OTIF

ORGANISATION INTERGOUVERNEMENTALE POUR LES TRANSPORTS INTERNATIONAUX FERROVIAIRES

ZWISCHENSTAATLICHE ORGANISATION FÜR DEN INTERNATIONALEN EISENBAHNVERKEHR

INTERGOVERNMENTAL ORGANISATION FOR INTERNATIONAL CARRIAGE BY RAIL

0. DOCUMENT INFORMATION

0.1. Amendment Record

The basis of this document is the ERA guide for the application of the TSI for freight wagons with reference ERA/GUI/07-2011/INT.

The blue rectangles such as this one in this document contain information relevant to the application of the OTIF UTP for freight wagons, reference A 94-02/2.2012, version 7 and further referred to as UTP WAG. Because the WAG TSI and UTP WAG are fully equivalent, much of the information in the TSI application guide is also relevant to application of the UTP.

All text edited by OTIF is in blue rectangles, which means that without the blue rectangles this document corresponds exactly to the ERA application guide.

As a general principle, where the guide refers to “TSI”, this can also be taken to cover the ‘UTP’. Where this is not the case, this is pointed out specifically.

The OTIF reference for this document is: **A 92-01/2.2013**

Version Date	*Section*	*Description*
V0.1 **21.08.2013**	All blue rectangles	First draft of OTIF document issued for review by the WG TECH 20
V0.2 **21.10.2013**	General layout, 2.1	Layout modified. Scope clarified. ERA comments incorporated.

0.2. Table of contents

1. SCOPE OF THIS GUIDE

1.1 Scope

This document is an annex to the 'Guide for the application of TSIs'. It provides information on the application of the Commission Regulation (EU) 321/2013 of 13 March 2013 concerning the technical specification for interoperability relating to the subsystem "rolling stock – freight wagons" (further referred to as "WAG TSI").

The guide should be read and used only in conjunction with the WAG TSI. It is intended to facilitate its application, but does not replace it. The general part of the 'Guide for the application of TSIs' should also be considered.

The information in this guide relates equally to the application of the UTP WAG. The WAG TSI application guide is published on the website of the European Railway Agency:

http://www.era.europa.eu/Core-Activities/Interoperability/Pages/TSI-Application-Guide.aspx

1.2 Content of the guide

In section 2 of this document, extracts of the original text of the WAG TSI are provided in shaded text boxes which are followed by a text that gives guidance.

Guidance is not provided for in clauses where the original WAG TSI requires no further explanation.

Guidance is of voluntary application. It does not mandate any requirement in addition to those set out in the WAG TSI.

Guidance is given by means of further explanatory text and, where relevant, by reference to standards that demonstrate compliance with the WAG TSI. Relevant standards are listed in Appendix 1 of this document, and their purpose is indicated in the column 'purpose' of the table.

1.3 Reference documents

Reference documents are listed in the general part of the 'Guide for the application of TSIs'.

1.3 Definitions and abbreviations

Definitions and abbreviations are given in the general part of the 'Guide for the application of TSIs'.

2. EXPLANATIONS ON THE APPLICATION OF THE WAG TSI

UTP Section 0: Equivalence and transitional provisions

The UTP WAG is equivalent to the EU regulations relating to freight wagons, in particular:

- The WAG TSI, and
- the marking of freight wagons as set out in appendix PP, in line with EU NVR Specification (Decision 2007/756/EU, as amended by Decision 2012/757/EU)

In addition it covers:

- Vehicle parameters relating to train detection as set out in appendix H, in line with the CCS TSI, and
- Operational parameters relating to the safe and correct use of wagons as set out in appendix I, in line with the OPE TSI.

A wagon that complies with all mandatory requirements in the UTP and with the optional additional conditions set out in section 7.1.2 and which is admitted to operation in one of the OTIF Contracting States will automatically be admitted to operation in all other Contracting States. The legal basis for this is set out in ATMF Articles 3a § 2 and 6 § 3. This principle is referred to as ”free circulation” and also applies to all EU Member States which are also OTIF Contracting States.

In accordance with ATMF Article 3a § 1, freight wagons “authorised for placing into service” in an EU Member State in conformity with the WAG TSI, section 7.1.2 (including the related markings), are also admitted to operation in all non-EU Contracting States.

2.1 Chapter 1: INTRODUCTION

Section 1.2: Geographical scope

“The geographical scope of this TSI is the entire European Union´s rail system, as set out in Article 1 of Directive 2008/57/EC taking into account the limitation concerning the track gauge set out in Article 2.”

A wagon complying with the TSI may be placed in service for the entire network of a member state belonging to the European Union´s rail system (that means without the parts excluded by the MSs in accordance with article 1(3) of the Directive), including high speed TEN lines, conventional rail TEN lines and non-TEN lines. No other authorisation is needed. Nevertheless the RU is still responsible for establishing the compatibility between the wagon and the line the wagon is intended to travel on. The geographical scope of the TSI is including the extension of scope. The exact geographical scope will depend on the individual Member State decisions.

COTIF applies to international rail traffic. The line or network a vehicle runs on is not a parameter relating to the scope of application of the UTP WAG.

All freight wagons which are in full compliance with the UTP WAG provisions are suitable to be admitted to international traffic under the ATMF uniform rules.

2.2. Chapter 2: Scope and definition of subsystem

Chapter 2: Scope and definition of the subsystem

"(a) A unit is the generic term used to name the rolling stock. It is subject to the application of this TSI, and therefore subject to the EC verification procedure.

A unit can consist of:

- *a wagon that can be operated separately, featuring an individual frame mounted on its own set of wheels or*
- *a rake of permanently connected elements, those elements cannot be operated separately or*
- *separate rail bogies connected to compatible road vehicle(s) the combination of which forms a rake of a rail compatible system."*

The following **figures 1, 2, 3 and 4** clarify these definitions.

Figure 1: **Example of a unit consisting of a (freight) wagon that can be operated separately, featuring an individual frame mounted on its own set of wheels**

Figure 2: **Example 1 of a unit consisting of a rake of permanently connected two elements (blue and orange), those elements cannot be operated separately (articulated wagon)**

Figure 3: Example 2 of a unit consisting of a rake of permanently connected two elements, those elements cannot be operated separately

Figure 4: Example 3 of a unit consisting of a rake of permanently connected elements, those elements cannot be operated separately (self-discharging train)

2.3. Chapter 3: Essential requirements

"The essential requirements 1.3.1, 1.4.1, 1.4.3, 1.4.4 and 1.4.5 of Annex III of the Directive 2008/57/EC fall under the scope of other Union legislation."

"The essential requirements 1.3.1, 1.4.1, 1.4.3 and 1.4.5 of UTP GEN-A may fall under the scope of other legislation applicable in the Contracting State. The application of the present UTP does not ensure full compliance with these essential requirements."

In accordance with UTP GEN-D, at the first (and if applicable consecutive) admission to operation, the Contracting State must take all appropriate steps to ensure that the wagon is designed and constructed in such way that it meets the essential requirements when integrated into the rail system. If neither the UTP nor the notified national rules provide an adequate basis for full assessment of compliance with the essential requirements, an explicit risk assessment and evaluation in accordance with UTP GEN-G must be performed.

The following essential requirements have not been dealt with at all within the drafting process of the WAG TSI because they are in the scope of other mandatory EU legislation:

1.3.1 *Materials likely, by virtue of the way they are used, to constitute a health hazard to those having access to them must not be used in trains and railway infrastructures* (Directive 2006/42/EC on machinery).

1.4.1 *The environmental impact of establishment and operation of the rail system must be assessed and taken into account at the design stage of the system in accordance with the Community provisions in force* (Council Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment).

1.4.3 *The rolling stock and energy-supply systems must be designed and manufactured in such a way as to be electromagnetically compatible with the installations, equipment and public or private networks with which they might interfere.* (Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility).

This essential requirement is complied with if the inherent nature of the physical characteristics of a wagon is such that it is incapable of generating or contributing to electromagnetic emissions which exceed a level allowing radio and telecommunication equipment and other equipment to operate as intended; and it will operate without unacceptable degradation in the presence of the electromagnetic disturbance normally consequent upon its intended use.

1.4.4 *Operation of the rail system must respect existing regulations on noise pollution.* (Commission Decision 2011/229/EU concerning the technical specifications of interoperability relating to the subsystem 'rolling stock – noise').

OTIF noise regulations equivalent to 2011/229/EU are set out in the UTP NOI, reference A 94-04/2.2012.

1.4.5 *Operation of the rail system must not give rise to an inadmissible level of ground vibrations for the activities and areas close to the infrastructure and in a normal state of maintenance.* (Directive 2002/44/EC on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration)).

Ensuring compliance with this essential requirement, beyond the specifications set out in the UTP WAG and UTP NOI, is required at the level of fixed installations such as railway infrastructure and its surroundings.

2.4. Chapter 4: characterisation of the subsystem

Section 4.1: Introduction

"The rail system, to which the Directive 2008/57/EC applies and of which freight wagons form a part, is an integrated system whose consistency shall be verified. This consistency shall be checked in particular with regard to the specifications of the rolling stock subsystem and the compatibility with the network (section 4.2), its interfaces in relation to the other subsystems of the rail system in which it is integrated (sections 4.2 and 4.3), as well as the initial operating and maintenance rules (sections 4.4 and 4.5) as requested by Article 18(3) of Directive 2008/57/EC.

The technical file, as set out in Article 18(3) and Annex VI to Directive 2008/57/EC (section 4.8), shall contain in particular design related values concerning the compatibility with the network."

The WAG TSI covers the harmonisation of all subsystem-related

- basic parameters necessary to achieve interoperability and safe integration including the
- basic parameters needed for the RU to establish together with the IM the compatibility of a unit with the network.

The WAG TSI sets out in addition how the values of the compatibility relevant basic parameters must be determined (calculation method, tests, simulations). Concerning the safe integration the applicant has to compile the initial documentation containing in particular all the elements relating to the conditions and limits of use and to the

instructions concerning servicing, constant or routine monitoring, adjustment and maintenance. This documentation has to accompany the unit and enables the RUs to take their responsibility concerning the safe operation as per article 4(3) of the Safety Directive and the OPE TSI.

Appendix I of the UTP sets out provisions relating to the safe and correct use of wagons. These principles are equivalent to provisions in the OPE TSI relating to this subject. Wagons are commonly exchanged between railway undertakings. The ECM of each wagon remains the same during such exchanges. It is imperative that each operating railway undertaking exchanges information with the ECM about the use and possible restrictions relating to each wagon.

The process of establishing the compatibility with infrastructure may be centralised, performed once giving restrictions of use line per line, or performed for each time slot allocated by the infrastructure manager. Whichever is the case, the railway undertaking has to control that all the wagons in its train composition are capable and suitable of going on the line the train is slotted for in respect of loading (axle load), loading gauge, brake performance (brake weight), etc.

Point 4.2.2.1.1: End coupling and
Point 4.2.2.1.2: Inner coupling

"End couplings shall be resilient and capable of withstanding the forces in accordance with the defined design operating state of the unit."

"The inner coupling shall be resilient and capable of withstanding the forces in accordance with the defined design operating state of the unit. The joint between two elements sharing the same running gear, is covered by point 4.2.2.2.

The longitudinal strength of the inner coupling(s) shall be equal to or higher than the one of the end coupling(s) of the unit."

The input parameters coming from the intended operation of the wagon (e.g. train weight, acceleration/deceleration of the train, etc.) determines the load (dynamic traction and compressive forces, etc.) the coupling must be designed for. The longitudinal direction is to be taken as the travel direction of the train.

Point 4.2.2.3: Integrity of the unit

"The unit shall be designed so that all movable parts intended to close an aperture (access doors, tarpaulin, lids, hatches, etc.) are prevented against an unintentional movement of these parts."

The naturally triggered movement of the tarpaulins, e.g. through fair wind, is excluded from “unintentional movement”.

Point 4.2.3.1: Gauging

> *“The compliance of a unit with the intended reference profile including the reference profile for the lower part shall be established by one of the methods set out in EN 15273-2:2009.”*
>
> *“The kinematic method, as described in EN 15273-2:2009, shall be used to establish, if any, between the reference profile established for the unit and the respective target reference profiles G1, GA, GB and GC including those used for the lower part GIC1 and GIC2.”*

The compliance with the requirements is used by the RU for the establishment of the compatibility with the infrastructure.

This compliance shall be proven in any case, not only for the interoperable gauges.

Points 4.2.3.5.1 and 6.2.2.2: Safety against derailment running on twisted track

"The demonstration of conformity shall be carried out either in accordance with

- *the procedure defined in section 4.1 of EN 14363:2005 or*
- *the method given in section 4.2 of EN15839:2012 by using the pre-calculation for standardised solutions."*

The method set out in EN 15839:2012 is an exemption from both testing and calculations and may be used if certain given conditions are met regarding bogie parameters and bogie type and the wheel flange angle.

Points 4.2.3.5.2 and 6.2.2.3: Running dynamic behaviour

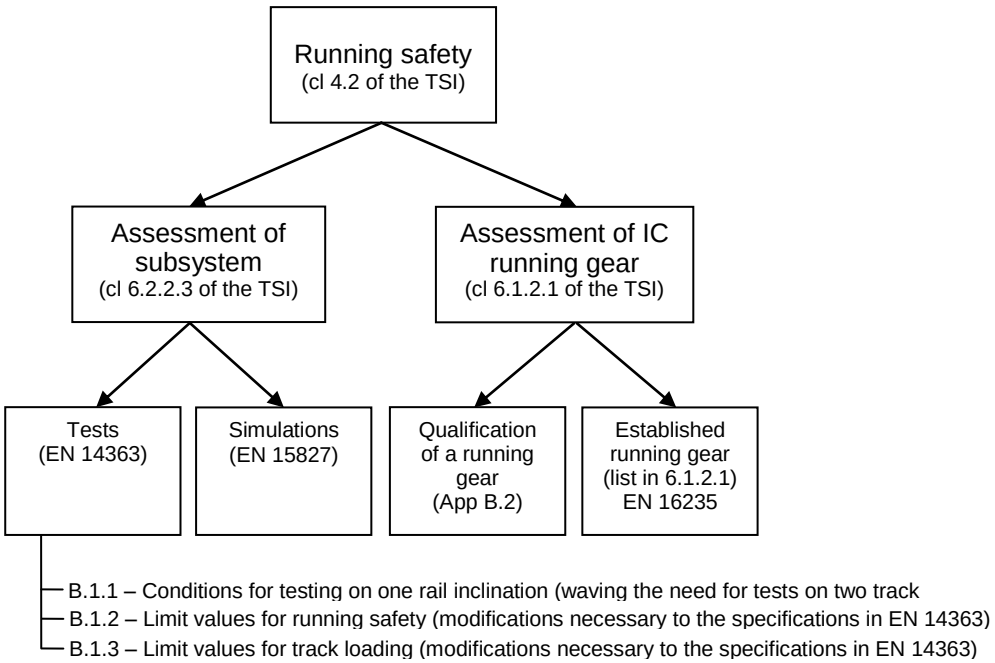
"The running dynamic behaviour of a unit shall be proven either by

- *following the procedures set out in Chapter 5 of EN 14363:2005, or*
- *performing simulations using a validated model."*

"Alternatively, under the conditions stated in section 9.3 of EN 15827:2011, a simulation may replace the above mentioned on-track tests."

The TSI sets out several possibilities to verify the running capability of a wagon as set out in figure 6.

Figure 6: Flow chart of all the possibilities to prove the running safety in the TSI



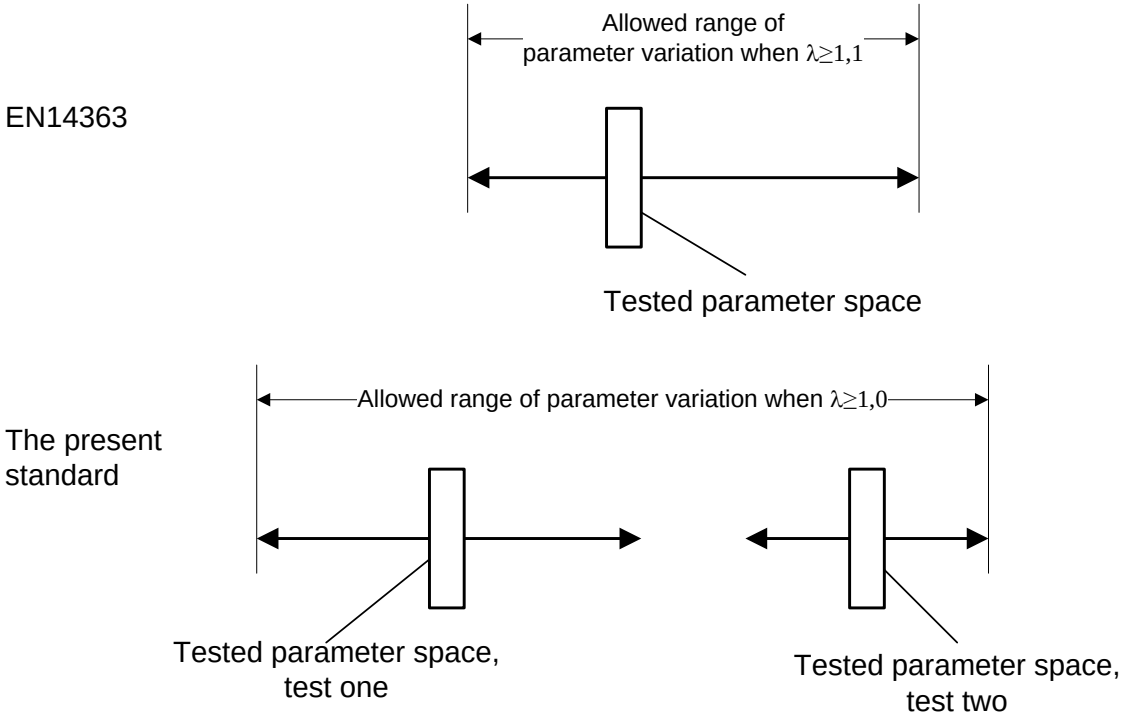
In addition there is a procedure to qualify the running gear as established running gear.

Simulations are to be performed by using validated models. The validation of a model assumes that on-track testing was initially performed and the data compared with results from the simulation model and the model subsequently modified in order to establish a validated simulation model (see figure 7).

Figure 7: Simulations

The principle of the procedure to qualify the running gear as being established is explained in figure 8. The procedure comprises of validating a range of wagon characteristics for a certain type of running gear (which thereby will become established). The validation means that on-track tests are performed using the to-be-established running gear on two wagons with different characteristics or parameters. The established running gear can thereby be used on wagons meeting the characteristics the running gear was validated for (area of use).

Figure 8: Validation of a broader range for use following testing



A wagon equipped with running gears belonging to the list of established ones and which are described in detail in EN 16235, is considered to meet the requirements of running safety as long as the wagon characteristics remain inside the validated range / area for use of the running gear.

> *"The combination of the highest equivalent conicity and speed for which the unit meets the stability criterion in clause 5 of EN 14363:2005 shall be recorded in the report."*

The recorded combination of the highest equivalent conicity and speed as required in Appendix B.1 enables the implementation of operational measures where necessary due to infrastructure characteristics.

Points 4.2.3.6.2 and 6.1.2.2: Characteristics of wheelsets

> *"The demonstration of conformity for the mechanical behaviour of the wheelset assembly shall be carried out according to clause 3.2.1 of EN13260:2009+A1:2010, which defines limit values for the axial assembly force and the associated verification test."*

The requirement of the wheelset mechanical behaviour of the assembly as expressed in the TSI is intended to ensure the ability of "transmitting a torque between the fitted elements" as stated in EN 13260 clause 3.2.1.

> *"A verification procedure shall exist to ensure at the assembly phase that no defects may detrimentally affect safety due to any change in the mechanical characteristics of the fitted parts of the axle."*

It is required that the permissible fatigue limits which are assumed for the axle design by application of EN 13260 and EN 13261 are verified in the assembly phase in case there are changes introduced in the assembly process.

Points 4.2.3.6.3 and 6.1.2.3: Characteristics of wheels

> *"(a) Forged and rolled wheels: The mechanical characteristics shall be proven following the procedure as specified in clause 7 of EN 13979-1:2003+A1:2009+A2:2011."*

The wheel is required to be designed following the methodology set out in EN 13979-1 clause 7 which requires calculations to be performed and subsequent tests if design criteria are not met.

For tread braked wheels the requirements of EN 13979-1:2003+A1:2009 clause 6.2.1 are fulfilled only by using the values of table C.2.

The design criteria, the permissible range of dynamic stress, are defined for forged and rolled wheels. The test to be performed in case of exceeding the criteria is a bench test where it is required that no fatigue cracks must be observed after the test.

> *"(a) …*
> *The decision criteria of residual stresses for forged and rolled wheels are set out in EN 13979-1:2003+A1:2009+A2:2011."*

The decision criteria of the thermo mechanical behaviour of wheels for materials other than ER6 and ER7 which are presented in EN 13979-1 have to be extrapolated from known data. Furthermore, any other type of wheel than those set out in the TSI, are permitted for (and restricted to) national use.

> *"A verification procedure shall exist to ensure at the production phase that no defects may detrimentally affect safety due to any change in the mechanical characteristics of the wheels. "*

The wheel is considered to be a safety relevant component which needs to be checked and controlled, not only for the design criteria, but also for ensuring end quality of the product. EN 13262 sets out the verification procedure to be followed for the parameters stated in the TSI; the material characteristics and the number of samples to be checked in production, the procedures to follow for any changes in the design of the axle or changes of manufacturer of the material of the axle, etc.

The verification of the fatigue characteristics of the wheel material, as set out in the TSI, is only intended to be performed if there is a change of supplier of the raw material for the production of the wheel or there are any changes to the manufacturing process or the design of the wheel is appreciably changed.

Point 4.2.3.6.4 and 6.1.2.4: Characteristics of axles

> *"In addition to the requirement on the assembly above, the demonstration of conformity for mechanical resistance and fatigue characteristics of the axle shall be based on clauses 4, 5 and 6 of EN13103:2009+A1:2010.*
>
> *The decision criteria for the permissible stress are specified in clause 7 of EN 13103:2009+A1:2010."*

The verification of the axle is supposed to be done by calculation as set out in EN 13103 which defines the load cases to consider, the specific calculation methods for

the design of the axle and the decision criteria, the permissible stress, for steel grade EA1N and the methodology for arriving to permissible stress with other materials.

> *"A verification procedure shall exist to ensure at the production phase that no defects may detrimentally affect safety due to any change in the mechanical characteristics of the axles. The tensile strength of the material in the axle, the resistance to impact, the surface integrity, the material characteristics and the material cleanliness shall be verified. The verification procedure shall specify the batch sampling used for each characteristic to be verified."*

The axle is considered a safety relevant component which needs to be checked and controlled, not only for the design criteria, but also for ensuring end quality of the product. EN 13261 sets out the verification procedure to be followed for the parameters stated in the TSI; the number of samples to be checked in production, the procedures to follow for any changes in the design of the axle or changes of manufacturer of the material of the axle, etc.

Point 4.2.3.6.7 and 6.2.2.5: Running gear for manual change of wheelsets

> *"Changeover between 1435 mm and 1668 mm track gauges*
>
> *The technical solutions described in the following figures of the UIC leaflet 430-1:2006 are deemed to be compliant with the requirements in point 4.2.3.6.7:*
> - *for axle units: figures 9 and 10 of Annex B.4, and figure 18 of Annex H of UIC leaflet 430-1:2006,*
> - *for bogie units: figure 18 of Annex H of UIC leaflet 430-1:2006.*
>
> *Changeover between 1435 mm and 1524 mm track gauges*
>
> *The technical solution described in Appendix 7 of UIC leaflet 430-3:1995 is deemed to be compliant with the requirements in point 4.2.3.6.7."*

At the present time only one approach for the manual change of wheelsets exists. The requirements concerning the interface between the unit and the current facilities carrying out the manual change of wheelsets can be found in UIC leaflet 430-1:2006 (1435mm/1668mm) and in UIC leaflet 430-3:1995 (1435mm/1524mm).

Should alternatives become available these will be addressed within the revision of this application guide.

Point 4.2.4.2: Brake - Safety requirements

"The braking system contributes to the safety level of the railway system. Therefore the design of the braking system of a unit has to undergo a risk assessment in accordance with the Commission Regulation (EC) No 352/2009 considering the hazard of complete loss of the brake capability of the unit. The severity level shall be deemed as catastrophic when

- *it affects the unit alone (combination of failures) or,*
- *it affects the brake capability of more than the unit (single fault).*

The fulfilment of the conditions of C.9 and C.14 of Appendix C is presumed to be in conformity with this requirement."

The brake system contributes significantly to the safety level of the railway system. Therefore point 4.2.4.2 of the TSI requires a risk assessment in accordance with Commission Regulation 352/2009 on risk evaluation and assessment (CSM regulation).

OTIF regulations equivalent to Commission Regulation (EC) No 352/2009 are set out in the UTP GEN-G, reference A 94-01G/1.2012.

The risk assessment is based on the following commonly accepted risk acceptance principles:

- The application of codes of practice and/or
- a comparison of the brake system under assessment with a similar brake system and/or
- an explicit risk estimation.

The applicant/proposer may choose which of the principles he wants to apply.

The hazard to be covered by this risk assessment is the complete loss of the brake capability of the unit. The following two scenarios are required to be controlled:

1. The failure or combination of failures is affecting only the brake capability of the unit itself.
2. One single failure leads to a loss of the brake capability of another unit or of other units in a train.

Both scenarios are allocated to the severity level "catastrophic" what means that the associated risk does not have to be reduced further if the rate of that failure or combination of failures is less than or equal to 10^{-9} per operating hour. All failures and the causes which may lead to one of these scenarios are to be analysed and identified.

The CSM regulation in its Article 7(1) obliges the assessment body to provide the applicant/proposer with a safety assessment report which must contain e.g. all made assumptions.

The applicant has to record in the technical file all corresponding operating and maintenance rules which shall be met (see section 4.4 and 4.5 of the TSI) in order to control the given scenarios. This information enables the RUs and ECMs to take their responsibility in accordance with Article 4(3) of Directive 2004/49/EC.

One possibility to carry out the risk assessment can be the application of code of practise, such as the CENELEC standards EN50126, EN50128 and EN50129, or some others, including the compliance with their applicable "reliability, availability maintainability and safety (RAMS)" requirements. In this case the corresponding RAMS performance must be recorded in the technical file as well.

The Brake block

The brake block is a part of the brake system and is assessed together with it. Therefore the proposer/applicant has to follow the CSM approach also for the brake block. If brake blocks are part of those listed in Appendix G of the TSI, that corresponding code of practise must be considered as applied.

Point 4.2.4.3.2: Brake - Brake performance

"The brake performance of a unit shall be calculated in accordance with one of the following documents:

- *EN 14531-6:2009 or*
- *UIC 544-1:2012.*

The calculation shall be validated by tests. Brake performance calculation in accordance with UIC 544-1 shall be validated as set out in UIC 544-1:2012."

A brake performance calculation performed in accordance with the UIC leaflet 544-1 has to be validated as set out in the UIC leaflet. The UIC leaflet describes some exemptions, therefore tests are not always necessary.

Point 4.2.4.3.3: Brake - Thermal capacity

"The braking equipment shall be able to withstand one emergency brake application without any loss of brake performance due to thermal or mechanical effects."

The essential requirement is fulfilled as soon as the wagon complies with this requirement. The operative rules, depending on the design of the wagon, have to set

out how to continue following a standstill after an emergency brake application. It could be necessary to check the brake equipment or to take time restrictions into account before the train is allowed to continue its journey (risk: immediate second emergency brake).

> *"A slope of 21 ‰ at 70 km/h during 40 km may be considered as the reference case for the thermal capacity which results in a braking power of 45 kW per wheel during 34 minutes for a nominal wheel diameter of 920 mm and an axle load of 22.5 t."*

The requirement allows for any thermal capacity of the brake equipment. The reference case sets out a combination of values considered to be representative for a major part of the European network. The fulfilment of the brake components with the reference case is to be recorded in the technical file and in ERATV.

Point 4.2.4.3.4: Brake - Wheel slide protection

> *"The following types of units shall be fitted with WSP:*
>
> - *Equipped with all types of brake block, for which the maximum mean utilisation of adhesion is greater than 0,12."*

The maximum mean utilisation of adhesion is the maximum mean utilisation of adhesion after response time (in accordance with EN 14478, clause 4.4.5) considering the speed range between 30 km/h and maximum intended operating speed of the wagon.

Point 4.2.5: Environmental conditions

> *"The design of the unit, as well as its constituents shall take into account the environmental conditions to which this rolling stock will be subjected to.*
>
> *The environmental parameters are described in the clauses below. For each environmental parameter, a nominal range is defined, which is the most commonly encountered in Europe, and is the basis for the interoperable unit.*
>
> *For certain environmental parameters ranges other than the nominal one are defined. In that case, a range shall be selected for the design of the unit.*
>
> *For the functions identified in the clauses below, design and/or testing provisions taken to ensure that the rolling stock is meeting the TSI requirements in this range shall be described in the technical file.*
>
> *Depending on the ranges selected and on provisions taken (described in the technical file), appropriate operating rules could be necessary when the unit*

designed for the nominal range is operated on a particular line where the nominal range is exceeded at certain periods of the year.

The ranges, if different from the nominal one, to be selected to avoid any restrictive operating rule(s) linked to environmental conditions, are specified by the Member States and are listed in section 7.4.

The unit and its constituents shall be designed under consideration of one or several of the following external air temperature ranges

T1: -25°C to +40°C (nominal),
T2: -40°C to +35°C and
T3: -25°C to +45°C.

The unit shall meet the requirements of this TSI without degradation for snow, ice and hail conditions as defined in clause 4.7 of EN 50125-1:1999, which correspond to the nominal range.

Where more severe 'snow, ice and hail' conditions are selected, the unit and its constituents shall then be designed to meet TSI requirements considering the combined effect with low temperature according to the temperature range chosen.

In relation with the temperature range T2 and with the severe conditions for snow, ice and hail, the provisions taken to meet TSI requirements in these severe conditions shall be identified and verified, in particular design and/or testing provisions considering the following functions:

- *Coupling function, restricted to the resiliency of couplings.*
- *Brake function, including brake equipment.*

The TSI mandates that environmental conditions of temperature and snow/ice/hail are taken into account in the design of the wagon. Therefore nominal conditions are set out (temperature range T1 and snow/ice/hail conditions in EN 50125-1).

However, a few MSs have concerns because they meet more severe conditions in some periods of the year. To cover that, severe conditions are specified for the parameters temperature and snow/ice/hail. Concerning the temperature, the ranges T2 (-40°C to +35°C) and T3 (-25°C to +45°C) have been introduced, concerning the snow/ice/hail conditions the WAG TSI refers to section 7.4 in case of more severe conditions than those set out in EN 50125-1.

The design and the assessment of a wagon may be completely assessed under nominal conditions or under consideration of one or both of the severe conditions.

The provisions in design and/or in testing taken to meet the chosen conditions are to be reported in the technical file and can be used to establish operating rules e.g. operating rules to take into account the more severe conditions during certain periods of the year in certain MSs.

For unrestricted access concerning the environmental conditions in the MS concerned the conditions set out in section 7.4 of the WAG TSI have to be fulfilled.

The term “coupling function” in the TSI text covers the function of drawing and buffing equipment

Point 4.2.6.1.1: Fire safety - General

> *“All significant potential fire sources (high risk components) on the unit shall be identified. The fire safety aspects of the unit design shall be aimed at*
>
> - *preventing a fire from occurring,*
> - *limiting the effects if a fire occurs.*
>
> *The goods carried on the unit are not part of the unit and do not have to be taken into account in the conformity assessment.”*

Significant potential fire sources and high risk components include: contact surfaces of brake blocks, tanks containing flammable liquids, electrical equipment (including cables), combustion engines, heat exchanging equipment like air-conditioning systems.

The fire safety requirements in this TSI are not aimed at the transport of dangerous goods. In case of dangerous goods carried on freight wagons, RID requirements shall be applied in all aspects of fire safety.

Point 4.2.6.1.2.1: Fire safety - Barriers

> *“In order to limit the effects of fire, fire barriers with integrity of at least 15 minutes shall be installed between the identified potential fire sources (high risk components) and the carried load.”*

2mm thick steel sheet and 5mm thick aluminium sheet are deemed to comply with the 15 minutes integrity requirement without testing.

Main source for fire on wagons are brake blocks. According to that, constructions in accordance with UIC leaflets 430-1 and 543 collect elements to be fitted above wheels, give presumption of conformity to the requirement in point 4.2.6.1.2.1 Barriers, for area above the brake blocks.

Point 4.2.6.1.2.2 and 6.2.2.8.2: Fire safety - Materials

> *“All permanent materials used on the unit shall have limited ignitability and flame spread properties, unless*
>
> - *the material is separated from all potential fire risks on the unit by a fire barrier and the safe application is supported by a risk assessment or*
> - *the component has a mass <400g, and is located within a horizontal distance of ≥40 mm and a vertical distance of ≥400mm to other non-tested*

components."

The expression in point 4.2.6.1.2.2 "the component has a mass less than 400 g" refers to the mass of the material without proven limited ignitability resp. which is not mentioned in the list of point 6.2.2.8.2 as deemed to comply with the requirement.

Point 4.5.3: Maintenance description file

"The maintenance description file includes the following:

- *…*
- *Parts list which shall contain the technical and functional descriptions of the spare parts (replaceable units). The list shall include all parts specified for changing based on condition, which may require a replacement following electrical or mechanical malfunction or which will foreseeable require a replacement after an accidental damage. Interoperability constituents shall be indicated and referenced to their corresponding declaration of conformity.*
- *…*

It is recommended to add to the parts list also the references from the spare part provider and manufacturer, in order to allow identification and procurement of the correct spare parts.

"The maintenance description file includes the following:

- *…*
- *Maintenance plan i.e. the structured set of tasks to perform the maintenance including the activities, procedures and means. The description of this set of tasks includes:*
  - *Disassembly/assembly instructions drawings necessary for correct assembly/disassembly of replaceable parts.*
  - *Maintenance criteria.*
  - *Checks and tests in particular of safety relevant parts; these include visual inspection and non-destructive tests (where appropriate e.g. to detect deficiencies that may impair safety).*
  - *Tools and materials required to undertake the task.*
  - *Consumables required to undertake the task.*
  - *Personal protective safety provision and equipment.*
- *…*

It is recommended that the following results of the Task Force on Freight Wagon Maintenance are included in the maintenance description file as they are considered as good practice:

- The harmonised maintenance program of inspection of axles, EVIC that is effective to reduce risks related to corrosion but insufficient to eliminate them completely. (See Annex III of [1]).
- The identification of the data that needs to be collected in the European Wheelset Traceability Catalogue, EWT (See Annex IV of [1]).
- The European Common Criteria for Maintenance for freight wagon axles, ECCM (See Annex V of [1]).

These three documents on railway maintenance, which were developed by the railway sector, should be taken into account by the applicant in the maintenance description file respectively for:

- The development and update of visual inspections on axles (EVIC).
- Defining the content of the part of the configuration file addressing wheelsets (EWT).
- Harmonising the maintenance plans (ECCM) when appropriate.

Regarding visual inspections there might be different understandings if they also belong to visual inspections carried out in the operational field outside of a maintenance workshop (see the final report “certification of maintenance workshops” 01.08.2008, clause 5.1 first steps of maintenance). It is up to the RU and keeper/ECM to carry out the visual inspection, . for example as agreed in the GCU.

Visual inspections may be carried out in maintenance workshops or in the operational field, for example by inspectors.

If the applicant can demonstrate through experience and risk assessment that it has more effective maintenance rules than the here-above recommended good practises, it should better introduce these in its maintenance description file.

a) A RU hauling the vehicle should:
   - carry out a procedure for checking basic information about the vehicle’s maintenance, in particular whether an ECM is registered for this vehicle in the vehicle register and, in the case of a freight wagon, whether a valid certificate exists for this ECM covering the respective scope of use of the wagon, such as dangerous goods;
   - perform checks before the departure of a train, such as a brake test, composition of the train in conjunction with the route to be taken, “visual check” for technical deficiencies which might endanger safe (onward) carriage, check that the deadline for maintenance registered or marked on the vehicle has been observed, and,
   - where necessary, perform the checks to be carried out en route and take appropriate action in case of operational incidents, e.g. a hot axle box;
   - ensure that it is able to hand over data to the ECM of the vehicle in due time, particularly on its operating performance (km, tonne.km), malfunctions,

accidents, incidents, near-misses and other dangerous occurrences, as well as on any restrictions on the use of the vehicle, inspections and repairs made in the period during which the vehicle has been in its charge.

If these checks reveal deficiencies or problems relating to safety, the RU should take appropriate measures, i.e. resolve the problem or refuse further carriage.

b) The ECM should

- ensure that it is able to receive and use data from the respective RUs (see above) through its contractual agreements;
- ensure that the carrying RUs can obtain information on updates concerning restrictions on the use of the wagon, and
- provide information on the maintenance of a freight wagon as requested from a RU for its operational purposes. This does not mean that the ECM would have to inform the RU of all its maintenance processes, which the RU is not responsible for checking.

Section 4.7: Health and Safety conditions

"If the unit is fitted with a manual coupling system, a free space for shunters during coupling and uncoupling shall be provided."

The free space for shunter as defined in chapter 3 of the ERA technical document 4 (ERA/TD/2012-04/INT version 1.0 of 04.06.2012) is deemed to be in conformity with this requirement of the TSI.

Appendix L of UTP WAG defines the space for shunting staff.

"The unit shall be equipped with footsteps and handrails except in those cases it is not intended to be operated with staff on-board, e.g. for shunting."

Footsteps and handrails in accordance with chapter 4 of the ERA technical document 4 (ERA/TD/2012-04/INT version 1.0 of 04.06.2012) in relation to the strength, size and free space for shunting staff are deemed to be in conformity with the requirement of the TSI.

Appendix M of UTP WAG defines footsteps and handrails.

All protruding parts deemed a hazard to operational staff shall be clearly indicated

and/or fitted with protective devices.

Protective devices as described in clause 1.3 of UIC 535-2:2006 are deemed to be in conformity with this requirement of the TSI.

Section 4.8: Parameters to be recorded in the technical file

"The technical file shall contain at least the following parameters:

- *…*
- *Position of the axles along the unit and number of axles*
- *…*

The position of the axle along the unit and number of axles is the geometrical position of the axles in the unit according to EN 15528:2008.

2.5 Chapter 5: Interoperability constituents

An IC can be defined if its requirements in the TSI can be assessed independently from the subsystem on constituent level and if its area of use can be specified.

The area of use covers all conditions under which the constituents, as defined in section 7.2 of the TSI, are intended to use and their technical boundaries.

Point 5.3.1: Running Gear

"The running gear shall be designed for an application range, the area of use, as defined by the following parameters:

- *…*
- *Rail inclination"*

Rail inclination is recognised as a parameter defining the area of use of the running gear. The reason is that the running dynamic tests according to EN 14363 require the tests to be performed on rail inclinations, 1:20 and 1:40, for "unrestricted international operation".

The TSI offers in Annex B.1 the possibility of a work around using high equivalent conicity of the wheelset in order to prove that the rolling stock is suitable to be used for all rail inclinations.

It is recognised, however, that it is not always possible to meet the limit values with this work around and not always necessary, for operative reasons, to perform two individual tests on the different rail inclinations of each rolling stock as some rolling stock will be operated only on dedicated networks.

Therefore, by introducing the rail inclination as a parameter, it will be possible to perform tests on only one rail inclination and restricting the use of the running gear to those networks with the rail inclination the running gear was tested for.

Point 5.3.3: Wheel

A wheel shall be designed and assessed for an area of use defined by

- *nominal tread diameter,*
- *maximum vertical static force,*
- *maximum speed and service life and*
- *maximum braking energy.*

The last bullet point indicates also the capability to be combined with a certain brake principle. For example when the brake force is not acting directly on the tread a very low braking energy or zero is stated for this parameter.

2.6 Chapter 6: Conformity assessment and EC verification

Explanations concerning the conformity assessment in section 6.1 and 6.2 of the WAG TSI are incorporated in section 2.4 of this application guide.

Section 6.3: Subsystem containing components corresponding to interoperability constituents not holding an EC declaration

"A Notified Body is permitted to issue an EC certificate of verification of a subsystem, even if one or more of the components corresponding to interoperability constituents incorporated within the subsystem are not covered by a relevant EC declaration of conformity…"

When a constituent is considered as an IC, the use of a constituent holding an EC declaration is mandatory to get an EC declaration of verification for a RST subsystem unless the conditions set out in section 6.3 of the WAG TSI are applied.

The assessment of ICs separate from the subsystem is not mandatory in OTIF regulations, unless required by a Contracting State; ICs which have been integrated into a vehicle could therefore be assessed together with the vehicle.

Section 6.3 of the UTP is only relevant in cases where the separate assessment of ICs is mandatory.

Only components corresponding to an IC not holding an EC certificate (non-certified ICs as defined in section 7.2 of the TSI), which are produced before or within the transitional period referred to in section 6.3 resp. in Article 8 of the Commission regulation are allowed to be incorporated in the subsystem. Within this period the manufacturer must obtain an EC certificate otherwise he has to stop the production. Exemption is the running gear, where point 4.2.3.5.2 of the TSI always allows the applicant to choose for the assessment on subsystem level in accordance with point 6.2.2.3 or on interoperability constituent level in accordance with point 6.1.2.1.

The distinction between “component” and “interoperability constituent” had to be made because the “component” means a tangible part of the subsystem and the “interoperability constituent” is defined by a function.

ICs which have been integrated into a new vehicle could be assessed together with the vehicle instead of being assessed separately. In this case, all parameters relevant to the IC must be assessed together with the vehicle.

It is also possible to use certified ICs and in some cases non-certified ICs. As an example the wagon manufacturer could buy from a sub-supplier certain parts that correspond to an IC and incorporate them into the wagon. Section 6.3 sets out the rules relating to such use of ICs.

If certified ICs are used, the corresponding certificates act as proof of conformity of the ICs and the parameters concerned by the IC certificate do not have to be assessed again on the vehicle.

Under certain conditions, as set out in section 6.3, it is permitted to use ICs which are not covered by a declaration of conformity in accordance with the (latest) UTP WAG.

Both for substitution on existing wagons and for use on new wagons, the following ICs built before 1.1.2014 may be fitted, under the conditions set out in section 6.3:

- running gear
- wheelset
- wheel
- axle

Separately assessed ICs ”rear-end signal” should be covered by the declaration of conformity from 1.1.2015.

2.7 Chapter 7: Implementation

Point 7.1 Authorisation for placing in service

> *"This TSI is applicable to the subsystem "rolling stock – freight wagons" within the scope set out in its sections 1.1, 1.2 and Chapter 2 which are placed in service after the date of application of this TSI."*

Article 20 of the Directive 2008/57/EC enables the application of this TSI to wagons already authorised in accordance with the WAG TSI 2006/861/EC, amended by CD 2009/107/EC, in order to e.g. receive the mutual recognition of the authorisation in accordance with point 7.1.2 or the allowance to mark the wagon "GE" or "CW" in accordance with Appendix C.5.

In any case it is possible to apply Article 22 of the Directive 2008/57/EC in order to obtain a new authorisation for placing in service including e.g. the mutual recognition of this authorisation in accordance with point 7.1.2 or the allowance to mark the wagon "GE" or "CW" in accordance with Appendix C.5.

The UTP WAG comes into effect on the date it enters into force, i.e. 1.1.2014. The scope of application concerns new freight wagons and existing freight wagons, although for the latter category, only in the case of renewal or upgrade and for specific provisions such as traceability of axles and the maintenance plan.

The UTP WAG is not intended to apply to the additional admission of wagons which existed before the UTP entered into force. If the UTP WAG were to be used for such a purpose, this would have to take place under a bilateral or multilateral agreement, outside the scope of COTIF.

Point 7.1.2 Mutual recognition of the first authorisation for placing in service

> *"In accordance with article 23(1) of the Directive 2008/57/EC the following list lays out the conditions under which a unit, once authorised for placing in service in one Member State, shall not be subject to any additional authorisation for placing in service. These conditions shall be seen as complementary to the requirements in section 4.2 of this TSI. These following conditions must be fulfilled in their entirety:"*

A unit which conforms to the core TSI requirements and which complies with the MS specific notified national technical rules concerning applicable open points and specific cases can be authorised for placing in service in the MS where the granting NSA is established. If the applicant wants to authorise the unit also in other MSs, it has to ask the competent NSAs in the other MSs for an additional authorisation and the DeBo of

each MS has to assess against the corresponding notified national technical rules again.

The same principle applies to OTIF, based on ATMF Article 6 § 4b.

In order to avoid this time and cost extensive process Article 23(1) of the Directive 2008/57/EC offers the possibility for vehicles in complete conformity with the requirements in chapter 4 of the WAG TSI to define conditions in the TSI under which the unit shall not be subject to any additional authorisation for placing in service. These conditions for mutual recognition of the first authorisation are set out in point 7.1.2 of the WAG TSI.

The same principle applies to OTIF, based on ATMF Article 6 § 3.

The precondition is that the unit is conforming to all the requirements of chapter 4 of the TSI.

The first four bullet points (a) – d)) of point 7.1.2 set out conditions which close the open points of the WAG TSI.

The conditions in the bullet points e) and f) define the way to deal with the specific cases of Sweden and Portugal. All other specific cases in section 7.3 of the WAG TSI are alleviations solely applicable to domestic traffic, therefore not touching interoperability and subsequently not relevant for the mutual recognition.

The UTP does not contain specific cases applicable to the non-EU OTIF Contracting States. It should be remembered that COTIF and its UTPs only apply to international traffic.

Nevertheless some MSs/NSAs requested for additional conditions for the mutual recognition of the first authorisation with regard to concerns related to the application of the new approach. In g) and h) two conditions are to be found related to the compatibility with the network, and the points i) to k) refer to technical solutions coming from the former RIV world.

Traditionally, RIV wagons have an axle distance not exceeding 17,500 mm. With the introduction of the UTP WAG, new wagons may be granted “free circulation” with an axle distance not exceeding 20,000 mm. The 17,500 mm limitation was removed from clause 7.1.2 of the TSI for the following reasons:

For the EU “target system”, 20,000 mm is the maximum distance between two consecutive axles (for both track side CCS and rolling stock, as set out in the respective TSIs). This value has been taken over because of the existing (non-RIV) and potential future wagons, on which the distance between axles exceeds 17, 500

mm. These kinds of wagons are mainly intended for special types of transport.

The link between conformity with the TSIs or UTPs and the technical compatibility between the train and the route on which it is operated is as follows;

a) Conformity with clause 7.1.2 does not guarantee technical compatibility with any existing line. The verification procedure and the documentation in the technical file provide all the vehicle-related data necessary for checking technical compatibility. Distance between axles is one such parameter.

b) According to ATMF Art. 6 § 2, UTP WAG Appendix I and the OPE TSI, it is the responsibility of the RU operating a train to check that it is technically compatible with the route on which it is intended to be operated.

No additional verification would need to be carried out for an additional admission to operation (the parameter and the corresponding value are already known from the first admission, as are the rules on how to use the wagon).

Therefore, it was not considered appropriate to restrict the application of clause 7.1.2 of the revised WAG TSI/UTP WAG to vehicles with the maximum distance between two consecutive axles limited to 17, 500 mm.

These principles apply to all the parameters relating to technical compatibility with the network and are in line with what was concluded by the OTIF “Safety subgroup” (meetings in 2012/2013). These principles have subsequently been introduced into appendix I of the UTP WAG.

A train detection section shorter than 20,000 mm is considered unusual. Today, most of the infrastructure is believed not to have such particularly short sections.

Section 7.2: Substitution, renewal and upgrading

“The word “check” in table 11 means that the entity in charge of maintenance (ECM) may under its responsibility substitute a component by another one utilising the same function and performance in accordance with the relevant TSI requirements…”

When a component is considered as an interoperability constituent (IC) in chapter 5 of the TSI, its use within the context of substitution, renewal and upgrading is set out in section 7.2 of the WAG TSI.

The separate assessment of ICs in the context of admission to operation of new vehicles is not mandatory in COTIF.

The following components are defined as ICs:

- running gear

- wheelset
- wheel
- axle
- rear-end signal

The replacement of an IC during substitution, renewal or upgrade is primarily the responsibility of the ECM, which must keep the vehicle in a good state of maintenance in such way that it continues to comply with the provisions specified in the UTP (cf. ATMF Art.15 § 1).

If substitution, renewal or upgrade leads to a different function or performance of a parameter defined in the UTP, the wagon may need a new admission to operation. Such a decision is up to the discretion of the Contracting State which first admitted the wagon to operation.

When components which are defined as ICs are replaced, the replacement IC must meet the UTP conditions. In such a case, the replacement IC is logically assessed separately as an IC, as it was not tested as part of the subsystem during the initial admission of the wagon.

The clarification in the TSI about ICs in the context of substitution, renewal and upgrading was necessary because these rules are needed for the WP members to assess whether or not a constituent should be declared as an IC. They are strictly based on the ECM regulation.

OTIF regulations equivalent to the EU ECM regulation are set out in ATMF Annex A, reference A 94-30/1.2012.

Only components corresponding to an IC not holding an EC certificate (non-certified ICs as defined in section 7.2 of the TSI), which are produced before or within the transitional period referred to in section 6.3 and indicated in the Commission Decision, are allowed to be used for substitution.

The distinction between “component” and “interoperability constituent” had to be made because the “component” means a tangible part of the subsystem and the “interoperability constituent” is defined by functions.

The text following table 11 in the WAG TSI explains when the ECM has a role to play and what the checks consist of.

2.8 Appendices of the WAG TSI

Appendix C: Additional optional conditions

Appendix C consists of a set of detailed prescriptions of conditions and technical solutions optimised for the free exchange of wagons and its adhered operative regime and maintenance concept of the incumbent railway undertakings.

Next to the compliance with the core TSI requirements in chapter 4 and the fulfilment of the complete set of conditions in point 7.1.2 the wagon may also fulfil the conditions of Appendix C. The fulfilment of the Appendix C conditions is optional and not needed to achieve TSI conformity.

If an applicant choses for the application of Appendix C the fulfilment of all conditions become mandatory and shall be assessed by a NoBo. Appendix C.5 allows for a limited fulfilment where the conditions C.3 and/or C.6 and/or C.7b are excluded.

The responsibility for safe operation and in particular under which conditions a certain wagon can be operated remains always with the transporting RUs.

Appendix C sets out the conditions for marking a wagon “GE” or “CW”.

“GE” marked wagons provide for a particular level of compatibility with the network and operative regimes. “GE” wagons may be hump shunted, comply with the G1 gauge and have an axle distance not exceeding 17,500 mm.

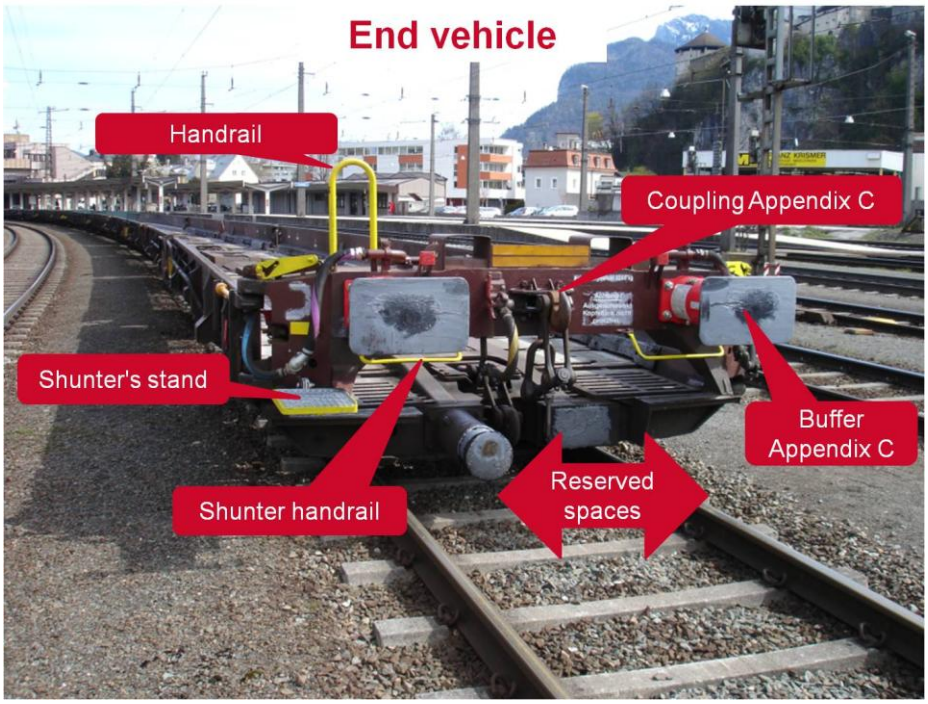
“CW” marked wagons do not comply with all the conditions set out in the previous paragraph. One parameter that stands out is the axle distance, which may be 20,000 mm on “CW” marked wagons.

2.9 Some practical cases

Example of a unit to carry lorries (“Rollende Landstrasse”)

In general several units to carry lorries are forming a block train. At each end of the block train the unit is fitted with movable head stocks which are equipped with footsteps and handrails (see **figure 9**).

Figure 9: Example of a unit to carry lorries (“Rollende Landstrasse”)



Appendix H sets out the conditions that wagons must meet in order to be compatible with train detection systems. The right-hand (EU) column does not appear in the WAG TSI, but in an Annex to the CCS TSI. As there is no equivalence with the CCS TSI in OTIF, the specifications have been included in the UTP WAG.

Appendix I sets out the operating requirements to be met by the railway undertaking

when operating a wagon. The specifications of Appendix I need not be checked by the assessing entity. The right-hand (EU) column does not appear in the WAG TSI, but in the OPE TSI. As there is no equivalence with the OPE TSI in OTIF, the specifications have been included in the UTP WAG.

APPENDIX 1: VOLUNTARY STANDARDS

Reference in the WAG TSI		Voluntary Standard	
Element of the subsystem	**Point**	**Standard ref.**	**Purpose**
Structures and mechanical parts	**4.2.2**		
End coupling	4.2.2.1.1		
Inner coupling	4.2.2.1.2	UIC 572:2009	The fulfilment of UIC 572:2009 gives presumption of conformity with the requirement in clause 4.2.21.2, for UIC couplings designed according to the design operating states considered in the leaflet.
Strength of unit	4.2.2.2 6.2.2.1	EN 15085-5:2007	Where applicable the fulfilment of the verification procedure of the EN 15085-5:2007 gives the presumption of conformity with the requirement in point 6.2.2.1 concerning joint techniques.
Integrity of the unit	4.2.2.3		
Gauging and track interaction	**4.2.3**		
Gauging	4.2.3.1		
Compatibility with load carrying capacity of lines	4.2.3.2		
Compatibility with train detection systems	4.2.3.3		
Axle bearing condition monitoring	4.2.3.4		
Safety against derailment running on twisted track	4.2.3.5.1 6.2.2.2		
Running dynamic behaviour	4.2.3.5.2 6.2.2.3 6.1.2.1		

Reference in the WAG TSI		Voluntary Standard	
Element of the subsystem	**Point**	**Standard ref.**	**Purpose**
Structural design of bogie frame	4.2.3.6.1 6.1.2.1		
Characteristics of wheelsets	4.2.3.6.2 6.1.2.2		
Characteristics of wheels	4.2.3.6.3 6.1.2.3		
Characteristics of axles	4.2.3.6.4 6.1.2.4		
Brake	**4.2.4**		
Safety requirements	4.2.4.2		
Brake performance- Service brake	4.2.4.3.2.1		
Brake performance- Parking brake	4.2.4.3.2.2		
Thermal capacity	4.2.4.3.3		
Wheel slide protection (WSP)	4.2.4.3.4		
Environmental conditions	**4.2.5**		
Environmental conditions	4.2.5 6.2.2.7		

System protection	**4.2.6**		

Fire safety - General			
Fire safety - Materials	6.2.2.2.5.2		
Fire safety - Cables	4.2.6.1.2.3		
Fire safety – Flammable liquids	4.2.6.1.2.4		
Protection against electric hazard	4.2.6.2		
Attachment devices for rear-end signal	4.2.6.3		
Operating rules	**4.4**		
Maintenance rules	**4.5**		
General - Marking	**-**	EN 15877-1:2012	Certain markings are mandatory to apply on the wagon, e.g. the lifting and jacking points. Other markings which are applied on the wagon are to be, as far as possible, in accordance with the EN 15877-1:2012. I.e. the symbol itself and the meaning of the symbol are supposed to be closely related to the description of the standard.
Longitudinal compressive forces	**-**	EN 15839:2012	Pass/fail criteria of LCF effects for certain design of wagons and under certain operative regimes.