State of the art in the rest of Europe

Stefano Guidi

Senior Advisor Rolling Stock

International Union of Railways (UIC)

➢ The gauge
  o EN Standards
  o The UIC documents (UIC Leaflets, IRSs)

➢ The UIC Combined Transport codification

The gauge

The reference EN Standards

✓ **EN 15273-1**:*Railway applications - Gauges - Part 1: General - Common rules for infrastructure and rolling stock*

✓ **EN 15273-2**: *Railway applications - Gauges - Part 2: Rolling Stock*

✓ **EN15273-3**: *Railway applications - Gauges - Part 3: Infrastructure*

✓ **EN15273-4**: *Railway applications - Gauges - Part 4: Catalogue of defined gauges*

✓ **FprCEN/TR 15273-5**: *Railway applications - Gauges - Part 5: Background, explanation and worked examples*
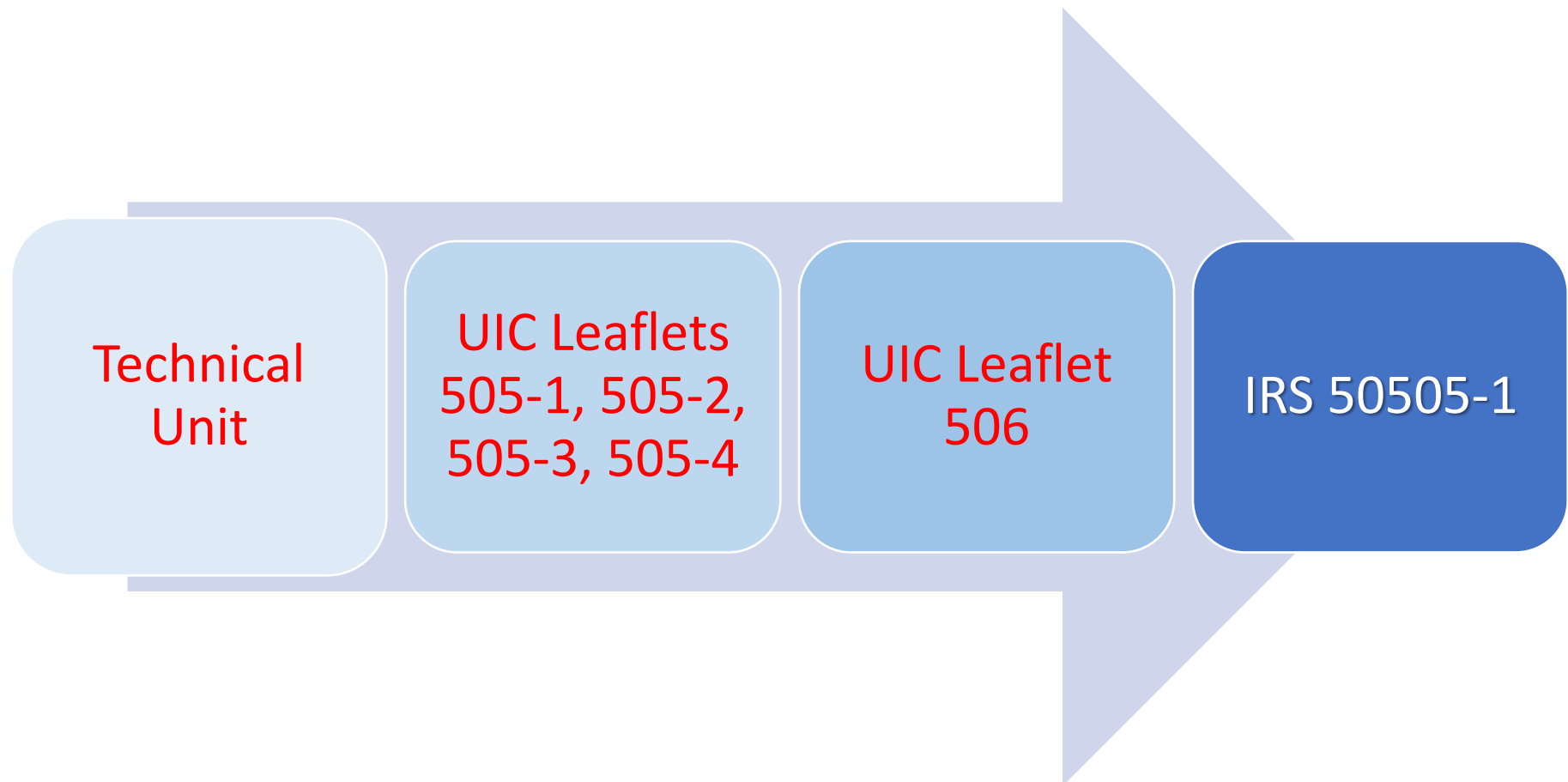
The EN Standards

Three types of gauges are defined in EN standards:

The static gauge: IMs take into account fixed allowances to cover certain dynamic displacements of the vehicle. The use of this type of gauge is restricted to vehicles in which the flexibility of the suspension is limited.

The kinematic gauge: IMs takes into account the dynamic displacements of the vehicle not exceeding certain values specified in the EN related standards. Any exceeding of the standard values is borne by the rolling stock.

The dynamic gauge: IMSs do not take into account the vehicle displacements. All the displacements are managed by the rolling stock on the basis of a track quality defined in the related EN standards.
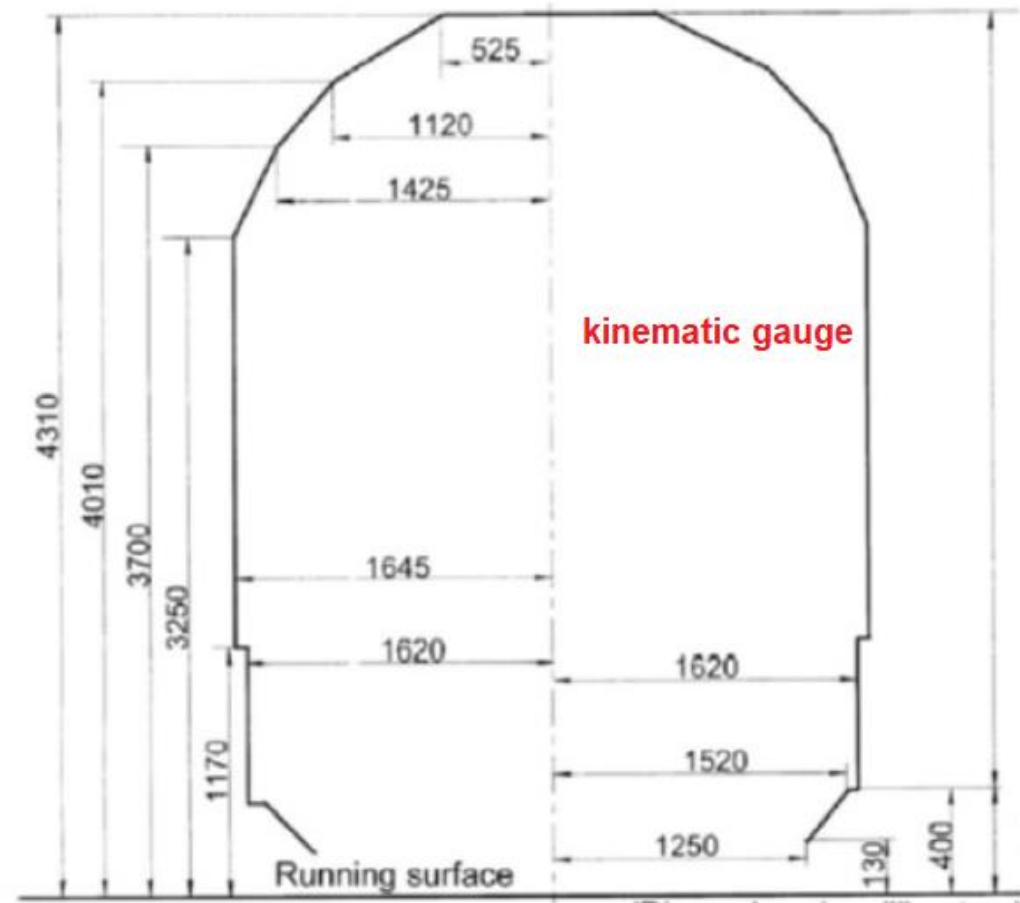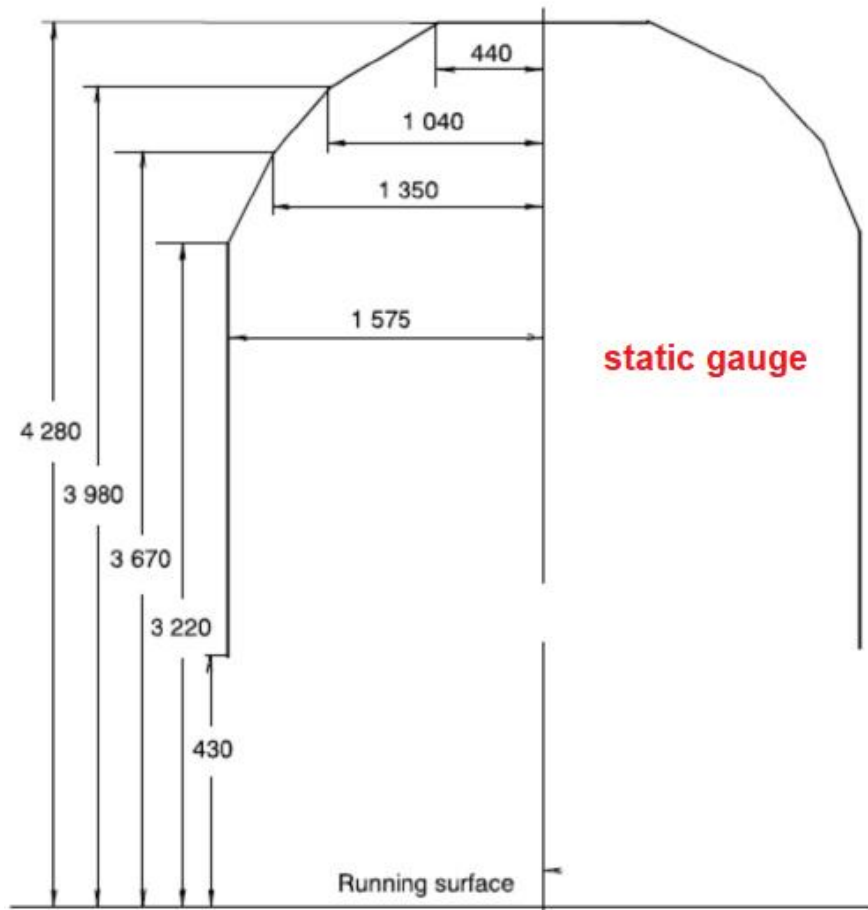
The evolution of the UIC Leaflets/IRS

Technical Unit → UIC Leaflets 505-1, 505-2, 505-3, 505-4 → UIC Leaflet 506 → IRS 50505-1

The UIC reference documents

✓ **IRS 50505-1**: *Railway transport stock - Rolling stock construction gauge*

✓ **UIC Leaflet 505-4**: *Effects of the application of the kinematic gauges defined in the 505 series of leaflets on the positioning of structures in relation to the tracks and of the tracks in relation to each other*

✓ **UIC Leaflet 505-5**: *History, justification and commentaries on the elaboration and development of UIC leaflets of the series 505 and 506 on gauges*

✓ **UIC Leaflet 506**: *Rules governing application of the enlarged GA, GB, GB1, GB2, GC and GI3 gauges*
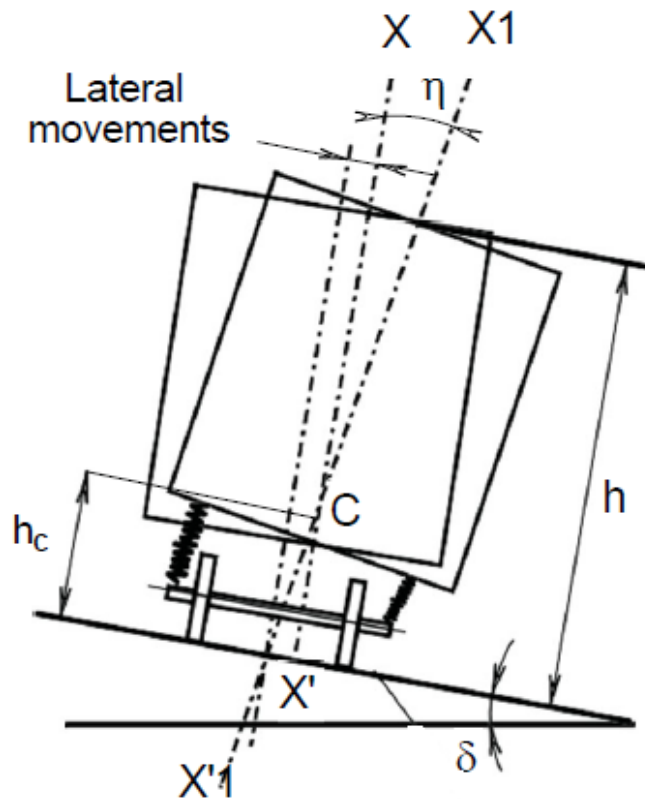
The UT static gauge vs. the UIC kinematic gauge

The UT static gauge vs. the UIC kinematic gauge

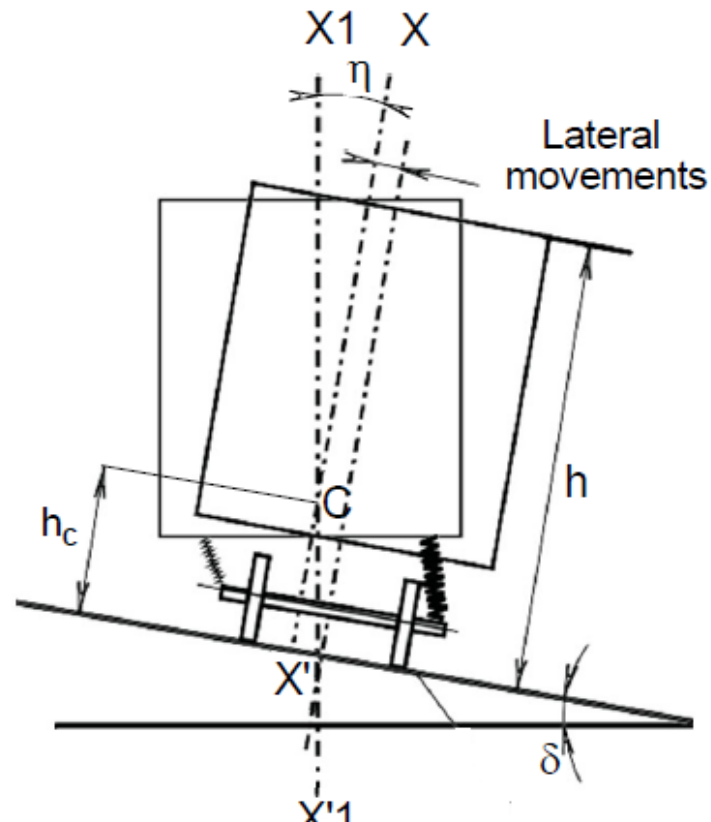The following parameters are considered when the profile of the vehicle is defined:

Parameters		Gauge	
		static	kinematic
Minimum Curve radius =250 m		yes	yes
Maximum track gauge =1, 465 m	Lateral play between rail and axle = (1,465 – 1,410) mm	yes	yes
Outer distance between the wheel flanges = 1,410 m			
Maximum cant deficiency			yes
Distance between the pivot of the bogies		yes	yes
Distance between the external axles		yes	yes
Bogie wheelbase		yes	yes
Vehicle overhang		yes	yes
Play between the axle and the vehicle body		yes	yes
Vehicle coefficient of flexibility			yes
Vehicle dissymmetry			yes
Vertical oscillations			yes

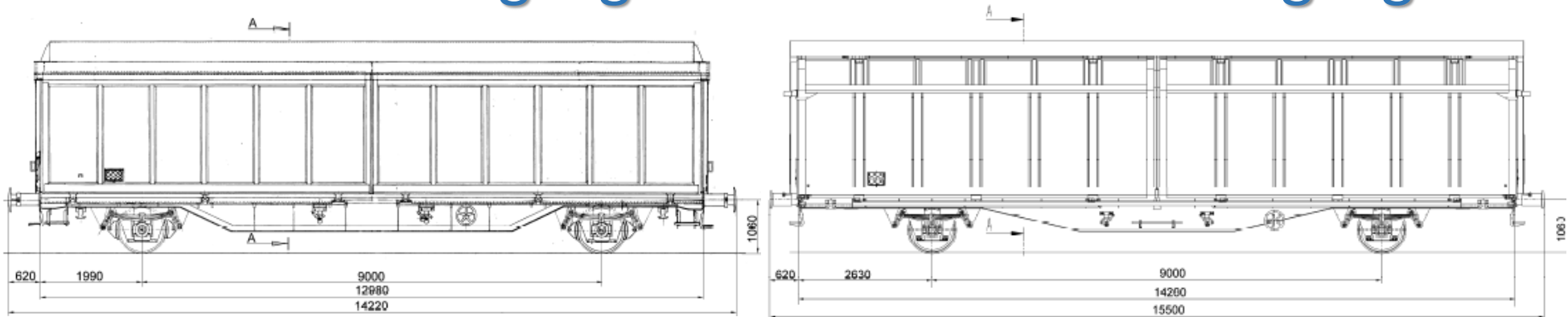# The UT static gauge vs. the UIC kinematic gauge

Vehicule at a standstill on canted track
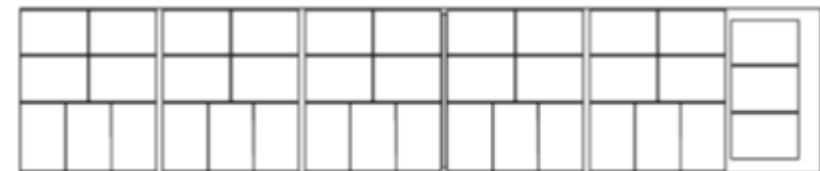
Vehicule running on a track with cant deficiency
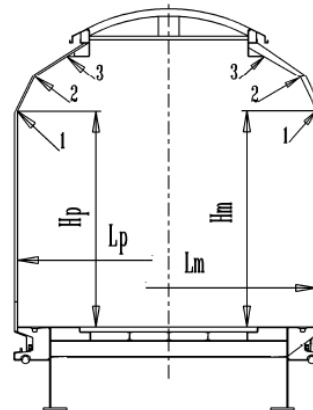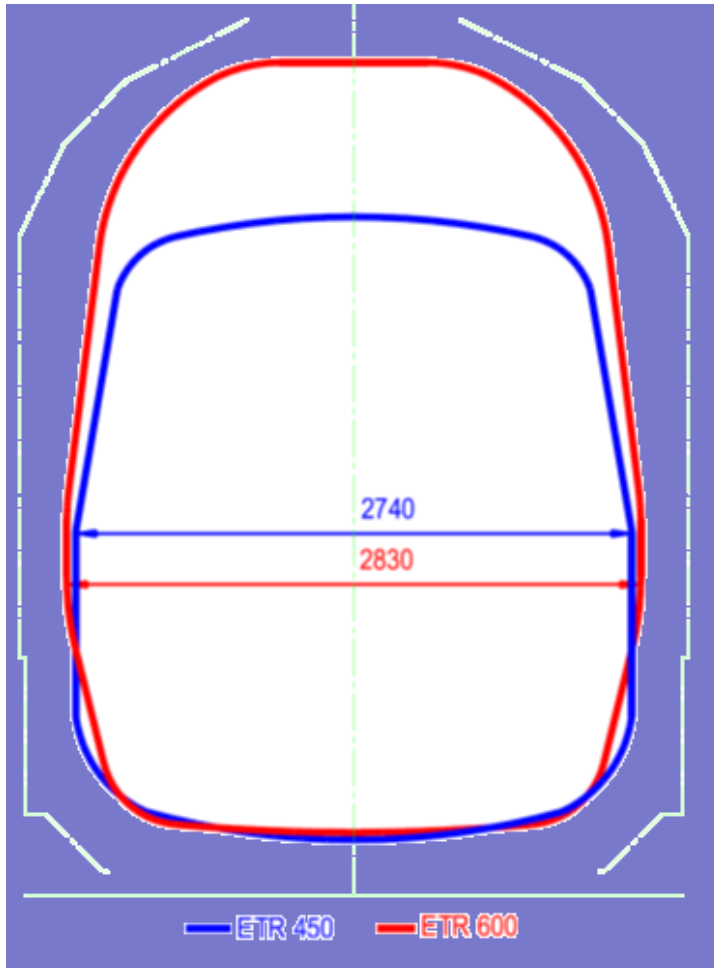
The UT static gauge vs. the UIC kinematic gauge

30 pallets (1200 x 800)

38 pallets (1200 x 800)

The GA, GB, GC kinematic gages vs. the UIC kinematic gauge

2740

2830

ETR 450   ETR 600

ETR 450
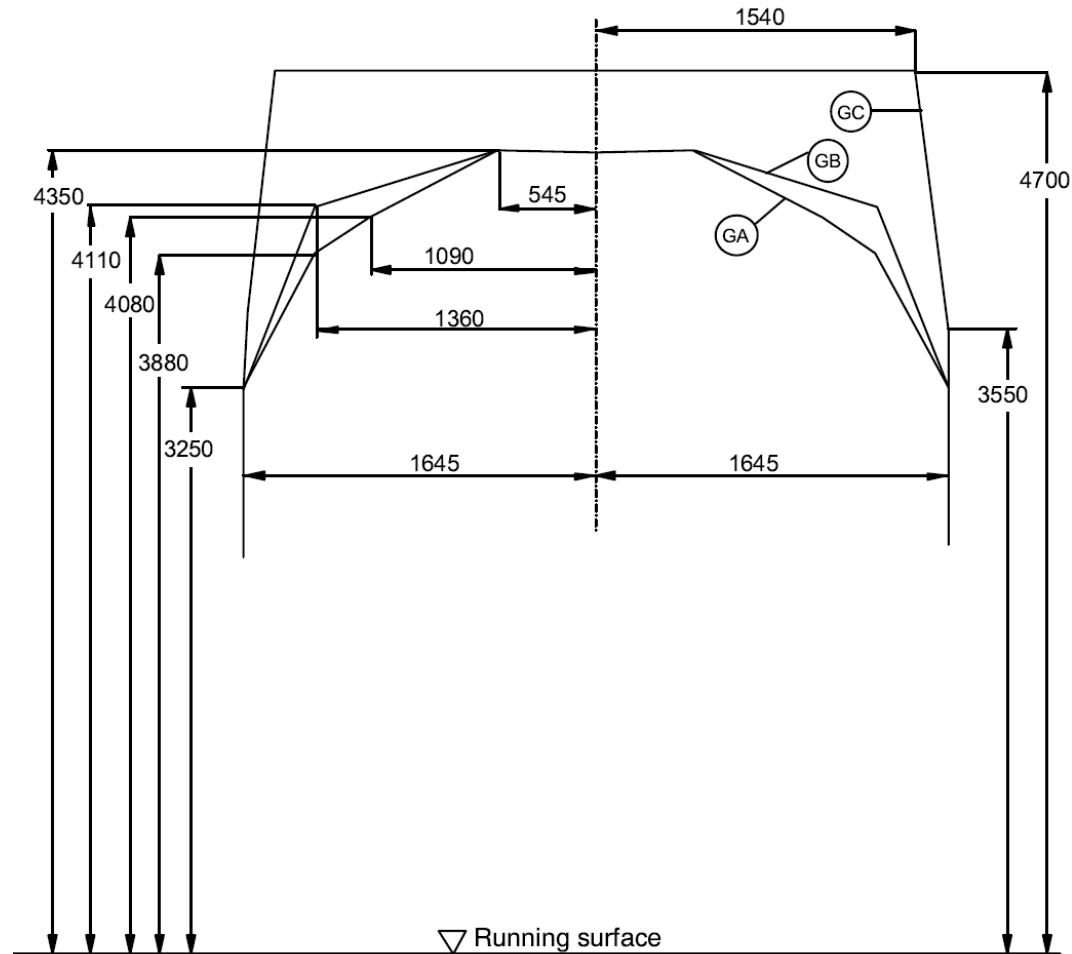**1st cl. seats: 126**
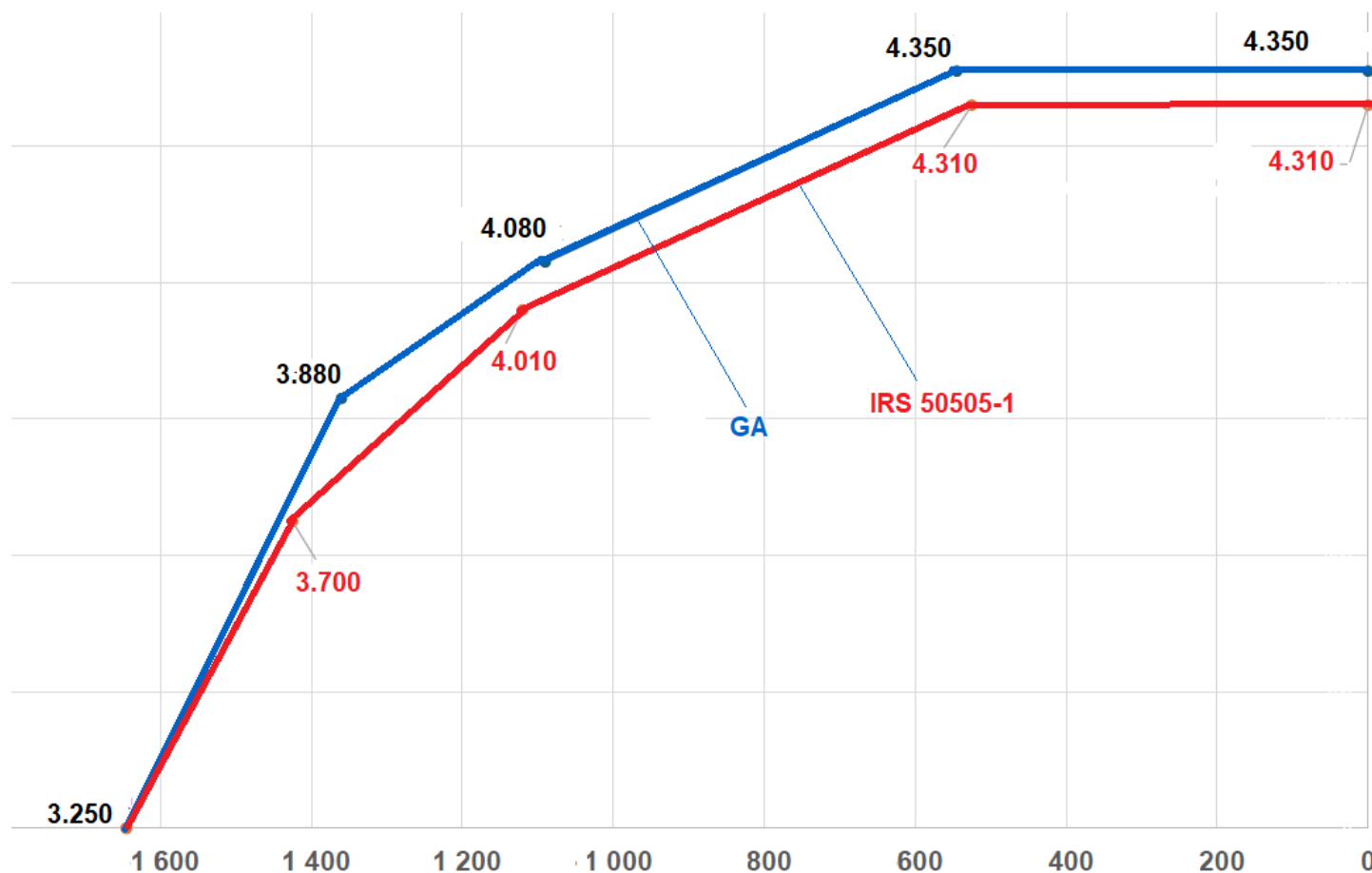**2nd cl. seats: 264**

ETR 600
1st cl. seats: 126
2nd cl. seats: 306

GA, GB, GC kinematic gauges

GA kinematic gauge vs. UIC kinematic gauge

GA kinematic gauge vs. UIC kinematic gauge: CT applications

Gauge	Swap bodies	Semi-trailers
IRS 50505-1	H = 2.675 mm W = 2.550 mm	H = 3.520 mm W = 2.500 mm
GA	ΔH = 0 mm ΔW = + 50 mm H = 2.675 mm W = 2.600 mm	ΔH = 0 mm ΔW = + 100 mm H = 3.520 mm W = 2.600 mm
GB	ΔH = + 230 mm ΔW = + 50 mm H = 2.905 mm W = 2.600 mm	ΔH = + 230 mm ΔW = + 100 mm H = 3.750 mm W = 2.600 mm
GC	ΔH = + 590 mm ΔW = + 50 mm H = 3.265 mm W = 2.600 mm	ΔH = + 590 mm ΔW = + 100 mm H = 4.110 mm W = 2.600 mm

The UIC Combined Transport codification

The Combined Transport

The Road-rail combined transport is a system involving:

o Intermodal Loading Units (containers, swap bodies, semi-trailers, roller units),
o Wagons,
o Lines.

The Intermodal Loading Units
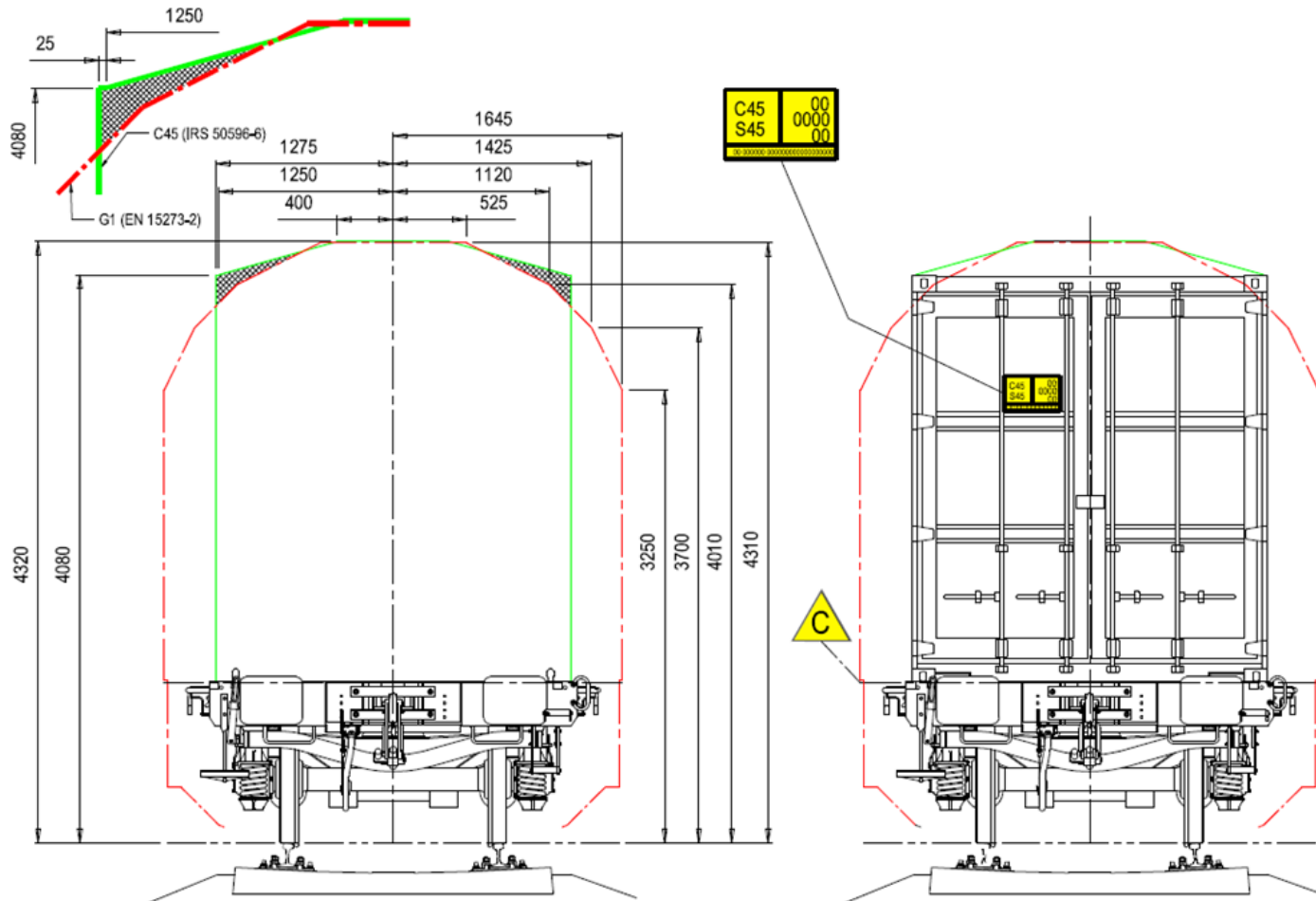
The Combined Transport wagons

The CT codification as per IRS 50596-6

- CT codification was introduced more than 40 years

- CT Codification aims at the facilitation of combined transport:
  - Improving the capacity of the lines,
  - simplifying operational rules.

The Codification of Combined Transport lines
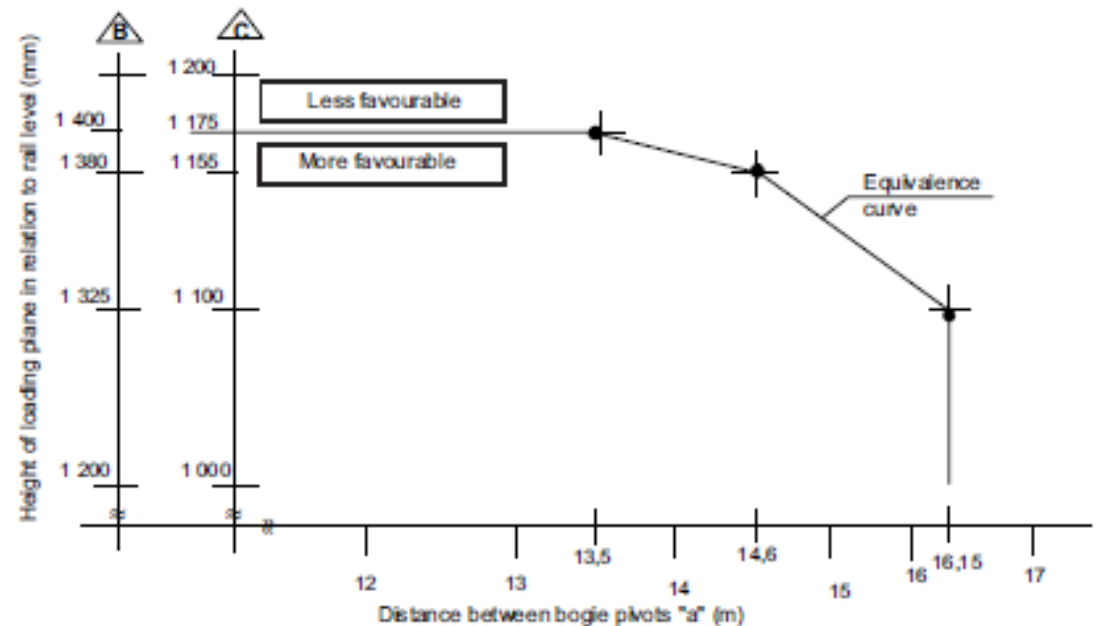
Why codification?

The UIC reference documents

✓ **IRS 50596-6**: *Conditions for coding intermodal loading units, combined transport lines and wagons*

✓ **IRS 50596-7**: *Railway Application - Rolling Stock - Conformity Assessment - Requirements for bodies performing the certification of coding in accordance with IRS 50596-6 (Conformity assessment bodies)*

✓ **IRS 50571-4**: *Wagons for combined transport - Vertical transhipment - Characteristics*

✓ **IRS 50571-5**: *Wagons for combined transport - Horizontal transhipment - Characteristics of the wagons suitable for the transport of roller units*

The UIC reference documents

- ✓ **IRS 50591**: *Roller units for horizontal transhipment - Technical conditions governing their use in international traffic*
- ✓ **IRS 50592**: *Rules governing application of the enlarged GA, GB, GB1, GB2, GC and GI3 gauges*
- ✓ **IRS 50596-5**: *Transport of road vehicles on wagons - Technical Organization - Conveyance of semi-trailers with P coding or N coding on recess wagons*
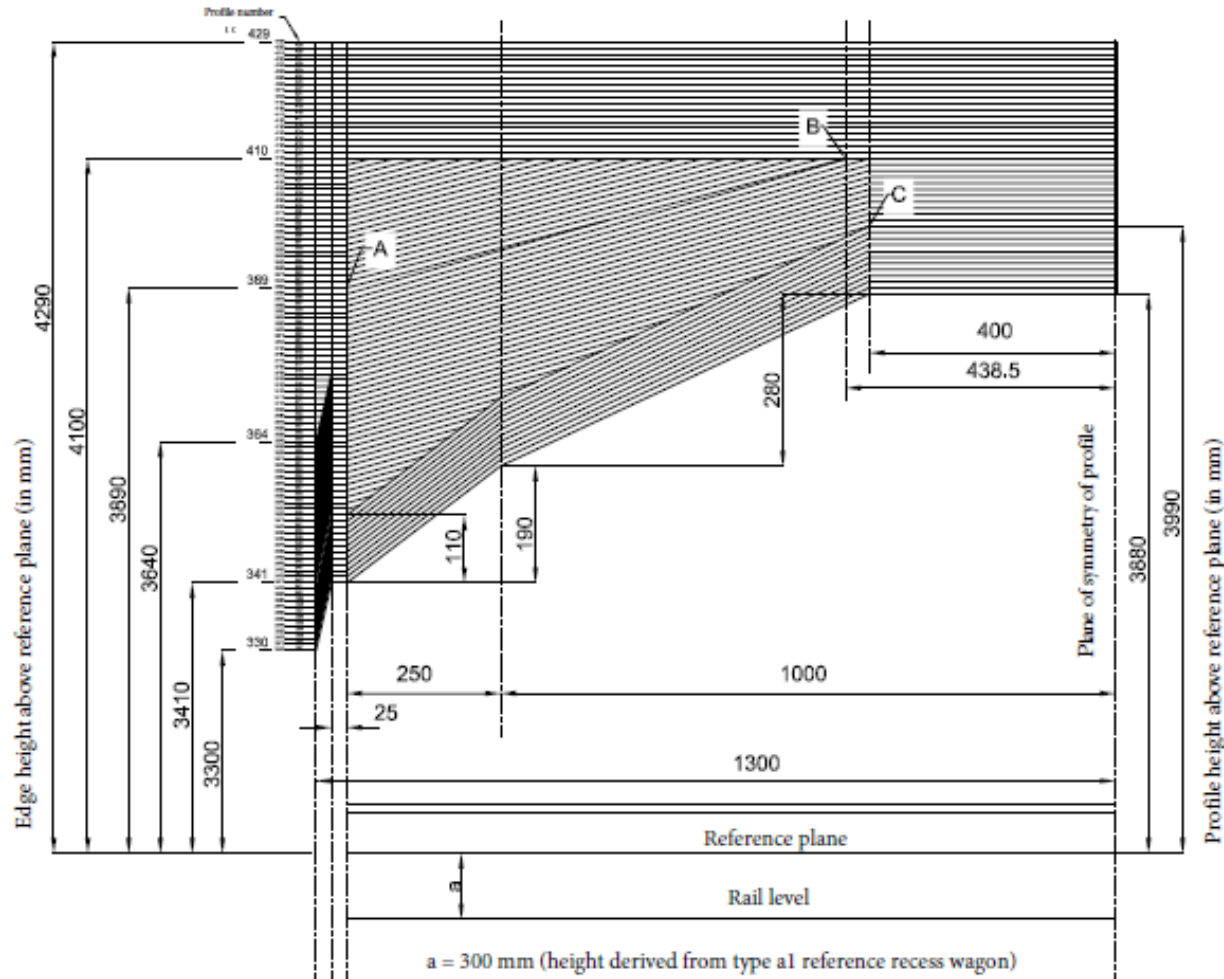
The reference wagon

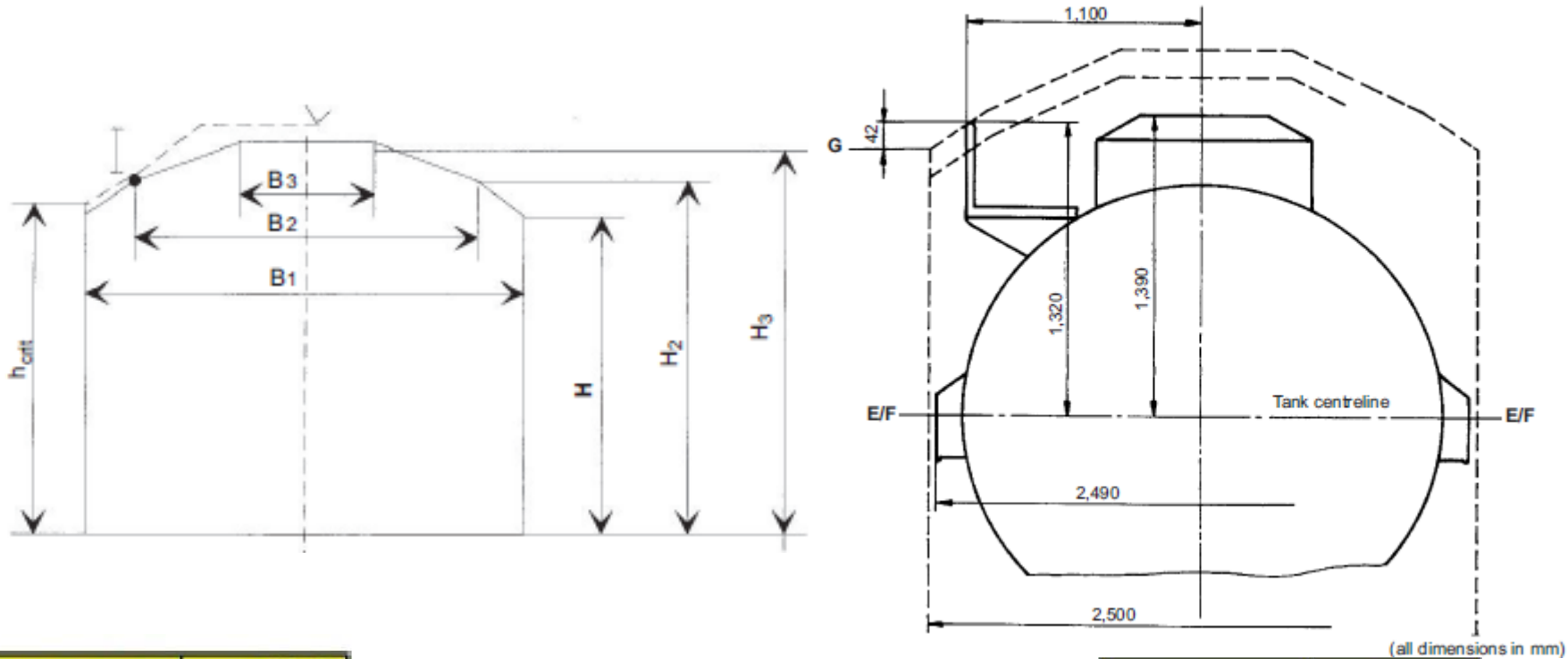|	
- Distance between bogie pivots (a)	13,500 mm
- Bogie wheelbase (p)	1,800 mm
- Height of SB loading plane	1,175 mm
- Maximum overhang (n_a)	2,000
- Load tolerance	10 mm
- Dissymmetry	1°
- Height of wagon roll centre (H_c)	500 mm
- (q + w) play	11.5 mm
- Play in side bearers (J)	12 mm
- Half-distance between side bearers (b_G)	850 mm
- Wagon flexibility (s)	0.15

The Wagon Compatibility Code (WCC)

The Combined Transport profiles

The codification of the Intermodal Loading Units

The coding plate

The codification of the lines

For the codification of the Combined Transport lines IMs shall consider:

- the characteristics of the reference wagons
- the combined transport profiles

which are given by IRS 50596-6.

Two methodologies exists:

- Definition of the CT Pn° based on the line gauge
- Definition of the CT Pn° based on the real position of the obstacles

In accordance with INF TSI the line section CT Pn° must be introduced in RINF.
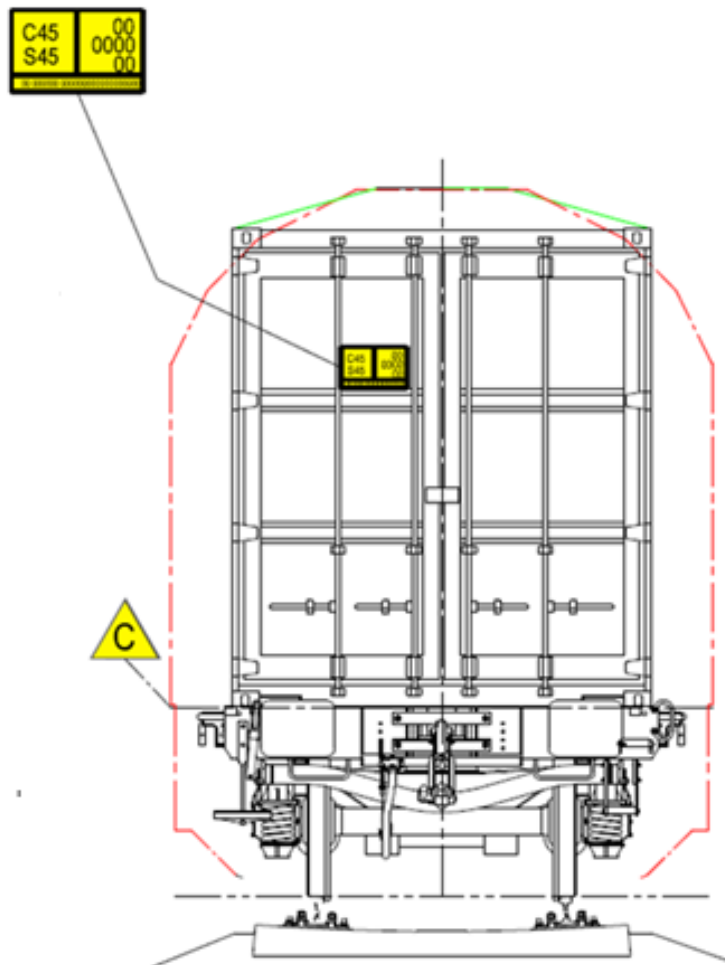
The operational provisions

Needed information:

Wagon	ILU Coding Plate	Lines
• WCC	• WCC • CT Pn°	• CT Pn° (given by IM/RINF)

Before train starts, staff in charge or train formation or inspection shall check that:

1. **WCC marked on the wagon = WCC marked on the ILU coding plate**
2. **CT Pn° marked on the ILU coding plate ≤ Line CT Pn°**

The operational provisions: example

1. **Wagon**
   - WCC = **C**

2. **Coding plate**
   - WCC = **C**
   - CT Pn° = **45**

3. **Line**
   - CT Pn = **80**

OK

"¡Muchas gracias por su atención!"

Stefano GUIDI

GUIDI@uic.org

Cell. 0039 335 263 70