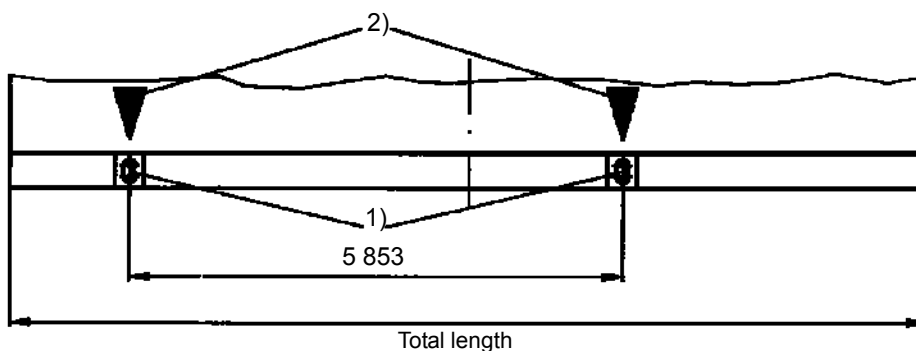


Fig. 9 - ITUs fitted with asymmetrical securing devices in the floor

### Legend

- 1) Securing device for rail transport
- 2) Marking for the securing devices to be used in rail transport

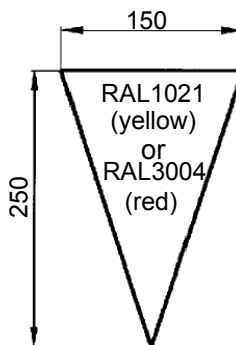


Fig. 10 - Example of marking 2)

## Appendix H - Intermediate bearings for ITUs in groups 40 to 45 and 91 to 98

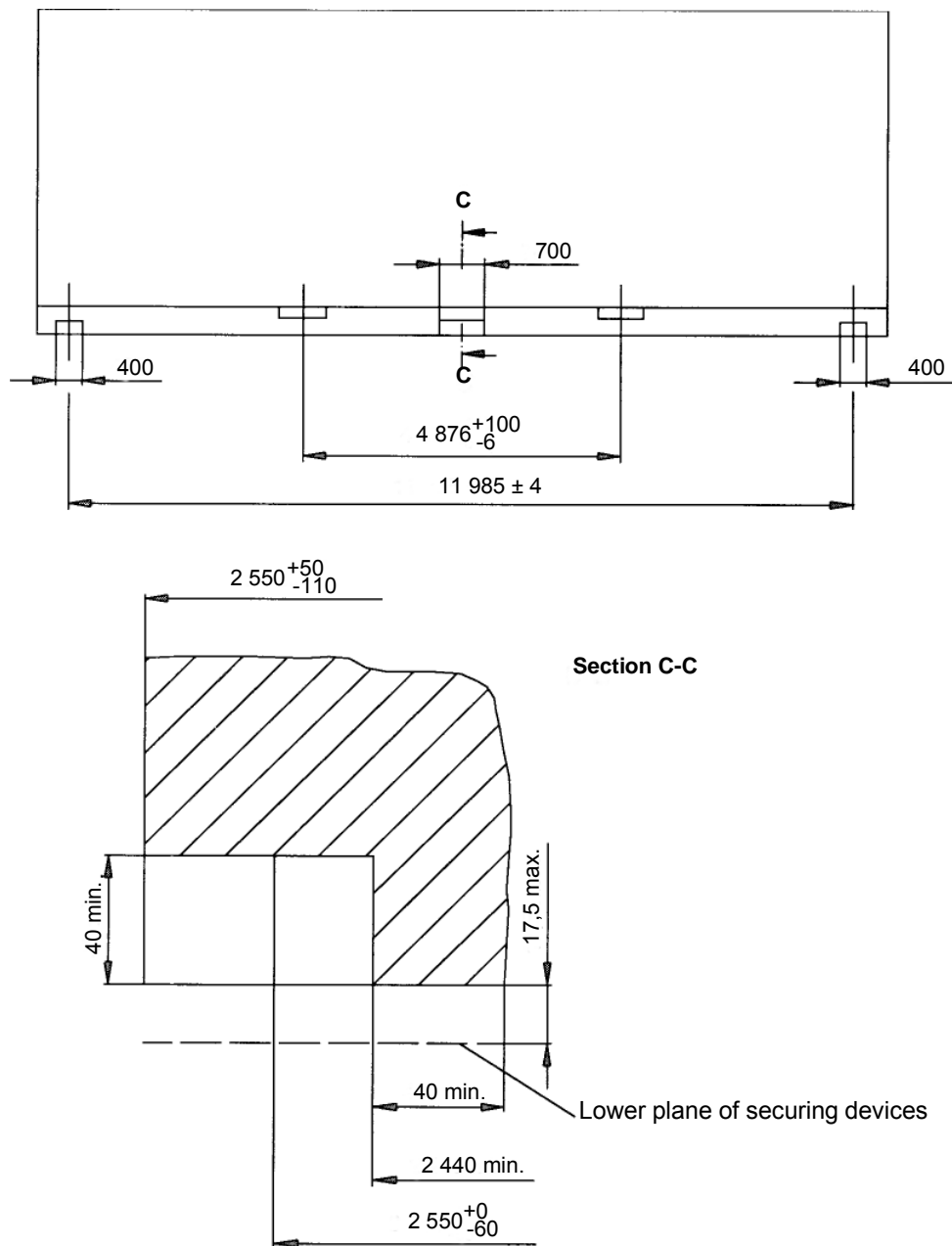


Fig. 11 - Intermediary bearings for ITUs of groups 40 to 45 and 91 to 98

## Appendix I - Length codes with regard to the positioning of corner fittings

### I.1 - ITUs with symmetrical dimensions

**NB:** if these ITUs have asymmetric protrusions, the value of the largest protrusion shall be used as the basis for both sides when determining the group number, taking the length range into account.

Table 1 : ITUs with symmetrical dimensions

Group No. <sup>a</sup>	Maximum length (in mm) <sup>b</sup>	Maximum overhang (in mm)	Distance between centres of securing devices (in mm)	Maximum overhang (in mm)	Securing devices	Width (in mm)	Maximum height of sides (in mm)
(20)	6 058 (= 20')	102,5	5 853 ± 3	102,5	20'	2 440	See <sup>d</sup>
(21)	6 250	198,5	5 853 ± 3	198,5			
22	7 150	648,5	5 853 ± 3	648,5			
23	7 450	798,5	5 853 ± 3	798,5			
24	7 820	983,5	5 853 ± 3	983,5			
(26)	8 150	1 148,5	5 853 ± 3	1 148,5			
(29)	9 125 (= 30')	1 636	5 853 ± 3	1 636	30'	2 550 <sup>c</sup>	See <sup>d</sup>
(30)	9 125 (= 30')	103,5	8 918 ± 4	103,5			
(31)	9 300	191,0	8 918 ± 4	191,0	40'	2 550 <sup>c</sup>	See <sup>d</sup>
40	12 192 (= 40')	103,5	11 985 ± 5	103,5			
42	12 500	257,5	11 985 ± 5	257,5			
(44)	13 100	557,5	11 985 ± 5	557,5			
(45)	13 716 (= 45')	865,5	11 985 ± 5	865,5			

a. Where necessary, three-figure sub-groups are allowed. Group numbers without ( ) correspond to the CEN coding. Preference is to be given to these swap bodies.

b. In the case of swap bodies with a distance of 30' and 40' between centres of securing devices and fitted with a protruding cooling unit, the latter shall be included in the overall length of the swap body.

c. The maximum width of 2 600 mm is permitted.

d. Every competent authority shall determine the marking of swap bodies in accordance with UIC Leaflet 596-6.

## I.2 - ITUs with asymmetric dimensions

Table 2 : ITUs with asymmetric dimensions

Group No. <sup>a</sup>	Maximum length (in mm) <sup>b</sup>	Maximum overhang (in mm)	Distance between centres of securing devices (in mm)	Maximum overhang (in mm)	Securing devices	Width (in mm)	Maximum height of sides (in mm)
(60)	8 543	1 190	5 853 ± 3	1 500	20'	2 400 to 2 550 <sup>c</sup>	See <sup>d</sup>
(81)	9 275	103,5	8 918 ± 4	253,5	30'		
82	9 330	103,5	8 918 ± 4	308,5			
(84)	10 040	103,5	8 918 ± 4	1 018,5			
(85)	10 200	103,5	8 918 ± 4	1 178,5			
(86)	10 900	103,5	8 918 ± 4	1 878,5			
(91)	12 500	103,5	11 985 ± 4	411,5	40'		
(94)	12 750	103,5	11 985 ± 5	661,5			
(95)	13 200	257,5	11 985 ± 5	957,5			
96	13 600	715,5	11 985 ± 5	900,5			
(97)	14 040	715,5	11 985 ± 5	1 340,5			
(98)	14 040	865,5	11 985 ± 5	1 189,5			

- a. Where necessary, three-figure sub-groups are allowed. Group numbers without ( ) correspond to the CEN coding. Preference is to be given to these swap bodies.
- b. In the case of swap bodies with a distance of 30' and 40' between centres of securing devices and fitted with a protruding cooling unit, the latter shall be included in the overall length of the swap body.
- c. The maximum width of 2 600 mm is permitted.
- d. Every competent authority shall determine the marking of swap bodies in accordance with UIC Leaflet 596-6.

## Appendix J - Simplified upper corner fittings

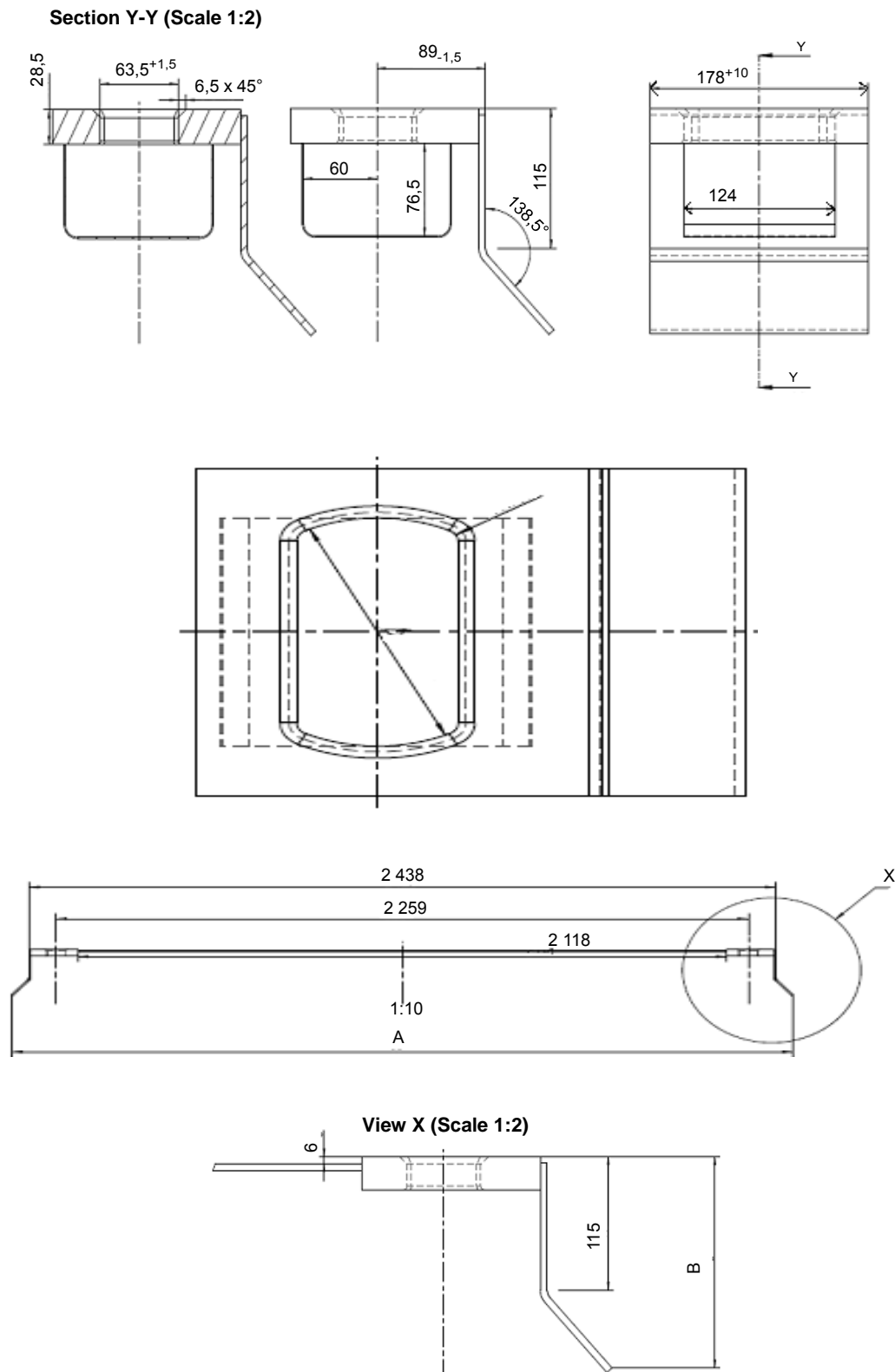
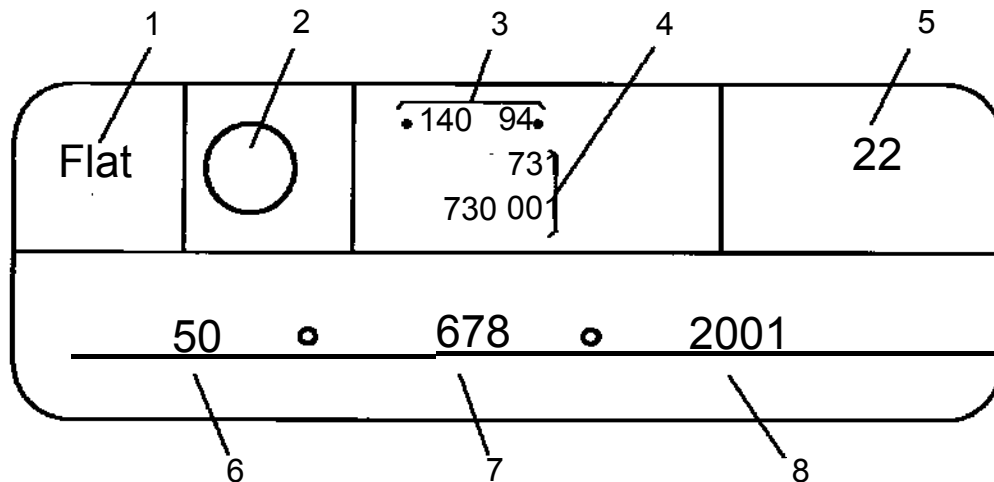


Fig. 12 - Simplified upper corner fittings

## Appendix K - Identification plate for 2.10 units in the inventory



*Fig. 13 - Identification plate*

- 1 Swap body type
- 2 Seal of approval
- 3 Year of manufacture
- 4 Frame number
- 5 Length code
- 6 Nationality code of intermodal transport company
- 7 Code number of company within national intermodal transport company
- 8 Number of loading unit within intermodal transport company



## Appendix L - Marking of ITUs upgraded to carry concentrated loads

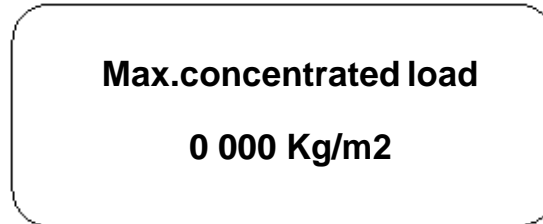


Fig. 14 - Example of marking on a swap body upgraded to carry concentrated loads

	<b>1</b>	<b>2</b>	<b>3</b>
<b>∅ min. (mm)</b>	1 130	1 130	1 130
<b>∅ min. (mm)</b>	1 900	1 900	1 900
<b>Max. weight (t)</b>	x	30,5	x
	15,5	x	15,5
	10,5	10,5	10,5

Fig. 15 - Example of marking on swap body specially upgraded to carry sheet metal coils

## Appendix M - Tests on non-standardised ITUs

**Remark:** Due to the ongoing revision of *EN 283* the new requirements resulting from this revision shall be observed, in particular:

- the test conditions for ITUs suitable for carrying concentrated loads,
- the strength of floors,
- the consideration of additional stresses caused by the load restraint assemblies in accordance with *EN 12195-1*.

In the case of ITUs with tarpaulins, the strength and securing of the tarpaulin to the superstructure shall meet the requirements of *EN 12641-1* and *EN 12641-2*.

**NB:** when conducting the tests, the test load shall be evenly distributed across the ITU. For units suitable to carry concentrated loads, the test loads shall be applied appropriately. During testing the load shall be secured with the appropriate devices.

### **M.1 - Strength test demonstrating resistance to stresses occurring during carriage**

This test is aimed at ensuring that the base structure and floor structure of a unit are able to withstand stresses occurring during carriage by rail.

#### **M.1.1 - ITUs without intermediate bearings**

The ITU, with its load uniformly distributed so that its total mass is equal to 1,5 R, shall rest on 4 rigid stands placed below each lower securing device. These stands shall be on the same level, centred under the securing devices, and shall have approximately the same dimensions as the latter. The unit shall be able to sag freely.

For ITUs in groups 40 to 45 and 91 to 98 without intermediate bearings, the total uniformly laden mass shall be 2 R under identical test conditions.

#### **M.1.2 - ITUs (groups 40 to 45 and 91 to 98) with intermediate bearings**

The test shall take place on 4 stands with 1,5 R as in point **M.1.1**. Moreover, during a second test, intermediate bearings shall be placed at the same level as those placed at the extremities. During the test, the force acting on either side of the intermediate bearings shall not exceed the maximum value of 75 kN.

If it is not possible to conduct the test as explained above, the approving body shall be free to accept the manufacturer's own calculations.

## **M.2 - Grab lifting test**

This test is aimed at demonstrating that a unit is able to withstand the forces resulting from grab lifting.

The ITU, with its load uniformly distributed so that its total mass equals 1,25 R, shall be lifted by means of 4 grabs or similar appliances inserted in its grab-handling grooves. The bearing surface shall measure approximately 30 x 260 mm.

The dimensions of the grab-handling grooves shall be checked following this test.

## **M.3 - Longitudinal stress test**

This test is aimed at demonstrating that the ITU structure is able to withstand longitudinal external stresses in dynamic conditions at an acceleration of 2 g. The test shall be conducted under the conditions of points [M.3.1](#) or [M.3.2](#).

### **M.3.1 - Static longitudinal stress test**

The ITU, with its load uniformly distributed so that its total mass equals 1 R, shall be immobilised longitudinally on rigid anchor points through the lower corner fittings of one of its ends. The ITU shall be subject first to a compressive, then to a tensile longitudinal force of 2 R (1 R per side), which shall be applied on the lower apertures of the lower corner fittings at the other end of the ITU.

### **M.3.2 - Dynamic longitudinal stress test**

The ITU, with its uniformly distributed, 1 R load, with a material filling as much of the available interior space as possible, shall be positioned centrally on a carrying wagon. The stationary carrying wagon shall then be subject to an impact produced by an 80 t wagon until an acceleration of 2 g can be measured on the securing devices with a low-pass filter at 16 Hz. This test shall be conducted in both operating directions; the rear securing devices shall be installed before the front securing devices.

## **M.4 - End wall strength test**

This test is aimed at demonstrating that an ITU superstructure is able to withstand dynamic stresses at a deceleration of 2 g. The test shall be conducted in accordance with points [M.5.1](#) and [M.5.2](#) - [page 30](#).

### **M.4.1 - Static end wall strength test**

The test shall be conducted on both end walls if one of the end walls includes a door. If the two end walls are designed symmetrically, a single test shall suffice.

The inner surface of each end wall shall be subject to an equal, evenly distributed load of 0,4 P, administered such that it allows each wall to bend freely.

### **M.4.2 - Dynamic end wall strength test**

This test shall be conducted concurrently with the test in point [M.5.2](#). In both cases, an impact shall be subjected in both directions under the aforementioned conditions.

## **M.5 - Side wall strength test**

This test is aimed at demonstrating that an ITU is able to withstand the forces generated by transverse accelerations during land transport.

### **M.5.1 - Side wall strength test for van ITUs**

A load of 0,3 P, uniformly distributed over the lower part of each side wall, shall be applied. If the side walls are symmetrically designed the test may be conducted on only one side wall.

### **M.5.2 - Side wall strength test for ITU beds with tarpaulin-covered sides ("savoyarde")**

A load of 0,24 P, uniformly distributed over the lower part of each side wall, shall be applied. The maximum height for applying this partial load shall be the top of the curtains. In addition, a load of 0,06 P, uniformly distributed over the lower part of each side wall, shall be applied. The minimum height for applying this partial load shall be the bottom edge of the lowest slats and the maximum height for applying the load shall be the upper edge of the highest slats. The tarpaulin frame may be included in load resistance.

### **M.5.3 - Side wall strength test for curtain-only ITUs**

A load of 0,3 P, uniformly distributed over the lower part of each side wall, shall be applied. The maximum height for applying the load shall be the top of the curtains. If chains linking the side walls are used in service, these may be put in place during the test.

## **M.6 - Floor strength test**

This test is aimed at demonstrating that an ITU is able to withstand concentrated dynamic stresses produced by loading and unloading using forklift trucks or similar appliances.

The test shall be conducted using a test vehicle fitted with tyres. The vehicle shall have an axle load of 5 460 kg, i.e. 2 730 kg per wheel. The nominal width of the wheels shall be 180 mm and the distance between the wheels shall be 760 mm. The contact surface shall therefore represent a rectangle measuring 185 mm (wheel width) x 100 mm. Each wheel shall have an effective contact surface of 142 cm<sup>2</sup> within the aforementioned area. The test vehicle shall move about the entire floor surface of the ITU. During the test, the ITU shall rest on its four lower corner fittings on four identically-sized stands to ensure that the floor structure may bend freely.

The test vehicle shall spend at least 5 minutes on the weakest area of the floor.

## **M.7 - Additional test for stackable ITUs**

The CSC provisions apply (tests and markings).

### **M.8 - Test for lifting by upper corner fittings**

This test is aimed at demonstrating that stackable units can be lifted using lifting gear acting vertically on the four longitudinal external openings of the upper corner fittings.

The ITU shall be loaded uniformly such that the total mass of the swap body is 2R. The unit shall be lifted with caution by its four corners such that no excessive acceleration or deceleration stresses occur.

### **M.9 - Test for lifting by lower corner fittings (side openings of lower corner fittings)**

This test is aimed at demonstrating that an ITU can be lifted using hooking gear attached only to the lower corner fittings (on the external side openings on the longitudinal side) and secured to its hanger arm above the centre of the unit.

The ITU shall be loaded uniformly such that the total mass of the unit is 2 R. The ITU shall be lifted with caution by its four corners such that no excessive acceleration or deceleration stresses occur.

The lifting forces for different groups shall be applied at the following angles:

- groups 20 to 26 and 60: 45°
- groups 30 and 31, 81 to 86: 37°
- groups 40 to 45, 91 to 98: 30°

relative to the horizontal plane.

The distance between the lines of action of the lifting forces and the outer surfaces of the ITU shall not exceed 38 mm. During lifting, the lifting gear may only act on the lower corner fittings.

The same test shall be conducted on the other side openings, located more to the interior of the securing parts, if the latter have lifting openings compatible with the ISO standard.

### **M.10 - Test for lifting by lower side openings**

This test is aimed at demonstrating that an ITU is suitable for lifting by the lower roping openings. The ITU, loaded uniformly such that its total mass is 1,5 R, shall be lifted - without significant acceleration or deceleration - by the roping openings provided for this purpose. The lifting forces shall act more or less vertically.

The lifting gear may not exert any thrust upon the ITU side walls. The lines of action of the lifting forces shall be located 38 mm from the side walls of the ITU.

### M.11 - Lifting test for forklift pockets

This test applies to ITUs with forklift pockets.

The ITU, loaded uniformly such that its total mass is 1,6 R, shall be positioned on 2 horizontal bars each 200 mm wide and inserted by  $1\ 828 \pm 3$  mm into the forklift pockets. The latter value shall be measured from the outer face of the wall of the unit. The bars shall be centred in the pockets.

### M.12 - Roof test (if rigid)

This test is aimed at demonstrating that an ITU is able to withstand the mass of persons working on the roof.

The weakest part of the ITU's roof shall be subject to a mass of 300 kg distributed uniformly over a surface of 600 mm x 300 mm.

### M.13 - Additional tests for tank ITUs

For tank ITUs intended for the carriage of dangerous goods, the value of the stress test as per points [M.3.1](#) and [M.3.2 - page 29](#) is 2 R.

#### M.13.1 - Longitudinal stresses - dynamic testing

The tank ITU shall be loaded to a maximum of 97 % of its capacity with water or another suitable fluid. For the test it shall be loaded such that the total mass comprising the tank and its contents shall be 1 R.

However, if the stresses resulting from the filling procedure differ from the stresses required for approval (total mass) of the tank swap body, the acceleration or deceleration to be attained shall be adjusted using the following formula:

- G = Acceleration 2 g
- R = Maximum gross mass
- G1 = Modified acceleration
- R1 = Reduced maximum gross mass

$$G1 = (G \times R) / R1$$

**NB:**  $G = 2\text{ g}$   
 $2\text{ g} \leq G1 \leq 6\text{ g}$

During the test, the unit shall rest with its four lower corner fittings or lower side beams on the wagon or on the corresponding securing spigots on a flat surface.

The longitudinal axis of the tank unit shall be horizontal at the moment of impact. Forces shall only be transmitted via the two lower openings of the two lower corner fittings located on the same side as the impact.

The tank ITU, with its load uniformly distributed to 1 R and with material filling up as much of the available interior space as possible, shall be positioned centrally on a carrying wagon. The stationary carrying wagon shall then be subject to an impact produced by an 80 t wagon until an acceleration of 2 g can be measured on the securing devices with a low-pass filter at 16 Hz. This test shall be conducted in both operating directions; the rear securing devices shall be installed before the front securing devices.

The same test shall be performed for tank swap bodies intended for the carriage of dangerous goods, albeit with an initial acceleration of 3 g. The modified acceleration shall be determined in accordance with the limit conditions  $3 \text{ g} \leq G1 \leq 6 \text{ g}$ .

### **M.13.2 - Strength test demonstrating resistance to the effects of lateral inertia**

The tank swap body shall be loaded with a total mass comprising the tank and the test load = 1 R.

The transverse axis of the tank unit shall be positioned at an angle relative to the horizontal of:

- 30 degrees for non-dangerous goods,
- 90 degrees for dangerous goods,

It shall be maintained in this position for at least 5 minutes by means of brackets which horizontally and vertically immobilise only the two lower corner fittings of the floor of the tank unit, and using anchoring equipment acting on the two securing devices at the upper end of the floor in such a way that they absorb the horizontal stresses only.

Only one side shall be tested, except in cases where the end walls of the tank swap body are not symmetric with regard to their central vertical axis.

### **M.13.3 - Pressure test**

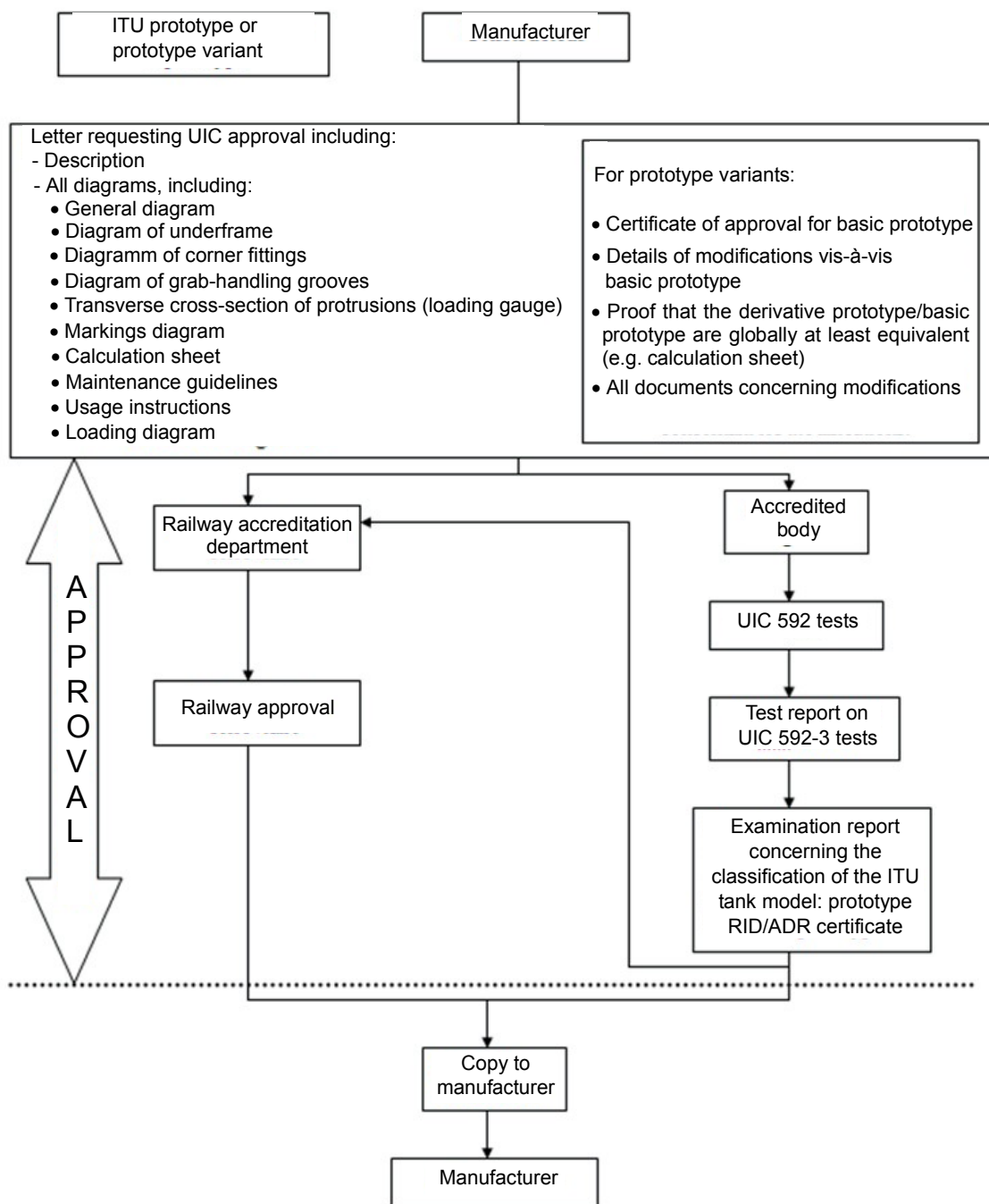
This test shall be executed:

- on the prototype after all the other tests,
- on each unit in the series.

The tank shall be tested at a hydraulic pressure whose value, defined by the competent authorities, shall determine the classification of the swap body design.

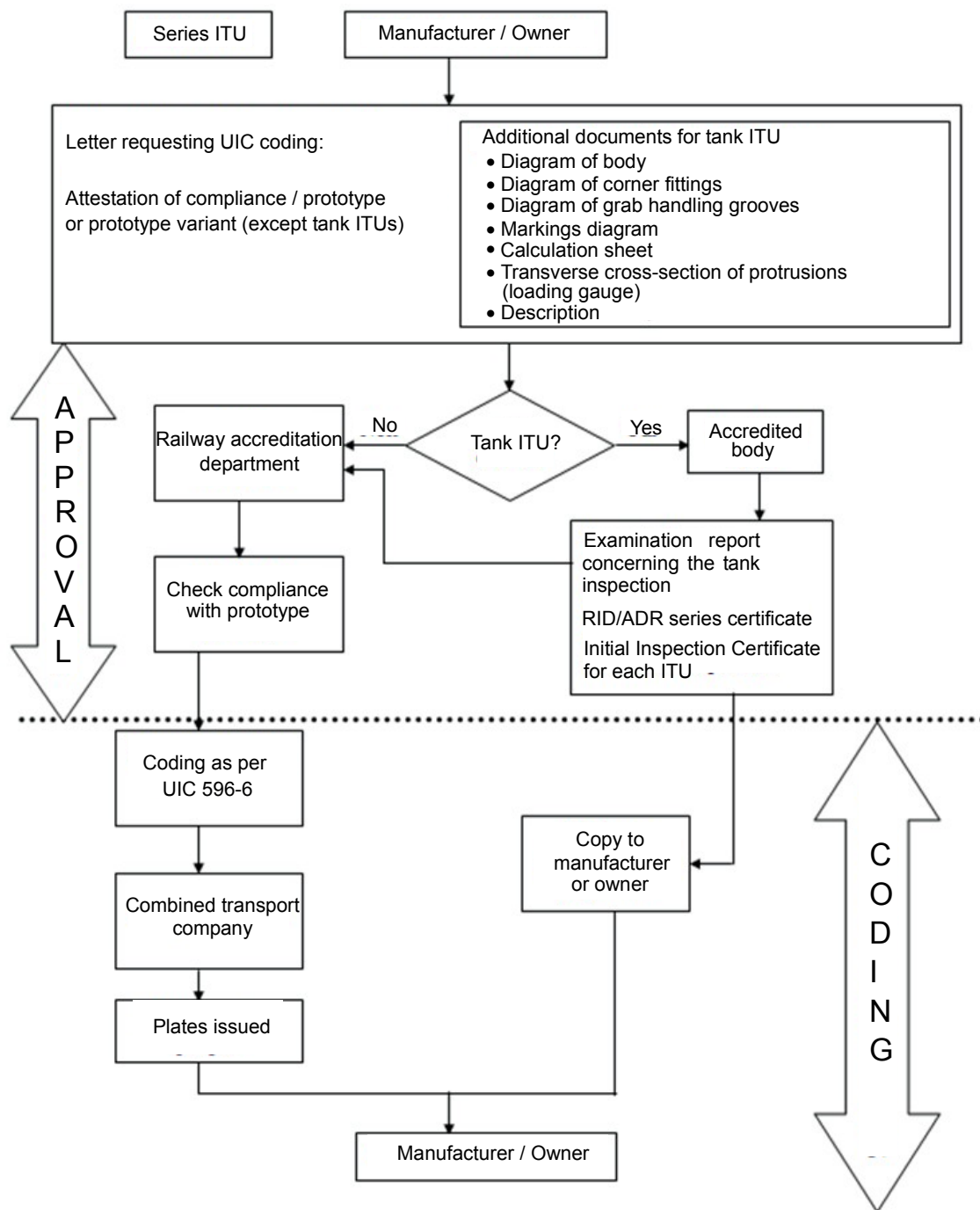
For swap bodies with several compartments, each compartment shall be tested at the test pressure with the adjacent compartment empty and vented to atmosphere pressure.

## Appendix N - Approval of prototype or prototype variant

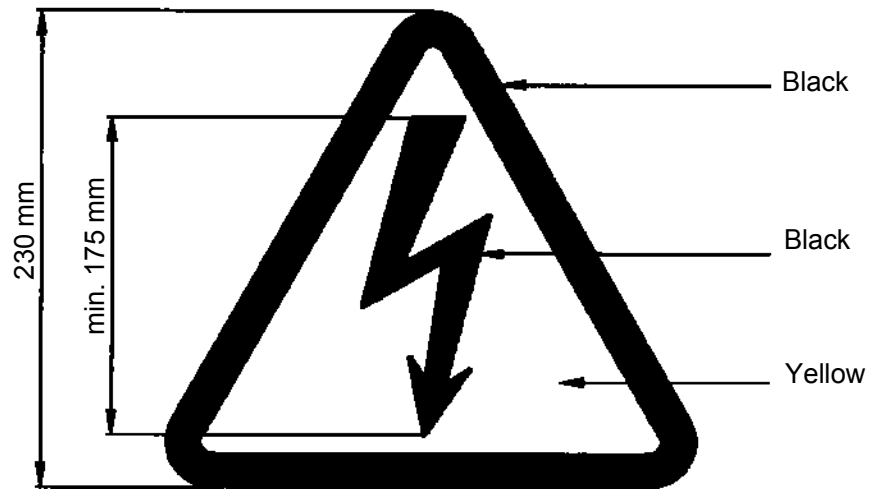




## Appendix O - Coding for series ITUs



## Appendix P - Sign for ITUs with ladders enabling access to the upper part



## Appendix Q - Code plates for units in categories 2.2 to 2.9 of the ITU inventory with normal and special profiles

(EN 13044-2)



Fig. 16 - Vertical plate

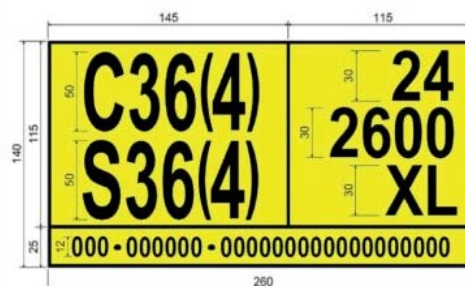


Fig. 17 - Horizontal plate

The elements in the marking have the following meanings (right-hand or top) (see Fig. 16):

- railway profile code as per *UIC Leaflet 596-6*, together with an "S" or a "C";
- two-digit length code for swap bodies in accordance with [Table 1 - page 23](#) and [Table 2 - page 24](#);
- width class of the swap bodies in mm (2 500, 2 550 or 2 600) ;
- strength of the bodywork of the swap bodies, normal or strengthened, with the marking as per *EN 12642* (see [Bibliography - page 39](#)).

The left-hand part of the marking contains all information regarding the approval of the swap bodies for carriage on the railway network. Meaning of the numbers:

- the first three digits are the code of the certifying body as per *UIC Leaflet 596-6*;
- the following six digits, separated by a dot, represent the generic case number allocated by the certifying body;
- after the next dot, the final digits are the underframe numbers of the swap bodies.

## List of abbreviations

<b>ADR</b>	European Agreement concerning the International Carriage of Dangerous Goods by Road
<b>ATP</b>	Agreement on the International Carriage of Perishable Foodstuffs and on the Special Equipment to be Used for such Carriage, drafted by the United Nations Economic Commission for Europe
<b>BIC</b>	Bureau International des Containers et du Transport Intermodal (international office for containers and intermodal transport)
<b>CEN</b>	European Committee for Standardization
<b>CIE</b>	Coras Iompair Eireann (Irish railway undertaking)
<b>CSC</b>	International Convention for Safe Containers of 1972
<b>EWS</b>	English Welsh and Scottish Railway
<b>GCU</b>	General Contract of Use for wagons
<b>IM</b>	Infrastructure manager
<b>ISO</b>	International Organization for Standardization
<b>ITU</b>	Intermodal Transport Unit
<b>PKP</b>	Polskie Koleje Państwowe (Polish railway undertaking)
<b>RID</b>	Regulation concerning the International Carriage of Dangerous Goods by Rail
<b>RU</b>	Railway undertaking
<b>UIC</b>	International Union of Railways

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