UIC FREIGHT DEPARTMENT

Comparative analysis of the combined transport usages and standards (CACTUS) Executive Summary

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UIRR
INTERNATIONAL UNION FOR ROAD-RAIL COMBINED TRANSPORT

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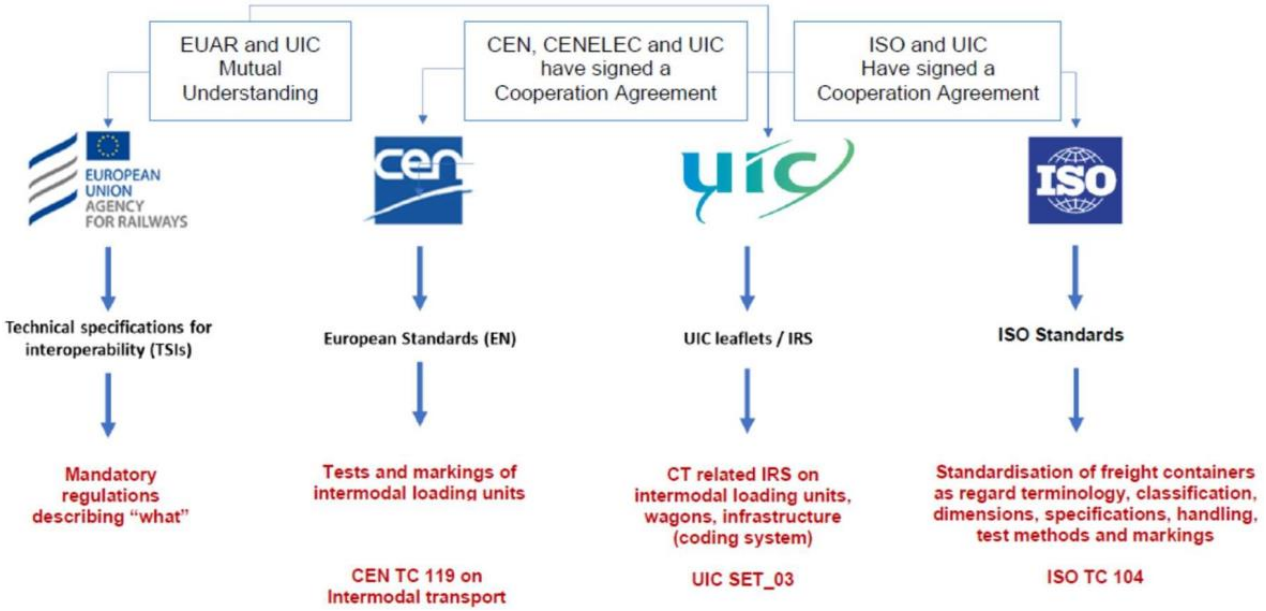
1. Foreword

Combined transport (CT) relates to the conveyance of Intermodal Loading Units (ILUs) using multiple modes of transportation (rail, road and maritime short sea shipping and inland waterways). When transported by rail, ILUs carried on dedicated wagons may exceed the gauge of the lines. According to the latest study by UIC-UIRR, road-rail combined transport represents about 50% of all current rail freight volumes (https://uic.org/special-groups/combined-transport-group/#documents).

To ensure the safe transport of ILUs, UIC has established a codification system for lines, ILUs and wagons in collaboration with UIRR. This codification system ensures compatibility between the loaded wagon profile and the line gauge and the operation of combined transport trains without constraints.

The stakeholders involved in combined transport must deal with several regulations and standards (TSIs, EN, IRS, ISO, etc.). These define the design/testing requirements for ILUs and their constituent parts and set out the conditions for the compatibility of ILUs with the means used for their conveyance on the various transport modes (trucks, wagons and ships) and for their transhipment in terminals. The graph below summarises the standardisation ecosystem for combined transport with a focus on the road-rail combination.



2. Introduction

In 2018, ERA decided to launch a taskforce on the facilitation of combined transport to analyse the integration of rail freight transport with other transport modes, focusing on the rail-road interface, and to propose improvements.

The ERA taskforce conducted a basic preliminary analysis of the relevant UIC leaflets and IRSs, EN standards and ISO standards used in combined transport to identify potential overlaps/duplications, contradictions or areas for improvement.

Also in 2018, UIC and UIRR launched the CACTUS project, involving experts from rail and combined transport operators, which aimed to develop sectoral recommendations to eliminate the contradictions, overlaps and gaps identified through the in-depth analysis and evaluation of all relevant reference documents published by policy authorities, standardisation bodies or industry best practice.

The CACTUS initiative was presented by both associations to RASCOP[1] which, at its plenary session in October 2018, decided to consider the results of the CACTUS project as one of its standardisation priorities. The recommendations from this study should also support the activities of the ERA Topical Working Group (TWG) on Facilitation of Combined Transport.

[1] RASCOP is an advisory group established to facilitate the coordination and streamlining of the activities of relevant stakeholders active in the EU in the development of European and international standards and other technical documents related to the railway sector.

3. Scope of the comparative analysis

The scope of the CACTUS project is the development of recommendations to eliminate overlaps and contradictions and to resolve outstanding issues and gaps identified in the comparative analysis of the following reference documents published by the stakeholders:

- The relevant international and European legal framework (UN Regulation, EU Directives & Regulations/ TSIs),
- All UIC-related leaflets and IRSs,
- All EN standards under the responsibility of the CEN TC 119,
- All ISO-related standards on freight containers.

UIC and UIRR have focused the comparative analysis on the codification system used in combined transport, which includes CT wagons, CT lines and CT ILUs.

4. Methodology

The analysis performed by the UIC/UIRR project team is focused on the following aspects:

- Specific safety and interoperability requirements,
- Technical requirements for compatibility between ILUs and CT wagons,
- Technical requirements for ILUs,
- The process for codification ILUs, CT wagons and CT lines,
- Conditions for the operation of CT trains.

It consists of the following activities:

- Inventory of the reference documents and selection of the specific parameters for CT wagons, ILUs and CT lines,
- Overview of the reference documents and identification of the requirements for each parameter which are provided in each reference document (dry analysis),
- Comparison of the requirements (comparative analysis),
- Identification of:
    a. overlaps, duplications, contradictions,
    b. potential cross-referencing, areas of improvement and harmonisation needs.

5. Main outputs

The results of the comparative analysis and the resulting recommendations are outlined in a dedicated report which contains:

- an overview of the UIC CT codification system (Chapter 3),
- the results and outputs of the comparative analysis on CT wagons (Chapter 4), ILUs (Chapter 5) and CT lines (Chapter 6),
- the UIC and UIRR recommendations based on the results of the comparative analysis (Chapter 7).

5.1. Codification system in combined transport

The provisions governing the UIC codification system are not integrated or referenced in the European legal framework (EU Directives, TSIs) and are outside the scope of EN standards for wagons and ILUs.

The roles, competences and responsibilities of the entities in charge of the codification of ILUs and the allocation of correction digits to CT wagons are not defined at European level.

An application guide is required to provide information on the application of the related legal framework, ISO standards, EN standards and UIC technical documents (IRSs and Loading Guidelines) to combined transport.

5.2. CT wagons

Like all types of freight vehicles, CT wagons are covered by the provisions of the WAG TSI and the NOI TSI. However, specific requirements for CT wagons, which are provided in IRS 50571-4, IRS 50571-5 and IRS 50596-6, are not integrated in the WAG TSI.

The criteria provided in IRS 50596-6 for allocating the WCC marking to CT wagons that comply with the requirements provided in IRS 50596-6 and for allocating the positive correction digit to CT wagons whose characteristics are more favourable than those provided in IRS 50596-6 are not integrated in the WAG TSI and are not considered during the conformity assessment of the CT wagon type carried out by the Notified Body as part of the authorisation process as per Directive EU 2016/797 Art. 24.

No harmonised method exists for the definition of the negative correction digit.

The bodies responsible for the allocation of the marking identifying wagons suitable for carrying ILUs without constraints (wagon compatibility code) and for the allocation of correction digits are not identified in the EU legal framework.

The calculation of payload limits for articulated wagons is not part of the methodology provided in EN 15528, which applies only to wagons with loads evenly distributed over the length of the wagon. In the event of longitudinally displaced or unevenly distributed loading, the payload must be reduced.

Due to the maximum gross mass, the length of the ILUs and their combinations when loaded on the wagons, the load distribution of wagons is never uniform. Reducing the payload will, in most cases, lead to the withdrawal of articulated wagons from the market.

The requirements for wagons suitable for the conveyance of semi-trailers which are not fitted with vertical lifting devices (also called non-craneable semi-trailers) are not covered by IRS 50571-4.

- No provision governing the maintenance of components fitted to CT wagons to secure ILUs (seating devices, spigots, pivoting frames) is included in any reference document (i.e., GCU Appendix 10).

5.3. Intermodal Loading Units

5.3.1. General

No EN standard or UIC document provides a vocabulary of terms and definitions related to ILUs. The terminology and the definitions used in directives, regulations, standards and guidelines, though not in conflict with each other, differ due to the prevailing scope.

The number of markings to be placed on ILUs suitable for rail transport is significant and the information is often spread across various EN standards, IRSs and the UIC Loading Guidelines. No standard or other technical document exists that provides the complete set of markings.

Several regulations, standards and loading guidelines contain provisions for the securing of cargo in loading units. In some cases, the provisions apply to a single transport mode (rail, road or sea); in other cases, they apply to more than one transport mode (rail and road) and they may be applied to combined transport.

As the criteria for defining such provisions often differ, the basic requirements in each regulation and standard are different for each mode of transport.

New and updated EN standards and IRSs have been published over the past five years, and the GCU and UIC Loading Guidelines are updated annually. New and updated requirements will be updated or introduced.

A revision of the technical documents is necessary.

The requirements set out in EN standards and IRSs for tests to be performed on ILUs to prove their ability to withstand the stresses occurring during transport and handling allow for FEM calculations to replace testing in some cases. No standard protocol exists for the validation of CAD/FEM calculations.

5.3.2. Semi-trailers

Directive 96/53/EC and EU Directive 2015/719 do not identify semi-trailers as ILUs.

The following types of semi-trailers are not considered in any EN standard or IRS:

a. Non-craneable semi-trailers that can be handled horizontally or vertically using interfaces that enable them to be lifted by cranes and reach stackers,

b. Thermal semi-trailers,

c. Tank semi-trailers,

d. Semi-trailers fitted with aerodynamic devices.

For the time being, there is no European obligation to affix the date of the next inspection to semi-trailers.

5.3.3. Swap bodies

The requirements for swap bodies suitable for the transport of concentrated loads and flat swap bodies are not provided by any EN standard on swap bodies.

The European legal framework does not define the entity responsible for the maintenance of ILUs or the obligation for the consignor, consignee, loaders (fillers) or unloaders (unfillers) to conduct inspections.

5.3.4. Roller units

The requirements for roller units (i.e. main dimensional and design characteristics, ratings, test methods, identification) are not covered by a specific EN standard.

5.4. CT lines

Although the codification of CT lines is part of the information to be provided by IMs in the RINF, there is no requirement for this in the INF TSI.

No official EU map of coded CT lines is currently available.

6. Recommendations

The recommendations proposed by UIC and UIRR concern the harmonisation and integration of the requirements on the interoperability, safety and operation of CT wagons, ILUs, CT lines and codification in the EU legal framework, ISO and EN standards, IRSs, UIC Loading Guidelines and the GCU.

6.1. A. Codification system

A.1. Creation of a specific TSI on combined transport covering the infrastructure, operation, traffic management and rolling stock subsystem aspects relevant for the interoperability of ILUs loaded on suitable wagons and carried on:

a. conventional lines for freight and mixed traffic (passenger and freight),

b. freight hubs, including intermodal terminals.

The new TSI is to be applied to:

- lines, intermodal terminals, hubs on which CT trains are operated,
- CT wagons which are in the scope of the WAG TSI (integrated with the requirements provided in IRS 50571-4, IRS 50571-5 and 50596-6),
- ILUs compliant with the related EN and ISO standards and IRS 50591, IRS 50592, IRS 50596-5 and coded in accordance with IRS 50596-6.

A.2. Inclusion of the combined transport profile number of the line as per IRS 50596-6

- in the list of the performance parameters for freight traffic provided in the INF TSI (Point 4.2.1, Table 3),
- in the list of the interface requirements of the infrastructure subsystem with the rolling stock/freight wagons (Point 4.3.1, Table 15),
- in the list provided in OPE TSI Appendix D1 of the parameters to be used in the railway undertaking's process prior to the first use of a vehicle or to the configuration of the train to ensure that all the vehicles composing a train are compatible with the route(s) the train is to operate on (including, where appropriate, deviation routes and routes to workshops).

A.3. Introduction of requirements for the roles, competences and responsibilities of the entities in charge of the approval and codification of ILUs and the allocation of the correction digits to CT wagons in the CT-specific TSI, referring to the technical competences provided in IRS 50596-7.

A.4. Publication on the ERA website of guidelines on the application of the related TSIs, ISO and EN standards, IRSs, GCU requirements and UIC Loading Guidelines to combined transport.

The guide will consist of a general part providing the main explanations of the concepts, roles and framework, and specific parts on:

a. ILU approval, certification and codification,

b. allocation of the wagon compatibility code and the correction digit to CT wagons,

c. CT line codification.

6.2. B. CT wagons

B.1. Introduction in the WAG TSI of the reference to the following safety requirements provided in IRS 50571-4 and 50571-5 on the devices used for securing ILUs when loaded on CT wagons (spigots, seating devices/hitches, pivoting frames):

- Shape and dimensions of the spigots,
- Strength and materials of the spigots and of their components and attachments to the underframe of wagons suitable for the conveyance of standard ILUs and/or heavy-duty ILUs (MGM > 36,000 kg),
- Limit dimensions and positions of the spigots permitted in manufacturing and operations,
- Functions, technical characteristics and strength of the seating device (under various conditions),
- Functions and characteristics of the locking device which, in all cases, must be designed to allow inspection staff (terminal operators, RUs) to check that the kingpin of the semi-trailer has been correctly locked into the seating device,
- Functions, technical characteristics and strength of the pivoting frames,
- Functions and characteristics of the device for locking the pivoting frames to the wagon underframe and the roller unit to the pivoting frame, which must be designed to allow RU staff to check that the pivoting frame and the roller unit are correctly secured.

B.2. Introduction in the WAG TSI of the reference to the following requirements provided in IRS 50596-6 in relation to parameters that have an impact on the assessment of the ability of CT wagons to carry ILUs on coded lines without constraints or limitations (WCC: wagon compatibility code and correction digit):

- Height of the loading plane,
- Bogie wagons: distance between the pivots,
- 2-axle wagons: wagon wheelbase,
- Overhang,
- Bogie wheelbase,
- Side bearers,
- Side bearer play (j),
- Distance between the side bearers (b_G),
- Total lateral play (q+w),
- Vehicle flexibility coefficient (s),
- Dissymmetry (η_0),
- Height of the roll centre,
- Tolerances (centring),
- Tolerances to the right of the tyres,
- Tolerances to the right of the king pin,
- Tolerances to the right of the spigots.

B.3. Integration in the WAG TSI of the obligation for the wagon manufacturer to provide information on the calculations used to define the wagon structure at the request of the ILU manufacturer and the requirements regarding the documentation to be provided.

B.4. Inclusion in the TSI on combined transport of the reference to the harmonised methodology for allocating the negative correction digit to CT wagons based on the kinematic calculation of lineside clearances and the determination of the corresponding margins in accordance with uniform criteria based on the results (IRS and guidelines) of the ongoing UIC “G CODE - CL Clearance Gauge Common Codification” project.

B.5. A methodology for the calculation of the payload of articulated CT wagons to be integrated in EN 15528 considering the mass, the length of the loaded ILUs, their position and possible combinations.

B.6. Inclusion of the requirements for wagons suitable for the conveyance of non-craneable semi- trailers (securing, compatibility) in IRS 50571-4.

B.7. Inclusion in IRS 50596-6 of the requirements for parameters with an impact on the assessment of the capability of CT wagons suitable for the conveyance of non-craneable semi-trailers on coded lines without constraints and limitations (WCC: wagon compatibility code and correction digit).

B.8. Inclusion of the reference to the requirements provided in IRS 50571-4 and 50596-6 relating to CT wagons suitable for the conveyance of non-craneable semi-trailers in the WAG TSI.

6.3. C. CT lines

C.1. Introduction of the reference to the harmonised methodology for assigning the negative correction digit to CT wagons, based on the kinematic calculation of lineside clearances and the determination of the corresponding margins in accordance with uniform criteria based on the results (IRS and guidelines) of the ongoing UIC “G CODE - Clearance Gauge Common Codification” project.

C.2. Publication of an official EU map providing the combined transport profile numbers registered in RINF for each line on the ERA website.

6.4. D. Intermodal Loading Units

D.1. Amendment of Directive 96/53/EC (as amended by EU Directive 2015/719) defining the semi- trailers suitable for transport by rail as intermodal loading units.

D.2. The following ILU-related EN standards are to be revised to introduce the new and updated requirements and cross-references between standards and to eliminate the overlaps, contradictions and deficiencies identified by the analysis carried out within the CACTUS project:

- EN 283,
- EN 284,
- EN 452,
- EN 1432,
- EN 12406,
- EN 12410,
- EN 13044-1,
- EN 13044-2,
- EN 13044-3,
- EN 16973.

D.3. Establishment of an EN standard on the terms and definitions relating to ILUs.

D.4. Establishment of an EN standard on ILU markings.

D.5. Introduction of the reference to a uniform protocol for validation of CAD/FEM calculations in ILU-related EN standards.

D.6. Integration of the requirements for dimensions, ratings, design, test methods of non-craneable ILUs, thermal semi-trailers (including those designed for the carriage of goods defined as dangerous by RID) and semi-trailers fitted with aerodynamic devices in EN 16973.

D.7. Inclusion of the specific envelopes of non-craneable semi-trailers and semi-trailers fitted with aerodynamic devices in IRS 50596-5.

D.8. Incorporation in EN 16973 of conformity with the ATP agreement and ADR/RID as a mandatory requirement for thermal semi-trailers and tank semi-trailers.

D.9. Integration of the requirements for strength test of swap bodies suitable for the transport of concentrated loads in the relevant EN standards.

D.10. Establishment of a new EN standard on flat swap bodies.

D.11. Establishment of a new EN standard on roller units.

6.5. E. ILU maintenance and inspection

E.1. Semi-trailers:

- Introduction in Directive 2014/45/EU of the obligation to affix the date of the next roadworthiness test on the semi-trailer, as well as a suitable marking,
- Updating of the current list provided in Annex 1 of Directive 2014/45/EU with the additional items to be checked (e.g., tarpaulins, king pin, body structure, craneability features),
- Inclusion of the new marking in EN 16973 as a cross-reference,
- Introduction in the catalogue of irregularities provided in GCU, Appendix 9/Annex 1 of information on the expiration of the date on the next roadworthiness test and lack of the related marking,
- Reference in IRS 50596-5 to the new marking provided by EN 16973,
- Introduction of the marking in the UIC Loading Guidelines Volume 2, Point 9.4.

E.2. Swap bodies and roller units:

- Definition in the EU legal framework of
- the entity responsible for the maintenance of swap bodies and roller units,
- the maintenance scheme,
- the catalogue of irregularities and possible damage,
- Publication of guidelines for evaluation and action to be taken in the event of irregularities and damage found during inspections:
- before packaging goods onto swap bodies and roller units,
- before loading swap bodies and roller units on CT wagons,
- during technical inspections of trains,
- after having removed swap bodies and roller units from wagons or after having unloaded goods from the ILUs.

E.3. Introduction of maintenance requirements for the seating devices of pocket wagons (including their locking systems), spigots of CT wagons and pivoting frames fitting CT wagons suitable for the transport of roller units (included their securing and locking systems) in GCU Appendix 10.

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