TECHINICAL OPINION OF THE EUROPEAN RAILWAY AGENCY REGARDING: METHOD FOR MEASURING THE SPEECH TRANSMISSION INDEX IN THE PRM TSI

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1. Introduction

Through a letter dated January 18th, 2011 from Mr Maurizio Castelletti, EC DG MOVE, to Mr Jean-Charles Pichant, European Railway Agency, the Agency is requested to give a technical opinion on a website enquiry that was received by the Commission and which is related to the method specified for measuring the speech transmission index in the PRM TSI. The website enquiry questions the appropriateness of that method.

2. References

Ref. N°	Document Reference	Latest Issue
[1]	Commission Decision 2008/164/EC of 21 December 2007 concerning the technical specification of interoperability relating to 'persons with reduced mobility' in the trans-European conventional and high-speed rail system	
[2]	IEC 60268-16 Objective rating of speech intelligibility by speech transmission index	Ed 2.0 – 1998 Ed 3.0 – 2003 Ed 4.0 – 2011 (draft)
[3]	Website enquiry from M. Philipp Schwizer , NTI-Audio AG	

3. Question to the Agency

In a website enquiry received by the Commission [3], it is stated that the method used to specify the speech transmission index in the PRM TSI [1] is no longer appropriate. The requirements in the TSI are expressed as follows:

§ 4.1.2.12 -Spoken information

The spoken information shall have a minimum RASTI level of 0,5, in accordance with IEC 60268-16 part 16, in all areas.

§ 4.2.2.8.3 - Information (route description and seat reservation)

The spoken information shall have a minimum RASTI level of 0,5, in accordance with IEC 60268-16 part 16, in all areas. The system shall meet the requirement at each seat location and wheelchair space.

The requirements are present in both the Infrastructure part and the Rolling Stock part of chapter 4 that gathers all basic parameters for subsystems.

In these parameters, RASTI stands for Room Acoustic Speech Transmission Index, that is an index developed in 1979 for practical measurement of the intelligibility of a speech. According to the website enquiry [3] that index is no longer in use and it is replaced by the STI-PA: Speech Transmission Index – Public Address.

4. Technical analysis

In order to evaluate the acoustic properties of an audio system in a room, a theoretical method can be applied, consisting in the measurement of the STI (Speech Transmission Index) : a calibrated sound pressure signal, acting as a carrier, is emitted and its strength is slowly modulated. The signal is then measured in several places in the room and a transmission index can be measured, that varies from 0.0 to 1.0.

However, the signal for measuring the STI is difficult to apply in practice : it covers the seven octaves band from 125 Hz to 8 kHz and each one is modulated by a series of fourteen frequencies : this results in measuring time of fifteen minutes for each location where the STI is measured.

Hence, a simplified index called RASTI has been developed that uses only two octave bands (500 Hz and 2 kHz), being modulated respectively by 4 and 5 frequencies. The measuring time is 10 to 15 s for each location where it is measured.

The norm IEC 60268-16 that is mentioned in the PRM TSI also describes the other index for measuring the speed transmission, that is called the STI-PA. This method has been developed after the RASTI method and was made possible by the improvement of technological means. The STI-PA method covers all octaves, each of them being modulated by two frequencies. Results obtained with the STI-PA method are more accurate with a measuring time that is comparable to that of the RASTI method.

5. Legal analysis

The PRM TSI does not mention the edition of IEC 60268-16 it refers to. Hence the reference edition is the one that was valid at the time the TSI entered into force in July 2008, i.e edition 3.0 from 2003. The RASTI method is described in that edition of the norm as being fully valid. In the next revision (edition 4.0 to be released in 2011), the RASTI method will be described as an obsolete method as shown in the following extract of the table of contents of the draft revised norm:

The STI-PA method was not present in the edition 2.0 of the norm in 1998. It was firstly introduced in edition 3.0 in 2003 and will also be present in the next revision.

6. Conclusions

Based on the information received, the Agency has the following opinions:

-there is no error in the PRM TSI as it specifies a method that was normative and fully valid at the time of entry into force of the TSI.

-consequently, there is no justification to modify the TSI independently from the revision process foreseen in Directive 2008/57/EC.

-however, the method for speech transmission index measurement will be reviewed in the context of the forthcoming PRM TSI revision process that will take place in 2011/2012, during which the working party will take into account the most recent technical developments.