

Fixed installations

TSIs INF,ENE and PRM

12 and 13.12.2024 | OPEN DAYS-BONN



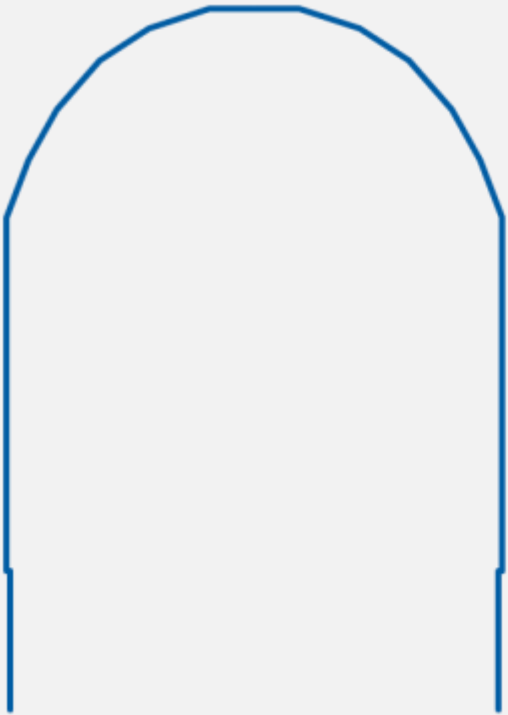
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Codification for combined transport



The issue of combined transport

The gauge reference
profile



Solution: another codification system



Intermodal Loading Unit



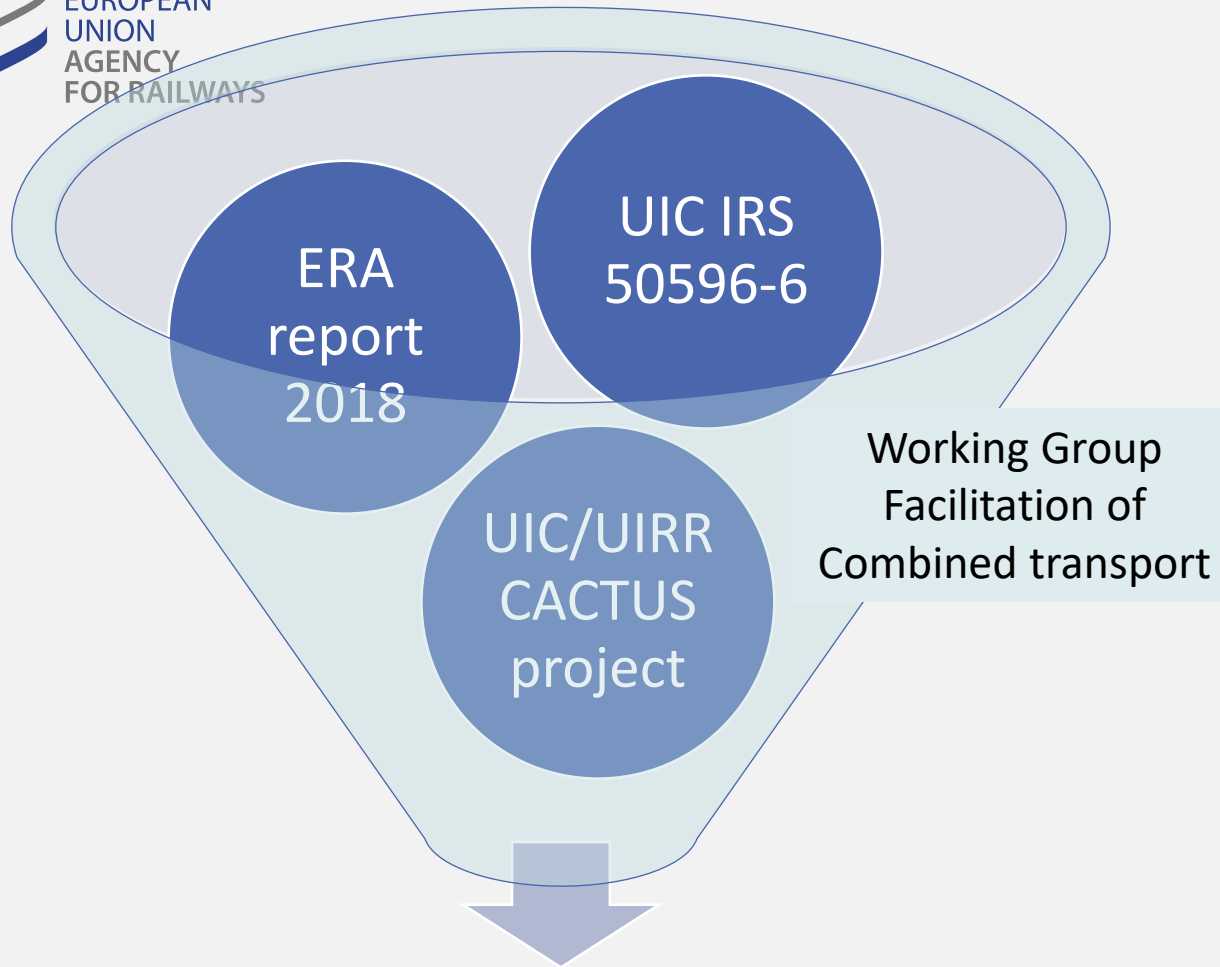
Operations



Wagon



Infrastructure



Amendments of TSI WAG, INF, OPE

Amendment of RINF

Technical document ERA/TD/2023-01/CCT

Application guide specific to the codification for combined transport



IMPLEMENTATION OF TSIs INF and ENE



- Will I need to move to the latest TSIs INF and ENE?
- How is my project impacted?

New infrastructure and energy subsystems

No transition regime apply to INF and ENE TSIs – Application since **28 September 2023**

- TSI INF - 7.2 Application of this TSI to a **new infrastructure subsystem**:
 - (1) For a new infrastructure subsystem, the application of this TSI shall be compulsory.
 - (2) A ‘new infrastructure subsystem’ means an infrastructure subsystem placed into service after 28 September 2023 which creates a route or a part of a route where none currently exists.

Any other infrastructure subsystems shall be considered as ‘**existing infrastructure subsystems**’
- TSI ENE - 7.2 Application of this TSI to a **new energy subsystem**:
 - (1) For a new energy subsystem, the application of this TSI shall be compulsory.
 - (2) A ‘new energy subsystem’ means an energy subsystem placed into service after 28 September 2023, which is created where no traction power supply and OCL previously existed.

Any other energy subsystem shall be considered as an ‘**existing energy subsystem**’.

Implementation of policy for the events of “upgrading”

Objective:

Using the “upgrading” events in infrastructure and/ or energy existing subsystems as an opportunity to streamline a TSI compliant fixed installation, in a more effective way.

Existing infrastructure subsystem (1/2)

UPGRADING PROJECT - Application since 28 September 2023

- TSI INF 7.2 (3) :

The following cases are considered as upgrading and not as the placing into service of a new infrastructure subsystem:

(a) the realignment of part of an existing route;

(b) the creation of a bypass;

(c) the addition of one or more tracks on an existing route, regardless of the distance between the original tracks and the additional tracks

- TSI INF 7.3.1 - Performance criteria of the subsystem

In addition to the cases referred to in point 7.2.(3), ‘upgrading’ is a major modification work of an existing infrastructure subsystem resulting in at least compliance with one additional traffic code or a change in the declared combination of traffic codes (referred to Table 2 and Table 3 in point 4.2.1).

- TSI INF 7.3.2 (1) :

For the upgraded infrastructure subsystem, **the application of this TSI shall be compulsory**, and applied to the upgraded subsystem within the geographical coverage of the upgrading. **The geographical coverage** of the upgrading shall be defined based on locations on tracks and metric references and shall result in the compliance of **all basic parameters** of the infrastructure subsystem associated with the tracks that are subject to the upgrading of the infrastructure subsystem.

The addition of one or more rails supporting a further track gauge is also considered as upgrade when the performance criteria of the subsystem is triggered as described in point 7.3.1.

Existing infrastructure subsystems(2/2)

OTHER THAN AN UPGRADING - Application since 28 September 2023

- TSI INF 7.3.2 (2) :

In the event of a change other than an upgrading of the infrastructure subsystem, the application of this TSI **for each basic parameters** (referred to in point 4.2.2) **affected by a change** shall be compulsory when the change requires to carry out a new 'EC' verification procedure in accordance with Implementing Regulation (EU) 2019/250 (*). Provisions defined in Articles 6 and 7 of Implementing Regulation (EU) 2019/250 shall apply.

- TSI INF 7.3.2 (3) :

In the event of a change other than an upgrading of the infrastructure subsystem and for those basic parameters that are not affected by the change, or when the change does not require a new 'EC' verification, the demonstration of the level of compliance with this TSI is voluntary.

REQUIREMENTS FOR NEW LINES not REQUIRED

- TSI INF 7.3.2 (4) :

In case of upgrading or renewal of the infrastructure subsystem, the compliance with the requirements which are laid down for new lines is not required

EXEPTIONS PERMITTED in 7.3.2 (7)

Cant, cant deficiency, platform height and offset

Existing energy subsystem (1/2)

UPGRADING PROJECT - Application since 28 September 2023

- TSI ENE 7.2 (3) :

The following cases are considered as upgrading and not as the placing into service of a new energy subsystem:

(a) the realignment of part of an existing route;

(b) the creation of a bypass;

(c) the addition of one or more tracks on an existing route, regardless of the distance between the original tracks and the additional tracks

- TSI ENE 7.3.1 - Performance criteria of the subsystem

In addition to the cases referred to in point 7.2.(3), ‘upgrading’ is a major modification work of an existing energy subsystem resulting in an increase of the line speed of more than 30km/h.

- TSI ENE 7.3.2 (1) :

For the upgraded energy subsystem, **the application of this TSI** shall be compulsory, and applied to the upgraded subsystem within the geographical coverage of the upgrading. The geographical coverage of the upgrading shall be defined based on locations on tracks and metric references and shall result in the compliance of **all basic parameters** of the infrastructure subsystem associated with the tracks that are subject to the upgrading of the energy subsystem.

The addition of one or more rails supporting a further track gauge is also considered as upgrade when the performance criteria of the subsystem is triggered as described in point 7.3.1.

Existing energy subsystem (2/2)

OTHER THAN AN UPGRADING

- TSI ENE 7.3.2 (2) :

In the event of a change other than an upgrading of the energy subsystem, the application of this TSI **for each basic parameters** (referred to in point 4.2.2) **affected by a change** shall be compulsory when the change requires to carry out a new ‘EC’ verification procedure in accordance with Implementing Regulation (EU) 2019/250 (*). Provisions defined in Articles 6 and 7 of Implementing Regulation (EU) 2019/250 shall apply.

- TSI ENE 7.3.2 (3) :

In the event of a change other than an upgrading of the energy subsystem and for those basic parameters that are not affected by the change, or when the change does not require a new ‘EC’ verification, the demonstration of the level of compliance with this TSI is voluntary.

EXEPTION PERMITTED in 7.3.2 (6)

Maximum lateral deviation of the OCL

Questions received at TSI-QA-2023@era.europa.eu

Is there a transition period in PRM TSI for fixed installations ?

What is the scope of an upgrade



PRM - Transition for fixed installations

New stations

No transition regime apply to PRM TSI for fixed installations – Application since 28 September 2023

7. IMPLEMENTATION OF THE TSI

7.1. Application of this TSI to new Infrastructure and Rolling Stock

7.1.1. *New Infrastructure*

This TSI is applicable to all new stations in its scope.

It is **not mandatory** to apply this TSI to new stations which have **already been granted a building permit or which are subject to a contract for major construction works that is either already signed or in the final phase of a tendering procedure at the date of application of this TSI.** However, an earlier version of this TSI must be applied within its defined scope. The consistence of applicable requirements of partial application of different versions of this TSI to particular sections of the station must be justified by the applicant certified by the notified body.

PRM – Upgrade / Renewal of existing stations

RENEWAL - UPGRADING PROJECT - Application since 28 September 2023

7.2.2. *Application of this TSI to existing Infrastructure*

For infrastructure, **the conformity with this TSI is mandatory for those parts that are renewed or upgraded.** However, the TSI recognizes that, due to the characteristics of **the inherited railway system**, compliance of existing infrastructure may be achieved through **a gradual improvement of accessibility**.

In addition to this gradual approach, 3 exceptions:

1. obstacle free route created from **existing footbridges, stairways and subways** : requirement related to **width is not mandatory**
2. **width of the platform is not mandatory for existing stations** if the cause of non-compliance is the presence of certain platform obstacles or existing tracks that are unlikely to be moveable
1. **historic building protected by national law,**

Principle of application of the PRM TSI to existing stations

Improvement of accessibility :

1. A coordinated approach : National Implementation Plans

[Persons with reduced mobility - PRM TSI NIP \(europa.eu\)](#)

- a strategy, including a prioritisation rule laying down the criteria and priorities for stations to be designated for renewal or upgrading
- extent of the upgrade or renewal of stations

2. Other upgrades/renewals

- case by case approach

Principle of application of the PRM TSI to existing stations

Priority and criteria taken from a NIP:

3.2. Prioritization rule

3.2.1. Stations

Budget spend to undertake works to stations identified as requiring upgrade with lifts and ramps to provide an obstacle-free route will be undertaken on a priority basis. The criteria utilised to identify and prioritise works is based on a number of factors, including -

- a) Daily passenger flow (i.e., daily average number of embarking and disembarking passengers over a full year);
- b) Stations with a remote platform accessed by footbridge or by white light level crossing, and
- c) Stations with a large number of users with reduced mobility.

3.3. Criteria according to which subsystems are treated in the plan

3.3.1. Stations

All new stations and all stations undergoing major upgrades are designed to comply with the current building regulations appertaining to persons with reduced mobility.

Example of application of the PRM TSI to existing stations

Example of extent of renewal taken from the same NIP:

- Tactile warning surfaces are utilised in accordance with building regulations and transport design guidelines.
- Staircases have dual-handrails and are painted in a contrasting colour for the visually impaired.
- Staircase step-nosing is highlighted and colour contrasted for visually impaired customers.
- XXXX is presently working on a revised suite of customer interface standards relating to furniture in stations and way finding, with full consultation of the user representative groups.

→ No requirement on the width of the stairs: **gradual improvement**

- Not all station areas
- Not all TSI characteristics

Role of the Notified Body



When assessing a station, difficult to close the eyes on non-conformities...

What's changed in PRM TSI

2014

Table E.1

Assessment of the infrastructure subsystem (constructed and supplied as single entity)

1	2	3
Characteristics to be assessed	Design and development phase	Construction phase
	Design review and/or design examination	Site Inspection
Parking facilities for persons with disabilities and persons with reduced mobility	X	(X) (*1)
Obstacle-free routes	X	(X) (*1)
Route identification	X	(X) (*1)

(*1) As-built drawings shall be provided or a site inspection shall be carried out when the realization differs from the design rules or drawings that were examined

2023

Assessment of the infrastructure subsystem (constructed and supplied as single entity)

1	2	3
Characteristics to be assessed	Design and development phase	Construction phase
	Design review and/or design examination	Inspection
Parking facilities for persons with disabilities and persons with reduced mobility	X	X
Obstacle-free routes	X	X
Route identification	X	X

Scope of NoBo assessment

For the PRM TSI part applicable to Fixed Installations, the Notified Body should assess the parts of the station that have been renewed/upgraded and, for those parts, only the characteristics that have been renewed/upgraded

“Categorisation of lines”

- TSI Categories of line
- Open Points closed in Appendix E



TSI Categories of lines

Changes in Table 2 and 3

Table 2

Infrastructure performance parameters for passenger traffic

– Route compatibility checks are subject to point 4.2.2.5 and Appendix D.1 of the OPE TSI

Traffic code	Structure gauge	Axle load [t]	Line speed [km/h]	Usable length of platform [m]
P1	GC	17 ⁽¹⁾ / 21.5 ⁽²⁾	250-350	400
P2	GB	20 ⁽¹⁾ / 22.5 ⁽²⁾	200-250	200-400
P3	DE3	22,5 ⁽³⁾	120-200	200-400
P4	GB	22,5 ⁽³⁾	120-200	200-400
P5	GA	20 ⁽³⁾	80-120	50-200
P6	G1	12 ⁽³⁾	n.a.	n.a.
P1520	S	22,5 ⁽³⁾	80-160	35-400
P1600	IRL1	22,5 ⁽³⁾	80-160	75-240

⁽¹⁾ Minimum required values of axle load to be used for checks of bridges using a dynamic appraisal, based on design mass in working order for power heads and locomotives and operational mass under normal payload for vehicles capable of carrying a payload of passengers or luggage (mass definitions in accordance with the specification referenced in Appendix T Index [1]).

⁽²⁾ Minimum required values of axle load to be used for checks of infrastructure using a static loading, based on design mass under exceptional payload for vehicles capable of carrying a payload of passengers or luggage (mass definitions in accordance with the specification referenced in Appendix T Index [1] with regard of the specification referenced in Appendix T Index [2]). This axle load may be linked to limited speed.

⁽³⁾ To be used for checks of infrastructure used for static loading, based on design mass in working order for power heads and locomotives and design mass under exceptional payload for other vehicles (mass definitions in accordance with the specification referenced in Appendix T Index [1] with regard of the specification referenced in Appendix T Index [2]). This axle load may be linked to limited speed.

Table 3

Infrastructure performance parameters for freight traffic

Route compatibility checks are subject to point 4.2.2.5 and Appendix D.1 of the OPE TSI

Traffic code	Structure gauge	Axle load [t]	Line speed [km/h]	Train length [m]
F1	GC	22,5 ⁽¹⁾	100-120	740-1050
F2	GB	22,5 ⁽¹⁾	100-120	600-1050
F3	GA	20 ⁽¹⁾	60-100	500-1050
F4	G1	18 ⁽¹⁾	n.a.	n.a.
F1520	S	25 ⁽¹⁾	50-120	1050
F1600	IRL1	22,5 ⁽¹⁾	50-100	150-450

⁽¹⁾ To be used for static checks of infrastructure, based on design mass in working order for power heads and locomotives and design mass under normal payload for other vehicles (mass definitions in accordance with the specification referenced in Appendix T Index [1]). This axle load may be linked to limited speed.

Axle load values for P1 and P2 **cover** both **dynamic** and **static** based loadings requirements:

P1: 17 t (**checks of bridges**)

P1: 21.5 t (**checks of infrastructure**)

P2: 20 t (**checks of bridges**)

P2: 22.5 t (**checks of infrastructure**)

TSI Categories of lines

New Table 2

Table 2				
Infrastructure performance parameters for passenger traffic				
– Route compatibility checks are subject to point 4.2.2.5 and Appendix D.1 of the OPE TSI				
Traffic code	Structure gauge	Axle load [t]	Line speed [km/h]	Usable length of platform [m]
P1	GC	17 ⁽¹⁾ / 21.5 ⁽²⁾	250-350	400
P2	GB	20 ⁽¹⁾ / 22.5 ⁽²⁾	200-250	200-400
P3	DE3	22,5 ⁽³⁾	120-200	200-400
P4	GB	22,5 ⁽³⁾	120-200	200-400
P5	GA	20 ⁽³⁾	80-120	50-200
P6	G1	12 ⁽³⁾	n.a.	n.a.
P1520	S	22,5 ⁽³⁾	80-160	35-400
P1600	IRL1	22,5 ⁽³⁾	80-160	75-240

⁽¹⁾ Minimum required values of axle load to be used for checks of bridges using a dynamic appraisal, based on design mass in working order for power heads and locomotives and operational mass under normal payload for vehicles capable of carrying a payload of passengers or luggage (mass definitions in accordance with the specification referenced in Appendix T Index [1]).

⁽²⁾ Minimum required values of axle load to be used for checks of infrastructure using a static loading, based on design mass under exceptional payload for vehicles capable of carrying a payload of passengers or luggage (mass definitions in accordance with the specification referenced in Appendix T Index [1] with regard of the specification referenced in Appendix T Index [2]). This axle load may be linked to limited speed.

⁽³⁾ To be used for checks of infrastructure used for static loading, based on design mass in working order for power heads and locomotives and design mass under exceptional payload for other vehicles (mass definitions in accordance with the specification referenced in Appendix T Index [1] with regard of the specification referenced in Appendix T Index [2]). This axle load may be linked to limited speed.

Classification of existing structures

Appendix E

- For **passenger traffic**, there are 2 new tables:
 - Table 38A** - Loading capability requirements for **bridges**
 - Table 38B** - Loading capability requirements for **geotechnical structures** including **earthworks**
- For **freight traffic**, there are 2 new tables:
 - Table 39A** - Loading capability requirements for **bridges**
 - Table 39B** - Loading capability requirements for **geotechnical structures** including **earthworks**
- In all tables 38 the types of traffic are now presented in **two columns**:
 - **Traffic with loco hauled trains;**
 - **Traffic with Electric or Diesel Multiple units, Power Units and Railcars;**
- In all tables 39 the types of traffic are now presented in **one column: Freight trains including freight wagons, other vehicles and Locomotives**

Table 38A - Loading capability requirements for bridges and additional requirements due to dynamic effect – Passenger traffic

Traffic with **Multiple units**:

- **P1** and **P2** open points closed:
(**HSLM** + EN Line category/speed or **HSLM** + LM71 to cover dynamic and static based loading requirements)
- **P3a** and **P4a** open points closed:
(**Load length L** of the bridge element + EN Line category/speed)
- **Appendix D1 of OPE TSI** to be used where HSLM cannot be achieved – see Note 8

Traffic code	Traffic with loco hauled trains: Passenger trains including Carriages (Coaches, Vans and Car Carriers) and Light Freight Wagons and Locomotives and Power Heads ⁽²⁾⁽³⁾⁽⁵⁾⁽⁶⁾⁽⁴⁾	Traffic with Electric or Diesel Multiple Units, Power Units and Railcars ⁽²⁾⁽⁵⁾⁽⁴⁾
P1	n.a. ⁽⁷⁾	HSLM ⁽⁸⁾ and D2-200 or HSLM ⁽⁸⁾ and LM71 with $\alpha = 1.0$ ⁽¹⁴⁾
P2	HSLM ⁽⁸⁾ and D2-200 Or HSLM ⁽⁸⁾ and LM71 with $\alpha = 0.91$ ⁽¹⁴⁾	HSLM ⁽⁸⁾ and D2-200 Or HSLM ⁽⁸⁾ and LM71 with $\alpha = 0.91$ ⁽¹⁴⁾
P3a (> 160 km/h)	L ≥ 4m D2-100 and L < 4m D2-200 ⁽⁹⁾⁽¹⁰⁾⁽¹⁵⁾	L ≥ 4m C2-100 and L < 4m C2-200 ⁽⁹⁾⁽¹⁵⁾
P3b	L ≥ 4m D2-100	L ≥ 4m D2-100

Evolution of the ENE TSI to facilitate the charging of traction batteries



Evolution of the ENE TSI to facilitate the charging of traction batteries

PROBLEM:

ENE TSI, section 4.2.5 and LOC&PAS TSI, section 4.2.8.2.5, limit the maximum current at standstill and it limits the charging capacity for battery trains

“4.2.5 Current at standstill

The OCL shall be designed to sustain at least the values of current at standstill per pantograph, in accordance with the specification referenced in Appendix E, Index [2].”;

Evolution of the ENE TSI to facilitate the charging of traction batteries

SOLUTION:

Include reference to new version of standard EN50367:2012+A1:2022 in both TSIs

Limit values of current at standstill can be exceeded for battery trains when charging in section 4.2.8.2.5 of TSI LOC&PAS

- (3) For trains equipped with electric energy storage for traction purposes:
 - The maximum current per pantograph at vehicle standstill in DC systems can be exceeded only for charging electric energy storage for traction, in allowed locations and under the specific conditions defined in the register of infrastructure. Only in that case, it shall be possible for a unit to enable the capacity to exceed the maximum current at standstill for DC systems.

Multiple pantograph operation (more than 2)



Multiple pantograph operation (more than 2)

Design of the OCL and pantograph distribution
in case of multiple pantograph operation (more than 2):

Analysis of rules in different Member States

Analysis of results from measurements and simulations

Check of actual TSI regarding necessary improvements

Multiple pantograph operation (more than 2)

It was concluded that more measurements/simulations are necessary to finally define TSI adjustments

Definition of necessary future research steps for general use of proposed rules

Adjustment in the text for a consistent use:

- ENE TSI, sections 4.2.12 and 4.2.13
- LOC&PAS TSI, sections 4.2.8.2.9.7 and 6.2.3.21

Harmonics and dynamic effects



Harmonics and dynamic effects

Update of:

- TSI ENE section 4.2.8 Harmonics and dynamic effects for AC traction power supply systems
- TSI LOC&PAS section 4.2.8.2.7 Harmonics and dynamic effects for AC systems

with the reference to new version of EN 50388-1:2022

Harmonics and dynamic effects

Main improvements:

- Update to last state of art in the subject
- It opens the possibility to use common codes of practices alternatively to the compatibility study (subject to complete development of series EN 50388)

Next steps in TSIs



Next steps in TSIs

ERA is working on the detailed planning of the EC mandate for the next TSIs revision, and the Agency has already set up the regular meetings of the Working Party on the revision of TSIs.

Among the tasks, as an example, ERA is following several research projects like for instance [FCH2RAIL – DLR Transport](#)

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