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# The new policy of the European Commission for the abatement of railway noise

A. Lundström<sup>a,\*</sup>, M. Jäcker-Cüppers<sup>b</sup>, P. Hübner<sup>c</sup>

<sup>a</sup> *European Commission, DG Energy and Transport, Rue de la Loi 200, B-1049 Bruxelles, Belgium*

<sup>b</sup> *Umweltbundesamt, Postfach 330022, D-14191 Berlin, Germany*

<sup>c</sup> *SBB Rail Environmental Center, Parkterrasse 14, CH-3000 Bern 65, Switzerland*

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## Abstract

With the Green Paper on *Future Noise Policy* published in November 1996, the European Commission began to step up its activities in the field of European noise abatement policy including the railway sector. The Commission has convened various working groups (WG) on noise reception and emissions in order to develop proposals for the new European noise policy. The Railway Noise WG started its work in December 1999. Furthermore, the Commission is going to enforce noise emission limits for high-speed and conventional train sets operating on the trans-European network within the Interoperability Directives of the European Union.

This paper reports on the reasons for the new European noise policy. It describes how railway noise regulations are developed within the framework of the Interoperability Directives. First, limit proposals for high-speed train sets are presented. Results of the activities of the Railway Noise WG are described.

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## 1. The reasons for the new European railway noise policy

Railway noise has so far not been the subject of European legislation whereas noise emission limits for road vehicles, outdoor machinery and aircraft were introduced in the early 1970s. An initial proposal of 1983 for noise limit values for railway wagons was withdrawn due to perceived conflicts with international agreements.

With the Green Paper on *Future Noise Policy* published in November 1996 [1], the European Commission began to step up its activities in the field of European noise abatement policy

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\*Corresponding author. Tel.: +32-2-299-2059; fax: +32-2-299-5889.

*E-mail addresses:* [anders.lundstrom@cec.eu.int](mailto:anders.lundstrom@cec.eu.int) (A. Lundström), [michael.jaecker-cueppers@uba.de](mailto:michael.jaecker-cueppers@uba.de) (M. Jäcker-Cüppers), [peter.ph.huebner@sbb.ch](mailto:peter.ph.huebner@sbb.ch) (P. Hübner).

including the railway sector. The Green Paper states that “a priority for Community transport policy is to achieve a better balance between different modes, which will mean achieving a greater role for rail.<sup>1</sup> This in turn will require increasing capacity and more infrastructure in certain areas. However, as the public’s main criticism of rail transport is the excessive noise level, which could be exacerbated with the growth of high-speed rail, there is considerable opposition in many areas to the expansion of infrastructure or capacity. Therefore increased noise abatement efforts are required if the expansion of traffic is to gain wider acceptance”.

Some countries are even discussing restrictions to freight trains, e.g., night restrictions, speed limits and “emission ceiling”, i.e., fixing the maximum amount of emissions with respect to the reception limits. Such unilaterally imposed measures could be counter to the European policy to promote the development of rail traffic, in particular for international freight transport.

Research projects funded by EU and technical work commissioned by the UIC, the International Union of Railways, show that there is a potential for reduction of noise from freight wagons, in particular if a combination of measures is applied, by as much as 8–12 dB (A). Considering the annoyance created by railway noise, the reduction potential, the general provisions of the Treaty of the European Union (Article 174)<sup>2</sup> and the international character of rail transport it is obvious that European activities are necessary to reduce noise created by railway rolling stock.

The Green Paper has identified the following instruments: “economic instruments such as a variable track charge which would enable the infrastructure fee for the use of track to be differentiated according to the noise levels of the wagons, legislation on emission limits, a negotiated agreement between the railways industry and the Community on targets for noise reductions and measures to ensure maintenance of in-use equipment”.

The instruments identified by the Commission for the development of noise emission limit values are the Directives on Interoperability [2,3] of the trans-European rail systems. One of the major problems in the limit setting is the choice of a measurement standard for type approval procedures which is commonly accepted and yields sufficiently reproducible and accurate results.

In June 1998, the International and European Unions of the railway operators (UIC, CER and UIP) published an Action Programme [4] for the noise reduction of freight wagons, which make a significant contribution to the impact of railway noise, due to their widespread operation at night and by the high noise emissions caused by the cast-iron block brakes. The cast-iron blocks will be

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<sup>1</sup>In its planned White Paper on a common transport policy the Commission will propose an approach by which the market share of the railways will return to their 1998 levels by 2010 making for a shift of balance from 2010 onwards (see policy guidelines for the White Paper on the Common Transport Policy as adopted by the Commission in July).

<sup>2</sup>Article 174 (ex Article 130r):

- (1) Community policy on the environment shall contribute to pursuit of the following objectives:
  - preserving, protecting and improving the quality of the environment;
  - protecting human health;
  - prudent and rational utilisation of natural resources;
  - promoting measures at international level to deal with regional or worldwide environmental problems.
- (2) Community policy on the environment shall aim at a high level of protection taking into account the diversity of situations in the various regions of the Community. It shall be based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay.

substituted by composite blocks on new and existing vehicles. The composite blocks do not roughen the wheel running surfaces as much as the cast-iron blocks and this results in a reduction of about 8 dB (A). In March 1999, the Unions proposed a corresponding voluntary agreement to the Commission on the cost-neutral modification of freight wagon brakes.

In December 1999, the Commission convened a working group (WG) on railway noise [5] in addition to the existing WGs on noise reception issues. Currently, the Railway Noise WG has 22 members from the member states, the Commission, the NGOs and the railway associations. It will assist the Commission in developing *proposals for a common European cost-effective strategy for railway noise abatement* and for *noise emission limit values* on the basis of suitable measurement standards within the Interoperability Directives and in evaluating the Action Programme of UIC, CER and UIP. The WG concentrates on the source-related measures, which in general have high cost-effectiveness. Furthermore, in order to support the activities of the WG, the Commission financed two studies:

- on the suitability of the draft ISO 3095 (2001), measurement of noise emitted by rail-bound vehicles (ISO 3095 Study [6], completed in May 2001); and
- on European priorities and strategies for railway noise abatement (Strategy Study [7], completed in October 2001).

## 2. The European Directives for the interoperability of the railway transport

The European Commission is concerned about the decline of rail's share in the transport market.<sup>3</sup> The important contribution of the railways to sustainable mobility will be lost if the present trends continue. The Union has identified the dominant national organization of the railway market as one of the main reasons for this decline [8].

The Union therefore promotes the separation of the railway undertakings into the infrastructure management and transport service, the fair and non-discriminatory access to the national networks through the Directives 91/440/EEC of July 1991 and 2001/12/EC of 26 February 2001, and the development of a single market for railway equipment.

Furthermore, the Commission will enact Technical Specifications for the Interoperability (TSIs) of high-speed trains (based on Directive 96/48/EC of 23 July 1996 [2]) and for the conventional rail traffic operating on the trans-European network (TEN-T) (based on Directive 2001/16/EG of 19 March 2001 [3]) by which the technical and operational conditions of the European railways are harmonized and integrated in order to increase their competitiveness. Also the noise issues will be treated in the TSIs.

The essential requirements are outlined in an Annex to the Directive relating to the high-speed system. For environmental protection the requirement is formulated as follows: *The repercussions on the environment of the establishment and operation of the trans-European high-speed rail system must be assessed and taken into account at the design stage of the system in accordance with the Community provisions in force.* In another Annex to the Directive the basic parameters are outlined. In relation to noise emission the basic parameter is defined as *boundary characteristics linked to external noise*. For noise emissions, for example, the establishment of the basic parameter

<sup>3</sup>In the freight sector the market share dropped from 32.6% in 1970 to 14.1% in 1998.

means the definition of a noise emission level from rolling stock and the measurement conditions under which it must be attained. For the infrastructure subsystem draft TSI the basic parameter is specified as follows: *Operating the trans-European high-speed rail system should not result in a level of noise that would be unacceptable for the environment in the vicinity of the line and the activities conducted there.*

Article 23 of the Directive for conventional rail interoperability gives ‘the order of priority for the adoption of the TSIs’: the first group of TSIs will cover... noise problems deriving from rolling stock and infrastructure.

### 3. The TSI decision-making process

The use of a TSI to adopt Community legislation on noise emissions deviates somewhat from that which is already well known in other fields of environmental legislation. The Directive itself is adopted through the normal decision-making process between the EU institutions which means that the high-speed directive is a Council Directive, whereas the conventional rail directive is adopted by co-decision and is consequently a Directive of the European Parliament and of the Council. The TSIs, however, are adopted by Commission decisions.

The development of TSIs was delegated to a ‘joint representative body’, which will draw up draft proposals under a mandate from the Commission. For the purpose of developing the TSIs, the railway operators and infrastructure managers within UIC, the equipment manufacturers within UNIFE (Union of the European Railway Industries) and the operators of local transport systems within UITP (International Union of Public Transport) have formed the AEIF (European Association for Railway Interoperability). The AEIF has been mandated by the Commission to develop the draft TSIs (see Fig. 1).

A Committee of Member State representatives (mainly from the Ministries of Transport) under the chairmanship of the Commission was established under the directive according to Article 21. The Committee is regularly informed of the work on the TSIs and can comment on the drafts and issue recommendations. When the TSI is presented in its final draft the Committee assembles for

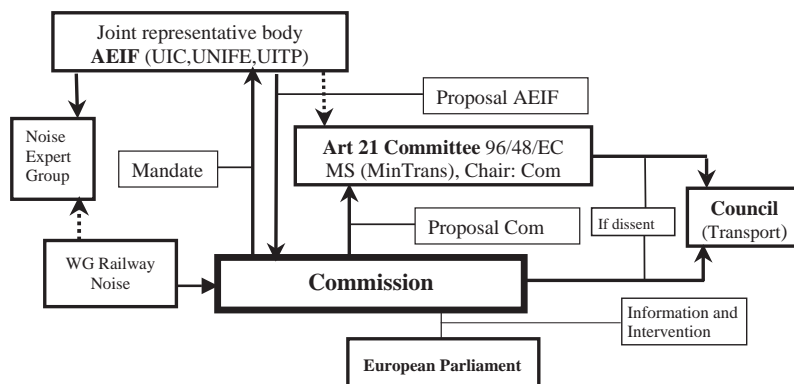


Fig. 1. The development of the noise-related TSI.

formal voting on its opinion on the TSI. Following the voting the TSI will then be adopted by a Commission decision and published in the Official Journal of the European Communities in 11 languages. If the Commission does not agree with the opinion of the Committee it shall submit a proposal to the Council (and inform the European Parliament) and the Council then takes the final decision. The TSI does not require implementation in national legislation, but enters into force in all Member States on the date indicated in the adoption decision.

The adoption procedure is laid down in Council Decision 1999/468/EC and is generally referred to as 'comitology' [9]. This procedure means that input from the European Parliament and its participation in the decision-making is ensured. The Commission must inform the Parliament of committee proceedings on a regular basis by submitting agenda, minutes from committee meetings, the results of voting and the draft decisions. The Parliament is able to react on the information submitted by the Commission. If the European Parliament considers that a proposal submitted by the Commission exceeds the implementing powers laid down in the basic instrument, i.e., the Directive, it shall inform the Council of its position. The case of the TSI for rolling stock under the high-speed directive, with limit values on noise emissions, was submitted to the Committee for its final voting in September 2001. At the same time it was transferred to the European Parliament for information. The TSI on noise problems deriving from conventional rolling stock and infrastructure has to be drawn up not later than within 3 years after the entry into force of the directive, that is, before 20 April 2004.

The Railway Noise WG has to assist the Commission in the evaluation of the AEIF proposals for the noise regulations. The Commission favoured the participation of WG members in the AEIF noise expert group, which started its work for the conventional rail system in September 2001.

#### **4. Noise emission limits for high-speed train sets**

The TSI on high-speed rolling stock has still not been adopted. Final adoption is expected by the end of 2001, but the main content has already been agreed upon in the committee procedure used for the adoption. Like the other TSIs it is divided into seven chapters: Introduction, Definition, Essential requirements, Characteristics of the subsystem (including basic parameters), Interoperability constituents, Assessment of conformity and Implementation. The noise limit values are formulated under Chapter 4.1—Basic parameters. They follow the proposals of the AEIF made in April 2001.

Two types of limit values are given by the TSI: stationary noise levels and noise levels in high-speed service. Noise levels from stationary trains in stations shall not exceed 65 dB (A) measured continuously or 70 dB (A) intermittently. The following measurement conditions are defined for stationary trains: measured over 30 s, in open country at 7.5 m from the axis of the track at a height between 1.2 and 3.5 m. In high-speed service the noise level generated by a train set shall not exceed a value of 88 dB (A) at a speed of 250 km/h and 91 dB (A) at a speed of 300 km/h (see Table 1). The measurement conditions are defined as follows: the passage of a train is measured at its normal operating speed in open country at 25 m from the axis of the track at a height of 3.5 m, on a track with newly ground rails and no faults.

For general measurement conditions, refer to prEN ISO 3095.

Table 1

Proposals for noise emission limits of high-speed train sets (transit exposure level (TEL) in 25 m distance and 3.5 m height in dB (A) for constant maximal speed

Proposal	Constant speed (km/h)			Measurement standard
	250	300	350	
AEIF 04/2001	88	91		ISO 3095
WG Chairman first step	88	91	94	ISO 3095 + +
WG Chairman second step (+ 5 years)	85	88	91	ISO 3095 + +
Strategy Study (short term)	87	90		ISO 3095
Strategy Study (long term)	84	87	91	ISO 3095

Chapter 7 of the TSI contains the implementation measures, the specific cases which are allowed permanently or temporarily, generally or in individual member states, and recommendations. For the TSI rolling stock it is possible, for example, to recommend future limit values that could be met voluntarily by manufacturers of new train sets while awaiting the revision of the TSI. The first generation TSIs will be subject to a revision process later. One of the objectives of the revision might be to reconsider the noise emission limit values in the light of current work and studies.

The Railway Noise WG has debated the emission limits and corresponding measurement conditions mentioned above. As it was felt that the measurement conditions in the AEIF proposal are not precise enough, the WG chairman made an additional proposal. This proposal (see Table 1) includes a second step with a further reduction of the constant speed limits by 3 dB (A) and additional specifications for the track conditions (rail pad stiffness definition and lower roughness levels than in draft ISO 3095; referred to in Table 1 as ISO + +).

Within the Strategy Study for noise emission limits of high-speed trains mentioned above, proposals have been made which are also included in Table 1. Some national railway companies and the railway representatives in the WG have disagreed with the proposals for the second step and with the proposed specifications to the modified draft ISO Standard, because they feel that the necessary technical solutions are not yet available.

## 5. Some results of the activities of the Railway Noise WG

### 5.1. Proposals for a European railway noise policy

Based on the analysis of the railway noise abatement strategies in European countries, on the current European noise policy, and on the results of the Strategy Study, attention should be paid to the following principles for railway noise abatement:

- Due to the international character of railway transport, national solutions are insufficient to solve the railway noise problem. Therefore, activities of the European Union are necessary which must be extended to the candidate countries as soon as possible.

- Source-related measures on the vehicles and tracks are in general very cost-effective, environmentally compatible and also effective for outdoor noise reduction. Financial means should be shifted from secondary measures (barriers, sound insulation windows, etc.) to these measures.
- Highest priority should be given to the control of noise generation, i.e., maintaining smooth wheels and smooth tracks to reduce rolling noise which is the most important railway noise source.
- Maintenance of vehicles and tracks is of the utmost importance for lasting low-noise railway operation.

For the implementation of these abatement principles the following instruments should be applied:

- *Noise emission limits for new rail-bound vehicles:* There is a general consensus among the railway noise experts regarding this instrument. For the vehicles covered by the Interoperability Directives ('interoperable' vehicles) implementation is progressing. Noise emission limits for regional and urban trains could either be enforced by the European Union in order to promote a single market and to abolish trade barriers, or by the national governments.
- *Noise emission regulations for tracks:* Although the TSI noise for conventional rail systems has to cover noise problems of the trans-European network, it is not yet clear how to implement this. There is a broad range of ideas, from the limitation of the track emissions (i.e., by rail roughness limits and track specifications) in the TSI, to the assignment of corresponding regulations for the infrastructure owners or the national regulation boards according to the subsidiarity principle. Of course, only the combined smoothness of wheels and rails will yield the beneficial effects, which underlines the importance of track noise regulations.
- *Maintenance:* Although the Interoperability Directives demand permanent conformity to the TSI conformity (high speed: Article 5, conventional: Articles 8 and 14), the method of implementation is not yet solved.
- *Noise reduction of the existing fleet:* Due to the long life of railway vehicles, noise reductions which apply only to new vehicles via emission limits would mean that the problem of railway noise would not be solved for many years to come. For freight vehicles particularly, which are the most problematic vehicle category, retrofitting solutions are urgently needed. As viable solutions for retrofitting are neither available nor proven, further research at a European level is needed. A short-term solution will require additional financial means to be made available in European or national noise abatement programmes. The on-going Swiss noise abatement programme is the most advanced example of such a programme; by saving money for secondary measures the retrofitting of the total national fleet will be finished by 2009 [10]. Incentives for the retrofitting of the existing fleet could also be given by operational or economic advantages for the use of low-noise rail-bound vehicles, such as noise-emission-related track charges or exemptions from access bans. However, the appropriate instruments for the implementation of these incentives are still to be developed.

## 5.2. Measurement standards

The essential statement of the ISO 3095 Study [6] is that "the current version of the prEN ISO 3095 standard is only sufficient for noise legislation of all types of rail vehicles if the track

conditions are more tightly specified”. Above all the rail pad stiffness and the track design should be specified more tightly. The WG has discussed various options for these additional specifications and their consequences regarding accuracy and reproducibility of the measurements, costs and availability of track sites and the avoidance of limit circumventing (for example, the ISO 3095++ definition of rail roughness, see Table 1). To date the WG has no common opinion.

In some cases the vehicle conditions and train configurations might also need some additional specifications.

For the enforcement of noise emission legislation it is most important to promote as soon as possible the selection and preparation of European test tracks following the specifications laid down in the regulations. The WG recommends that the Commission should organize this work in co-operation with the associations of the railway companies, the track and vehicle manufacturers and the national notified bodies for the TSI implementation. The necessary financial means have also to be organized. It is suggested that further research on the problems of track specification and evaluation should be supported.

For the assessment of the noise regulations and of future noise reduction potentials, it is necessary to create a European noise emission data bank immediately, which would be based on the proposed ISO 3095 draft. The data sheets for each measurement should contain the test report information requested in the draft ISO Standard (Chapter 8). Most important is the description of the track design, rail roughness and pad characteristics (stiffness).

## 6. Conclusions

With the publication of the new European railway noise policy, the prospects for solving the noise problems for railways in the near future have been improved considerably. The European Union defines noise emission limits for new interoperable rail-bound vehicles in the form of TSIs. Noise problems resulting from the infrastructure of the trans-European network are also to be treated in the TSIs. The importance of vehicle and track maintenance for a lasting reduction of noise emissions has been recognized. The technical measures for ambitious emission reductions are in general available. With the approval of the draft standard ISO 3095 a basis for a commonly agreed measurement standard will be available.

The main problem to be solved is the short-term noise reduction of the existing fleet, especially for freight transport, as cost-neutral retrofitting solutions are not yet available. The Railway Noise WG recommends European or national noise abatement programmes similar to the Swiss programme with its emphasis on fleet retrofitting and the reliable financing of its implementation.

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