

Revision of EU rail noise standards (TSI)
Input to the ERA Working Party TSI Noise

November 2011



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T&E Input Paper – Revision of EU rail noise standards (TSI)

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Editeur responsable
Jos Dings, Director

Transport & Environment
Rue d'Edimbourg, 26 | B-1050 Brussels | Belgium

www.transportenvironment.org

Summary

EU noise standards for rail vehicles

The current European Union noise regulations for new or upgraded interoperable rail vehicles came into force in 2002 for high-speed rail and in 2006 for conventional traffic. These standards are known as Technical Specifications for Interoperability (TSI), and are adopted by Commission Decisions. A comprehensive revision of the Noise TSI is planned for 2013. A working group has been established by the European Railway Agency (ERA) who is leading the revision process, where T&E represents the views of environmental groups. This paper is intended as an input to the working group.

Essential requirements for the revision of the Rail Noise TSI

- Noise emission limits for rail vehicles have to be tightened
- Vehicles of the existing fleet must be included in the noise regulations
- Noise regulations must address both vehicles and infrastructure

Principles for the revision process:

- Further reduction of railway noise is urgently needed to protect the health and quality of life of people living near railways. Rail traffic noise, and public resistance to increasing traffic and new infrastructures due to noise, is a major obstacle towards achieving the EU policy objective of shifting traffic to less carbon-intensive transport modes.¹
- Noise reductions at the source (vehicles, tracks) are the most cost-effective option. Setting stringent EU noise emission standards in the TSI is an appropriate measure to ensure substantial noise reductions are achieved by new vehicles. Such measures may need to be reinforced by operating restrictions at a later stage.
- To ensure the necessary noise reductions are achieved, the TSI revision must go beyond the current approach and stimulate new noise reducing techniques. For example, for freight wagons the current noise limits are met by simply fitting composite brake blocks or disc brakes; additional reductions are only possible with further measures. Innovative solutions such as the LEILA-bogie (steering wheel sets, wheel mounted disc brakes, special suspensions, etc.) are not yet homologated. New limit values should therefore be based on the combination of available noise reducing components.
- The main railway noise problem is due to the existing stock of freight wagons with cast iron (CI) block brakes, especially as these are frequently operated at night. A solution must be found to phase-out wagons with CI blocks in the medium-term.
- A joined-up approach is required to reduce noise caused by the interaction of railtracks and vehicles (rolling noise, curve squeal etc). Therefore, both the vehicle- and infrastructure-related TSI must establish regulations for the noise emissions of both components.
- The regulations have to make provisions for maintenance, in order to ensure that the limit values are always met throughout the lifetime of the vehicle and track.
- Noise limit value requirements should cover the main operating conditions (stationary, starting, braking, constant speed pass-by, running through curves, etc.).
- The measurement test method must be defined as precisely as possible to ensure that measurement results are reliable and reproducible.

¹ EC (2011) Transport White Paper; Recently Bavarian communities rejected the enlargement plans in connection with the Brenner base tunnel (DVZ 4th July 2011 “Wutbürger’ machen gegen Zulaufstrecken mobil”)

1 Time for the EU to act to cut rail noise

T&E welcomes the European Commission's recognition of the severity and widespread nature of the rail noise problem throughout Europe, as outlined in the consultation document back in May 2007, but we are sorely disappointed that no progress has been made in almost five years.

Even more puzzling however are the repeated delays of the rail sector to tackle the noise problem voluntarily, since it is a rapidly growing obstacle to growth (bottlenecks, public protest, campaigns) and an increasing source of negative public perception of rail transport. With the new Transport White Paper (2011) reemphasising the role of rail and sustainability, it is a long-overdue matter of credibility that the EU takes action to cut rail noise where the sector has failed to act.

Some 35 million EU citizens are exposed to levels of railway noise which pose a threat to their health.² Beyond just being an annoyance, the negative consequences of long-term noise exposure include sleep disturbance, increased stress, elevated blood pressure, and cardio-vascular disease and can potentially be fatal.³

With the primary objective to reduce the number of people (dwellings) exposed to levels of noise potentially damaging to health, the positive impact of the revision of the TSI must be substantial and demonstrable, ultimately by means of noise maps. The indicator on which policy options should be evaluated is substantial reduction of the number of people exposed to potentially harmful levels of noise, defined by the World Health Organisation as long-term exposure to traffic levels exceeding 55dB(A). WHO recommends 55dB(A) as a short-term target for nighttime noise exposure, and 40dB(A) in the longer term to protect public health – these values should guide policy-makers.

In accordance with the Treaty, action should be based on the precautionary, preventive and polluter-pays principles, and the problem should be primarily addressed directly at the source to maximise cost-effectiveness.

2 Scope of the Rail Noise TSI revision

The working group convened by the ERA has a mandate to draft a proposal for the Noise TSI and a report including further proposals for rail noise abatement, such as for example, a strategy to phase-out noisy freight wagons. The revision of the noise TSI will include the current TSI Noise for conventional rail vehicles as well as the TSI Rolling Stock for high-speed rail. The intention is to merge both into a single TSI Noise, with a scope of application which should also be expanded beyond the trans-European rail network (TEN-T).

The revision of the Noise TSI must cover the following aspects (see Chapter 7.2 of the conventional TSI Noise):

² CE (2007) *Traffic noise reduction in Europe*, Delft.

http://www.transportenvironment.org/Publications/prep_hand_out/lid:495

³ Babisch, W. (2006) "Transportation noise and cardiovascular risk, Review and synthesis of epidemiological studies, Dose-effect curve and risk estimation" WaBuLu-Hefte01/06, Umweltbundesamt, Berlin.

- Tightening of noise limits
- Inclusion of infrastructure into the noise regulations
- Inclusion of maintenance requirements for the vehicles
- Assessment of the TSI Noise costs and benefits
- Use of a continuous limit curve for the freight wagons (currently a step function)

The inclusion of additional noise types/sources such as brake and curve squeal shall be considered.

3 Revision of the Noise TSI for vehicles

3.1 Extend the scope to tackle all major rail noise problems

To date, only new or substantially updated interoperable rail vehicles are required to meet the provisions of the Noise TSI. This approach is insufficient to address the scale and severity that rail noise poses in Europe because of the long life of rolling stock. It is imperative, therefore, that the noise limits are also extended to **include existing freight wagons** (possibly with mandatory transition periods, e. g. in connection with retrofitting programmes for wagons with CI blocks).⁴

The group should also consider provisions for **operating restrictions** in noise-sensitive areas to take effect by a certain date to ensure that retrofitting is carried out, in a similar approach to that applied to non-compliant aircraft.

Furthermore, the requirements should be extended to **include braking and curve squeal**, which are specific sources of noise disturbance and annoyance.

The working group should also **consider noise limits for public transport vehicles** (including eg. Trams) primarily by examining whether there is a need, and secondarily checking coherence with internal market requirements.

3.2 Improve the test procedure

It is currently possible to bypass the limit values testing vehicles on a particularly low noise test track. There is a considerable spread of the noise emission values on reference tracks. Swiss studies show that constant speed emissions from freight wagons with k-blocks or disc brakes are up to 9 dB(A) below today's limit values (with a

⁴ Switzerland plans to introduce a ban for CI block braked vehicles by 2020 in connection with funding retrofitting for foreign wagons which are regularly operated in Switzerland (Presentation of P. Füglistaler, Director of the Swiss Transport Agency (BAV) at the meeting of the Railway Group of German Members of Parliament, 27 October, 2011 in Berlin, see <http://www.verkehrsforum.de/medienservice/pressemitteilungen/artikel/datum/2011/10/28/schweiz-will-ab-2020-laute-waggon-bremsen-verbieten.html>). The European Commission indicated that the incentives for a fast retrofitting ("First-Mover-Advantage") of the existing fleet via noise differentiated track access charges (NDTAC) could be supported by a ban of the CI wagons after a transition period (DVZ, 19 July 2011). The German Ministry of Transport supports a ban of CI wagons by 2020 in conjunction with the planned German retrofitting programme via a bonus system within the track access charges (Key Point Agreement between DB Netz AG and Ministry of Transport on the introduction of NDTAC, 5 July 2011).

spread of 7 dB(A)); this is mainly due to test tracks with very low roughness and/or high track decay rates.⁵

In order to ensure that in future vehicles will reliably meet the limit values outside test conditions, a stringent definition of test track properties is needed. There are two options to prevent this kind of limit circumvention: either stricter definition of the test track properties or adjusting the emission values according to the track parameters ("virtual test track").⁶ The test procedure should also define which relevant components (e.g. compressors) should be active under certain operating conditions.

Furthermore, maintenance regulations must be added to ensure that vehicles' real world noise emissions remain consistent with tested emissions, so that noise reductions are durable over time.

3.3 Tighten the limit values

3.3.1 Freight wagons

Given that freight wagons are mainly operated at night, particular efforts are urgently needed to cut noise emissions, and especially noise from the existing fleet. In addition to the composite brake blocks / disk or drum brakes required to fulfil the current standards, further mitigation measures should be induced by ambitious tightening of the noise limit values.

Whilst the limit values should be technology-neutral, the best technological solution for the problem should be incentivised by stringent standards. We note that, currently, noise reduction potential is highest with freight wagons fitted with disc brakes. Composite brake blocks favoured by the current regulation have some drawbacks, including increased wheel wear and restriction of other options to improve the acoustic properties of the wheels (design, absorbers, etc.) as the wheels need to be able to withstand high brake temperatures.

It is of course essential to note that the real-world emissions reduction also depends on the respective contributions of both the vehicle and the rails, and that efforts should be made to minimise the gap between test track conditions and real world operation.

3.3.2 Coaches

More stringent limit values should be considered for passenger coaches, taking into account the potential to fit wheel absorbers alongside disc brakes (eg ICE). For locomotives and multiple units wheel mounted disc brakes are now state of the art.

⁵ Reference: "*Studie zu besonders lärmarmen Güterwagen*", October 2010.

⁶ The discussion at the last WP meeting showed that the methodology for the conversion of measurement results to a normalised reference track may not be available for the ongoing limit revision.

3.3.3 Locomotive traction and aggregate noise

Research projects such as the the SILENCE project⁷ funded by the EU Commission have demonstrated substantial reduction potential from these sources, compared to current emissions.

4 Merging the regulations for high speed and conventional railways

We support the approach to merge the regulations for high-speed and conventional vehicles. There are various aspects where the two can be better aligned, such as a harmonized measurement distance should be introduced (7.5 m from the track centre line) as well as a continuous function of limit values and vehicle speed.

The definition of the high speed train set limits for discrete speeds and the introduction of class 2 high speed trains and vehicles (190 - 259 km/h) in 2008 has led to inconsistencies. These should also be logically integrated, together with the infrastructure requirements, into a single TSI Noise.

5 Approaches for the Noise TSI infrastructure

For the noise mitigation measures at source on the vehicles to be fully effective, the contribution of rail roughness and the rail sound radiation must also be regulated. With particular focus on rail infrastructure close to residential areas, the rail infrastructure's influence must be limited. Arguably, infrastructure noise standards could also be set at national level, but it should be seen as the responsibility of EU policy to ensure a consistent approach between the requirements for rolling stock and those for infrastructure.

Furthermore, the EU has a special responsibility for the so-called freight corridors within the TEN-T. Regulation 913/2010 regarding a European rail network for competitive freight states in its recital (10): "...harmonizing rules relating to those freight corridors should be established at Union level". In its memo "Connecting Europe: The new EU core transport network" the Commission demands: "*All TEN-T projects have to undergo a rigorous environmental impact before qualifying for EU money. To do this they must meet all the requirements, in terms of planning and sustainability set out under EU environmental legislation.*"⁸

As well as tackling noise emissions of rolling stock, the contribution of the tracks/rails to rolling noise emission must also be addressed. Obligations for infrastructure managers need to be introduced to ensure polishing of rails and fitting of rail dampers. These noise reduction measures are complementary to retrofitting of quiet brake blocks and further enhance the cost-effectiveness. The total noise reduction potential of track

⁷ see <http://www.silence-ip.org/site/>. For example, the noise emissions from cooling systems can be reduced by 10 dB(A)

(http://www.silence-ip.org/site/fileadmin/SP_E/Deliverable_ED17.pdf)

⁸ MEMO/11/7068, Brussels, October 19 2011.

polishing and quiet brakes is up to 15 dB(A) with respect to badly maintained tracks⁹. In addition, the contribution of rail dampers is approximately 3 dB(A). Recommendations should be made in the Communication on how to monitor the noise quality of tracks.

Therefore the obligation to minimize the track contributions to noise should be included in the TSI Noise. Two technical parameters could be defined – maximum rail roughness and minimum track decay rate (higher track decay rates lower the sound radiation of the track). Alternatively, the rail emissions should be limited. The maximum allowable rail roughness over time can be ensured through monitoring and, if necessary, new grinding according to the German concept of "specially monitored track."

6 For further information, please contact:

Nina Renshaw

nina.renshaw@transportenvironment.org, +32 (0)2 893 0841

Michael Jäcker Cüppers, Noise Working Group of the German Society of Acoustics

<http://www.ald-laerm.de/>

⁹ UBA-Text 61-03 "Geräuschemissionen von Eisenbahnen"