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CONVENTIONAL RAILWAY INTEROPERABILITY IN THE EUROPEAN COMMUNITY, STATE OF THE ART 2005

This paper describes the state of the art in the field of railway interoperability in the European Community showing present state of works and the scope of the for first priority TSIs (control command and signalling, cargo wagons, noise, telematic applications for freight services, traffic operation and management), second priority TSIs (accessibility for people with reduced mobility, safety in railway tunnels) and the perspective for the third priority TSIs (locomotives, EMUs and DMUs, passenger cars, telematic applications for passenger services, infrastructure, energy).

INTEROPERACYJNOŚĆ KOLEI KONWENCJONALNYCH WE WSPÓLNOCIE EUROPEJSKIEJ, STAN PRAC 2005

Niniejszy dokument omawia stan prac dotyczących interoperacyjności kolei we Wspólnocie Europejskiej pokazując aktualny stan prac i zakres specyfikacji TSI pierwszego priorytetu (sterowanie, wagony towarowe, hałas, aplikacje telematyczne dla przewozów towarowych, ruch kolejowy) i drugiego priorytetu (dostęp dla osób z ograniczoną możliwością poruszania się, bezpieczeństwo w tunelach kolejowych) oraz perspektywy dotyczące trzeciego priorytetu (lokomotywy, elektryczne jednostki trakcyjne i spalinowe jednostki trakcyjne, wagony pasażerskie, aplikacje telematyczne dla przewozów pasażerskich, infrastruktura, energia).

1. INTRODUCTION

European rail interoperability has been presented during previous TST conferences showing respective European and Polish legal acts, Polish involvement in the European works and Polish works based on interoperability related European specifications.

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The first priority TSIs (control command and signalling – TSI CR CCS, cargo wagons – TSI WAG, noise – TSI NOI, telematic applications for freight services - TSI TAF, traffic operation and management – TSI CR OPE) have been prepared by the European Association for Railway Interoperability involving in between others also Polish experts. The works on technical requirements and regulations in that respect started in 2002 and ended in 2004 and 2005 when this TSIs have been officially voted by the Member States. The first priority TSIs are now being translated to all EU languages including Polish to be published in the Official Journal of the European Community. In case of first priority TSIs Poland was voting for those specifications on the basis of the attitude of the Polish State Railways. Polish experts involved in the preparation of those TSIs are officially nominated on the Member State level to verify Polish text of those TSIs before publication in the OJ.

The second priority TSIs (accessibility for people with reduced mobility – TSI PRM, safety in railway tunnels – TSI SRT) have also been prepared by the European Association for Railway Interoperability involving in between others also Polish experts. They have not been voted yet by the Member States of the European Community as they are at present under the enquiry with Social Partners and Users' Associations. This is last stage before Member States voting which is expected to take place in November 2005.

The third priority TSIs (locomotives, EMUs and DMUs, passenger cars, telematic applications for passenger services, infrastructure, energy) as a result of the changes introduced to the Directive 2001/16/EC (by the Directive 2004/50/EC in relation to the way how the TSIs are to be worked out) will not be prepared by the European Association for Railway Interoperability. They will be worked out by the European Railway Agency (ERA) which is organising at the moment dedicated groups comprising experts proposed by different European railway related organisations.

Only following organisations are entitled to propose experts:

- CER - Community of European Railways and Infrastructures Companies
- EIM - European Infrastructure Managers
- UNIFE - Union of the European Railway Industries
- UITP - International Association of Public Transport
- UIP - International Union of Private Wagons Owners
- UIRR - International Union of Combined Road-Rail Transport Companies
- ERFA - European Rail Freight Association
- ETF - European Transport Federation
- ALE - Autonomes Lokomotivführer-Gewerkschaften Europa.

Mandate for the work on the third priority TSIs is at present under discussion between European Commission and the Member States and is expected to be officially issued to the European Railway Agency in September 2005. This is also the month in which experts groups are expected to start their work under ERA.

European Railway Agency in parallel will work on railway safety unification in the frame of the Directive 2004/49/EC. Together with interoperability related unification this should allow use of a common unified technical basis for construction, upgrading, placement into service and operation of the railway in Europe as it is bounding for 25 EU countries as well as for Norway and Switzerland.

2. SCOPE OF THE TECHNICAL SPECIFICATIONS FOR INTEROPERABILITY

Detail scope is known for the first and second priority TSIs. For the third priority TSIs it is to be defined by relevant ERA groups. Following sub-chapters are presenting scope of unification TSI by TSI.

2.1. SCOPE OF THE CCS TSI

The Control-Command Subsystem is defined as a set of functions and their implementation, which allow the safe movement of trains. The TSI Control-Command defines the essential requirements for those parts of the Control-Command Subsystem that have relevance to interoperability.

Within the Control-Command Subsystem two classes of train protection and radio communication systems are defined:

Class A: The unified Control-Command system.

Class B: Control-Command systems and applications existing before entry into force of the Directive 2001/16/EC, limited to those described in the TSI CCS Annex B.

Member States have the responsibility to ensure that Class B systems are managed during their lifetime; in particular any changes to these specifications must not prejudice interoperability.

The interfaces specified by this TSI define the means of data transmission to, and sometimes from, trains. The Class A specifications referenced by this TSI provide options from which a project may choose the means of transmission that meet its requirements. Three levels of application are defined:

Level 1: Data transmission is achieved by spot transmission (Eurobalise) and in some cases by semi-continuous transmission (Euroloop or radio in-fill). The detection of trains is achieved by track-based equipment, usually track-circuits or axle counters. Signalling information is communicated to the driver by equipment in the driving cab and, optionally, lineside signals.

Level 2: Data transmission is achieved by continuous radio transmission (GSM-R). For some functions, the radio transmission requires complementing by spot transmission (Eurobalise). The detection of trains is achieved by track-based equipment, usually track-circuits or axle counters. Signalling information is communicated to the driver by equipment in the driving cab and, optionally, lineside signals.

Level 3: Data transmission is achieved by continuous radio transmission (GSM-R). For some functions, the radio transmission requires complementing by spot transmission (Eurobalise). The detection of trains is achieved by equipment on-board, reporting to the Control-Command Track-side Assembly. Signalling information is communicated to the driver by equipment in the driving cab.

2.2. SCOPE OF THE WAG TSI

The rolling stock, which is the subject of the TSI WAG comprises the freight wagons likely to travel on all or part of the trans-European conventional rail network. The freight wagons include rolling stock designed to carry lorries.

This TSI applies to new, upgraded or renewed freight wagons placed in service after entering this TSI into force. This TSI does not apply to wagons being subject to a contract already signed before the date of entry into force of this TSI. The rolling stock freight wagons subsystem includes the structure of the vehicles, braking equipment, coupling and running gear (bogies, axles etc.) suspension, doors and communication systems. The procedures for maintenance work allowing the mandatory corrective and preventive maintenance to assure safe operation and the performance required are also included in this TSI.

Requirements relating to the noise generated by freight wagons are excluded from this TSI, except maintenance issue, as there is a separate TSI dealing with the noise generated by freight wagons, locomotives, multiple units and coaches.

The freight wagons shall contribute to the following functions:

- “Load freight” – the freight wagons provide the means to operate and carry the load safely
- “Move rolling stock” – the freight wagons are able to be moved safely on the network and contribute to the braking of the train.
- “Maintain and provide data on rolling stock, infrastructure and timetable” – Specification of the maintenance file and certification of the maintenance establishments allow the control of the freight wagon maintenance.
- “Operate a train” – the freight wagon shall be able to be operated safely under all expected environmental conditions and in certain expected situations.
- “Provide services for freight customers” - Data relating to the freight wagon to support freight services for customers is provided in the rolling stock register, marked on the wagons and eventually by means of vehicle to ground communication devices.

2.3. SCOPE OF THE NOI TSI

The rolling stock that is the subject of this TSI comprises locomotives, multiple units, freight wagons, and coaches likely to travel on all or part of the trans-European conventional rail network. Freight wagons include rolling stock designed to carry lorries. This rolling stock include those designed for international use and those designed for national use only, taking due account of the local, regional or long distance use of the stock.

The rolling stock subsystem TSI noise includes limits for stationary noise, starting noise, pass-by noise and interior noise for driver’s cabs caused by conventional rolling stock.

2.4. SCOPE OF THE TAF TSI

The subsystem Telematic Applications for Freight includes in particular:

- Applications for freight services, including information systems (real-time monitoring of freight and trains),
- Marshalling and allocation systems, whereby under allocation systems is understood train composition,
- Reservation systems, whereby here is understood the train path reservation,
- Management of connections with other modes of transport and production of electronic accompanying documents.

Payment and invoicing systems for customers are not within the scope of this TSI, nor are such systems for payment and invoicing between various service providers such as railway undertakings or infrastructure managers. The system design behind the data exchange in accordance with this TSI, however, provides the information needed as a basis for payment resulting from the transport services. Also the long term planning of the timetables is out with the scope of this Telematic Applications TSI. Nevertheless at some points there will be reference to the outcome of the long term planning in so far as there is a relationship to the efficient interchange of information required for the operation of trains.

2.5. SCOPE OF THE OPE TSI

The Traffic Operation and Management subsystem includes in particular:

- "The procedures and related equipment enabling a coherent operation of the different structural subsystems, both during normal and degraded operation, including in particular train driving, traffic planning and management.
- The professional qualifications which may be required for carrying out cross-border services"

The scope of this TSI applies to the Traffic Operation and Management subsystem of Infrastructure Managers and Railway Undertakings related to the operation of trains on the conventional rail TEN lines. The specifications laid down in the TSI on Traffic Operation and Management may be used as a reference document for the operation of trains even if they are not covered by the scope of this TSI.

Requirements apply to staff undertaking the safety critical tasks of driving a train and accompanying a train, when this involves crossing a border(s) between states and working beyond any location(s) designated as the 'frontier' in the Network Statement of an Infrastructure Manager and included in his safety authorisation. For staff undertaking the safety critical tasks of despatching trains and authorising train movements, mutual recognition of professional qualifications and health and safety conditions between Member States will apply. For staff undertaking the safety critical tasks associated with the last preparation of a train before it is scheduled to cross a border(s) and work beyond any 'frontier' location(s) as described above, unified professional qualification requirements will apply together with mutual recognition between Member States of health and safety conditions.

The existing European differences in infrastructure layout and concepts, which are at least partly responsible for existing differences in rules and procedures, can often only be overcome as a result of huge investment. Consequently, the general objective of the present version of this TSI, which is the first one after the entry into force of Directive 2001/16/EC, is not to create a single European rulebook for conventional rail traffic operation and management. However, the rules and procedures enabling a coherent operation of the new structural subsystems intended to be used in the TEN, and in particular those that are linked directly to the operation of a new train control and signalling system, must be identical where identical situations exist.

2.6. SCOPE OF THE PRM TSI

“People with Reduced Mobility” (PRM) means all people who have difficulty when using trains or the associated infrastructure. This includes the following categories:

- Wheelchair users (persons who due to infirmity or disability use a wheelchair for mobility)
- Other mobility impaired including: people with limb impairment; people with ambulant difficulties; people with children; people with heavy luggage; elderly people; pregnant women.
- Visually impaired.
- Blind people.
- Hearing impaired.
- Deaf people.
- Communication impaired (meaning persons who have difficulty in communicating or understanding the written, or spoken language, and including foreign people with lack of knowledge of the local language, people with communication difficulties, people with sensory, psychological and intellectual impairments).
- People of small stature (including children).

Impairments may be long-term or temporary, and may be visible or hidden.

Special requirements are defined in respect to infrastructure and in respect to rolling stock. Infrastructure for the PRM TSI is defined as tracks, points, engineering structures (bridges, tunnels, etc.), associated station infrastructure (platforms, zones of access, including the needs of persons with reduced mobility, etc.), safety and protective equipment. This includes the accessibility of the public areas of the infrastructure (including stations) controlled by the Railway Undertaking, Infrastructure Manager or Station Manager. However this TSI is only applicable to the public areas of the stations and their zones of access controlled by the Railway Undertaking, Infrastructure Manager or Station Manager.

The rolling stock (structure, command and control system for all train equipment, traction and energy conversion units, braking, coupling and running gear and suspension, doors, man/machine interfaces) is affected in relation to passive and active safety devices and requisites for the health of passengers and on-board staff.

2.7. SCOPE OF THE SRT TSI

The TSI "Safety in Railway Tunnels" extends to all parts of the railway system relevant for the safety of passengers and on-board staff in railway tunnels during operation. This TSI assumes that the pure "railway risks" are covered by appropriate measures, deriving generally from the safety standards applying in the rail industry, and reinforced by the other TSIs which are being finalised or will be mandated to the European Railway Agency (ERA). However this TSI also looks at measures which could offset or mitigate the difficulty of evacuation or rescue operations following a railway accident. Relevant measures have been identified, which will suppress or significantly reduce the risks arising from scenarios developed, in relation to prevention, mitigation, evacuation and rescue.

"Hot" scenarios: Fire, explosion followed by fire, intoxication.

The leading scenario is fire. It is assumed that fire starts in one coach or power unit (<25MW) and is fully developed 15 minutes after ignition. It is discovered and alarm is given during these first 15 minutes. Whenever possible the train leaves the tunnel. If the train comes to a stop, passengers are evacuated, directed by the train crew, or by self-rescue, to a safe area.

"Cold" scenarios: collision, derailment

The tunnel specific measures concentrate on access/egress facilities to support evacuation and the intervention of rescue forces. The difference with the hot scenarios is that there is no time constraint due to the presence of a hostile environment created by a fire.

Prolonged stop

Prolonged stop (an unplanned stop in a tunnel, without a fire on board, for longer than 10 minutes) is not, by itself, a threat to passengers and staff. However it may lead to panic and to spontaneous, uncontrolled evacuation that exposes people to dangers in a tunnel. Measures shall be provided to keep such a situation under control. It shall be possible, if necessary, to start evacuation at latest 60 minutes after the train has come to a rest.

3. CONCLUSION

A number of the TSIs are already prepared and will start to be applicable in Poland as part of the European Community. They have been prepared involving Polish experts and supported (by positive vote) by Poland as a Member State. They will be published in the Official Journal of the European Community in all EU languages including Polish in 2005 (in case of first priority TSIs) and in 2006 (in case of second priority TSIs). All the other TSIs covered by the mandate for ERA are to be prepared within two years. As a result full set of the unified railway related requirements will be ready nearly two years earlier than foreseen in the Directive 2001/16/EC.

Implementation of those requirements by upgrading of railway lines and equipping traction units with on-board CCS equipment can be significantly supported by different EU funds. The level of use of those funds will mainly depend on the activities of Polish railway companies and Polish authorities. This requires both technical competence and political wish and therefore have to be treated as a promising challenge.

Reviewer: Ph. D. Andrzej Białoń