

Railway Safety Management

Yellow Book 4

Application note 5

Relationship of Yellow Book with European Directives

Published by RSSB on behalf of the UK rail industry

Contents

Foreword 3

Background to the European Directives 3

 A European vision 3

 Compatibility 4

 Cross Acceptance of systems or products 4

The Interoperability and Railway Safety Directives 5

 Interoperability directives 5

 Railway Safety Directive 6

Engineering Safety Management and the Directives 7

 Responsibilities 7

 National safety rules (including Railway Group Standards) 7

 Non-interoperable infrastructure 8

Yellow Book & Engineering Safety Management 8

Foreword

The Yellow Book is published by Rail Safety and Standards Board (RSSB) on behalf of the rail industry as a whole and updated under the direction of a steering group with representatives from across the industry.

The Yellow Book has changed significantly since its first issue. It has evolved so that it now provides a set of fundamentals with supporting guidance applicable to the whole railway industry. Issue 4 broadens the book's scope to include some aspects of railway maintenance in addition to changes to the railway. We have also brought the book up to date with current legislation and good practice.

A major change to the regulation of GB railways has been the application of European Directives. The first of these was implemented into UK law by the Railways (Interoperability) (High Speed) Regulations 2002 and others will follow. These are altering some fundamental aspects of the structure of safety regulation that has been in place since the Railways Act 1993.

This application note explains the relationship between the good practice outlined in the Yellow Book and the principles behind what is necessary to comply with European Directives. For detailed information on the latter and how they are to be applied in Great Britain, the reader is referred to Guidance to be issued by the Department of Transport (DfT).

Background to the European Directives

A European vision

Improving the efficiency of Europe's transport links has been a long-term objective of the European Commission. Traditionally the railways have been organised on a national level and when international trains crossed a border there was a change both of the locomotive and the train crew. On some routes there have been bilateral arrangements between the national administrations to allow through running with the same personnel, but these were the exception, not the rule.

In December 1990 the European Community published a report¹ setting out a plan for a truly international high-speed rail network covering all member states (and certain neighbours, such as Switzerland). It recognised that, unlike air travel where it is possible to consider international routes without taking much account of domestic services, a European rail network has to be based on the domestic railway infrastructures of member countries. The report and subsequent documents² therefore concentrate on creating links between national railways, and providing for progressive upgrading of the network on certain routes, rather than on superimposing a brand new international rail network.

Three of the key requirements of the EC vision are Europe-wide affordable interoperability over the network, an open market for certain types of railway components, and acceptability of safety process across different Member States. There are a number of aspects associated with these concepts. There must be :

- ◇ Compatibility between the infrastructure and international trains in different countries. This includes such issues as track and loading gauge, electrification voltage, electromagnetic interference capability, platform height etc.

¹ Commission of the European Communities, The European High Speed Train Network, December 1990.

² Commission of the European Communities, The Future development of the Common Transport Policy, a global approach to the construction of a Community framework for sustainable mobility, 1992.

- ◇ Cross acceptance of specified railway systems and products between one country and another.
- ◇ Cross acceptance of International Railway Undertaking's (i.e Train Operator's) safety management systems between Member States. This may be likened to the fact that Continental motoring would be a nightmare if every time you cross a border your car has to be subject to a national MOT test and the driver to a driving test. The same applies to the rail industry.

Compatibility

In Europe, rolling stock can physically be hauled over most countries' networks with few problems. The exceptions are Finland, Russia parts of the Iberian peninsular (and Ireland), which have a wider track gauge. Apart from those countries, the main problems are electrical power supply, potential electromagnetic interference (EMI) between the rolling stock and the signalling system and/or radio systems and gauging. However these problems can be solved (at a price) by the use of techniques such as multi-system locomotives; installation of electronic filters on power cars to control EMI; adjustment of items such as track circuits; fitting a multiplicity of signalling and radio systems; building vehicles to the smallest gauge route over which they may have to travel.

It is always possible to design a train that meets such a whole range of conflicting requirements. The only problem is that it is complicated and expensive. Failure to adopt European wide standards results in expensive new rolling stock that will not achieve the objective of an affordable and reliable European railway network.

Currently International trains have to comply with all the standards of the countries through which they pass and have to be formally accepted by each country. For un-powered coaches and freight wagons this is a well-proven and straightforward process in most European countries. Cross acceptance of locomotives and powered passenger multiple units is more complicated, The European Commission recognised that there is unlikely to be much progress in interoperability while trains are subject to multiple approvals. This was the driving force behind the High Speed and Conventional Interoperability Directives, which introduce a regime where approval by one country, against a set of European technical standards, must result in EU-wide approval against those standards.

Cross Acceptance of systems or products

Currently the size of the European market for railway products can be unnecessarily constrained because of the differing national requirements for the same products in each country. For example signalling principles traditionally used in Great Britain are different to those in many European countries. Thus we end up requiring individual designs or components and the size of the components market is reduced to that of individual or groups of States. The adoption of European standards for certain railway systems or components, which are mandatory for use through out the EC whenever the railway is upgraded, or a new one is built, enables the expansion of the market for that component to the whole of the EC. Typical examples of specified components currently covered by such standards are rails, sleepers, track fastenings, wheel sets, and pantographs.

Cross Acceptance of Safety Management Systems

The efficiency of international train services is artificially constrained when locomotives or train crew are changed at borders. There are two problems to be overcome. Firstly acceptability of Rolling Stock, which is to be addressed by the adoption of pan European Standards, as indicated above. Secondly the competence of train crew and the safety management systems of International train operators have to be recognised in the various member states through which they will operate the trains. Issues such as language, risk

assessment and controls, and other safety management processes must be addressed. Such matters are included in the Railway Safety Directive.

The Interoperability and Railway Safety Directives

Interoperability directives

There are two Directives covering High Speed and Conventional Interoperability. The requirements of both have been harmonised to a great extent by the amendments to them detailed in the Second Railway Package, which came into European Law on the 30th April 2004;

- 96/48/EC on the Interoperability of the Trans-European High-speed Rail System, as amended
- 2001/16/EC on Interoperability of the Trans-European Conventional Rail System, as amended.

The former (which, in the UK, applies to specified lines on the East Coast Main Line (ECML), West Coast Main Line (WCML), Great Western Main Line (GWML) and Channel Tunnel Rail Link (CTRL)), is primarily intended to ensure that high-speed trains can run freely across the European high-speed network. The Directive was implemented in the UK by the Railways (Interoperability) (High-speed) Regulations 2002. The Conventional Directive is designed to achieve the same outcome for non-high speed trains and infrastructure. It achieves this by extending the principles of the high-speed interoperability to a large number of other rail lines, including in Great Britain. This is scheduled to be implemented in Great Britain by 2006, and will apply to most of the mainline network.

Both Directives are also intended to increase the size of the European market for specified railway products, known as Interoperable Constituents.

Concept

The interoperability directives are designed to achieve the goal of an interoperable railway by specifying the Essential Requirements (ER) for interoperability for interfaces between the various subsystems that make up the total railway system. The ERs specify at a very high level the interfaces between sub systems from a point of view of safety, reliability and availability, health, environmental protection and technical compatibility.

However the ERs are set at too high a level for design and operational purposes, so Technical Specifications for Interoperability (TSIs) have been, or are in the process of being created for both High Speed and Conventional subsystems. Each TSI specifies how the ER for that subsystem are defined, how compliance to it is to be assessed (similarly for any interoperable constituents), and finally what are the implementation arrangements to drive forward compliance across the EC.

TSIs are absolute in nature and do not require any test of ALARP. They are mandated by law and take precedent to any other standard, including national standards. A TSI may call up a Euronorm, either in whole or part to specify particular elements of subsystems, or specify items, which are to be specified by an individual Member State. The latter are known in Great Britain as Notified National Technical Rules. (NNTR)

To assess compliance to a TSI, a Contracting Entity is required to contract with a Notified Body (NoBo), which has been appointed by the Member State as being competent to assess compliance to that particular TSI. A Contracting Entity is typically, but not necessarily, the party paying for or owning the project. During the assessment the NoBo prepares a Technical File, which details how the assessment was carried out and other matters specified in the Directive. Once complete the NoBo issues a Certificate of Conformance.

The Contracting Entity then sends the Technical File, together with a Declaration of Verification to the Supervisory Authority. The latter undertake checks to make sure that the Technical File is complete and once satisfied will issue an authority that the sub system can be “put into service”.

For a full description of the application of the Interoperability process in Great Britain you should refer to the guidance that is in the course of preparation by DfT.

In conclusion, it would be theoretically possible to run a train that complies with the TSI for rolling stock over any infrastructure that is compliant with the relevant TSIs, without any further safety or technical checks. This is because TSIs fully specify the requirements for the interfaces and the train and route have each been assessed as compliant.

Reality

There are two principal problems.

1. The TSIs are not yet fully complete and contain a number of open points where Notified National Technical Rules have to be used. Whilst revisions are being made to the TSIs, this will always be a problem, which is however diminishing. Furthermore a TSI may contain for a particular Member State, a “Specific Case”. This is in effect a pre-agreed derogation against a particular part of the TSI. An example is structure gauge. The infrastructure TSI contains for Great Britain a permanent derogation permitting the use of the UK1 gauge, which is smaller than that used in the rest of Europe. The Specific Case recognises that it would never be economic to convert British lines to the Continental gauge.
2. Very few routes in Great Britain are fully compliant to the TSIs and this situation is unlikely to change significantly for a long time.

Europe’s railways have been built over a long period of time to different standards using different technology. Therefore to allow interoperability to be progressively introduced at reasonable cost, the Directives specify that the TSIs need only be applied when a new subsystem is created, such as a rail vehicle or new piece of railway; or an existing system is undergoing a major upgrade or renewal. In addition, the TSIs are prefaced by stating that nothing within the TSIs will prevent existing rolling stock from operating. This acts as a further limitation on the applicability of the TSIs.

Care is therefore needed when assuming something is interoperable, especially when it has not been used in the Member State before.

In conclusion when considering the operation of a vehicle over a railway route that it has never been over before, it is likely that a supplementary process needs to be carried out to ensure that compatibility is achieved. In Great Britain this is called route acceptance. For further details refer to the Guidance to be issued by the DfT.

Exemptions and Derogations against the TSIs

In addition to Specific Cases, these may be available in certain circumstances as defined in the Directives. Depending upon their nature, they would be granted either at the European Commission level, or by the Member State, depending upon their nature. For details refer to the DfT Guidance.

Railway Safety Directive

The EC realised that many of the problems with the single market and international rail services arise from fundamentally different approaches to safety regulation taken in member states across Europe. It also realised that the interoperability initiatives are likely to stall if

this issue is not addressed. Consequently, on 29 April 2004, EU passed Directive 2004/49/EC of the European Parliament and of the Council on safety on the Community's railways. (Each Member State has two years to adopt its provisions into their own laws). This defines an EU safety regulation framework and links together and clarifies the safety aspects of existing directives and the infrastructure package proposals. It includes:

- ◇ Establishment of common principles for safety and development of risk acceptance criteria, including the gradual adoption of Common Safety Targets and Safety Methods to deliver them
- ◇ Specification of the principles of safety management system (SMS) requirements for infrastructure managers and railway undertakings (train operators). The SMS for railway undertakings is divided into a common part to be acceptable in all Member States, and a part that is specific to the Infrastructure Manager(s) over which the railway undertaking requires to operate
- ◇ Establishment of national safety regulators and supervisory bodies and their responsibilities with respect to licensing of infrastructure managers and railway undertakings, and certification and placing into service of interoperability sub-systems
- ◇ Mandatory and independent investigation of serious accidents and incidents

Some of these already exist in the UK industry or (such as the independent accident investigation) have been recently introduced.

The Directive applies to all main line railways with some minor exceptions. Tramways, light rail systems and metros may be excluded, at the discretion of the Member State.

Engineering Safety Management and the Directives

It can be seen from the above brief description of the European Directives that they were primarily conceived to address interoperability and competitiveness of the rail industry and that they are concerned with safety in as much as it affects these objectives. In the following sections we consider various issues where these interact with the obligations of infrastructure owners and train operators to run a safe railway.

Responsibilities

The Safety Directive adopts very similar principles of safety management to UK regulations. The introduction says *"All those operating the railway system, infrastructure managers and railway undertakings, should bear the full responsibility for the safety of the system, each for their own part. Whenever it is appropriate, they should cooperate in implementing risk control measures"*.

The Directive also recognises a clear division between the responsibilities of the rail industry and the regulator. It says *"Member States should make a clear distinction between this immediate responsibility for safety and the safety authorities' task of providing a national regulatory framework and supervising the performance of the operators"*.

National safety rules (including Railway Group Standards)

The Directive recognises that there will be a continuing role for national rules and national technical standards, at least in the short term. It says, *"National safety rules, which are often based on national technical standards, should gradually be replaced by rules based on common standards, established by TSIs. The introduction of new specific national rules, which are not based on such common standards, should be kept to a minimum. New national rules should be in line with Community legislation and facilitate migration towards a common approach to railway safety."*

Non-interoperable infrastructure

Whilst much of the UK rail infrastructure and rail vehicles are not fully compliant to the TSIs, and the latter contain open points, there have to be additional Notified National Technical Rules (NNTR) and specific equipment to ensure safety. For example, the Advance Warning System (AWS) and the Train Protection and Warning System (TPWS) are recognised by the applicable TSI as Specific Cases and are specified by NNTRs, but are not classed as interoperable. Therefore until a particular route on the UK network used by trains fitted with European Train Control System (ETCS) is fitted with the (ETCS), trains have also to be fitted with AWS and TPWS. New trains must make provision to be fitted with ETCS. AWS and TPWS guard against some driver error and comply with the current British law, as will ETCS when it is introduced.

Yellow Book & Engineering Safety Management

Good safety management, the basis of the Yellow Book, covers a range of issues – the technical performance of equipment, interfaces between different systems and the way in which the equipment interfaces with operators and users.

If you are a Railway Undertaking, planning to run interoperable rolling stock on fully interoperable infrastructure you must, discharge your responsibility for safety by having a Safety Certificate that has been authorised by the relevant Supervisory Authority(ies) that covers the scope of your railway operations, and ensuring that your rolling stock complies with the relevant Essential Requirements as defined in the TSIs and NNTRs. The vehicle builder must ensure that the vehicles fully comply with the relevant TSIs and NNTRs.

However you are unlikely to be running over fully interoperable lines for many years and so your Safety Certificate will have to describe how you ensure safety in this mixed situation. Where a particular interface is compliant with TSIs you will be able to demonstrate that risks have been reduced to ALARP by quoting the TSI and explaining how it covers a particular group of risks. But when applying for authorisation to put into service new or vehicles subject to major upgrade, over routes that are not fully interoperable, or where there are no TSIs applicable for the vehicle in Great Britain you will need to demonstrate that you have reduced risks to ALARP in accordance with the process described in the NNTR and your safety certification. The Yellow Book provides guidance on how to do this.

For Infrastructure Managers, the Safety Directive explicitly requires that you and the Railway Undertakings are jointly responsible for the safety of the railway. Therefore when considering the introduction of rolling stock over non-interoperable routes, you will have to co-operate with the Railway Undertaking to ensure that safety is maintained. The Yellow Book provides guidance on good engineering safety management processes to help to demonstrate this. Similar principles apply when you are planning to upgrade or renew the infrastructure.