

## Noise and vibration

Transport is the most widespread and powerful source of acoustic discomfort in urban areas. Hence, the Company, as part of its environmental commitment, places special emphasis on minimising adverse physical factors and takes steps to reduce acoustic impact and vibration.

Minimising noise and vibration is a top priority for the Company's environmental strategy. Russian Railways keeps launching new, more efficient technologies and cutting-edge solutions to minimise or eliminate the causes of noise and vibration, protect people from acoustic impact, enhance passenger comfort and ensure that its acoustic impact meets applicable standards.

The Company's employees from industrial environmental laboratories receive training in measuring and assessing noise impact in adjacent housing areas. In addition, railway experts are trained in operating the Ecologist-Noise software to create and develop proprietary systems for monitoring noise and mapping areas adjacent to railway infrastructure.

In 2021, Russian Railways launched a large-scale project of noise mapping in the most critical areas to assess the noise pollution impact and distribution in urban areas near railway infrastructure.

The Company regularly handles public queries and outlines comprehensive measures to mitigate acoustic discomfort within metropolitan areas. This includes transferring locomotive sites to a remote distance from residential areas, regulating sound signals, checking and adjusting the loudspeaker operation modes, etc.

In 2021, the Company was engaged in developing technologies of sound insulation materials for the internal surfaces of VL locomotive bodies, with the project testing scheduled for 2022. Technical requirements for main types of traction rolling stock are currently being updated.

Every year, Russian Railways implements measures to reduce noise and vibration both at the noise source (wheel-rail interface) and along the route of transmission to the protected object. In 2015–2021, the Company:

- laid 103,000 km of continuous welded rails;
- ground 413,000 km of rails;
- laid 213 million anti-vibration pads;
- installed 302 km of noise protection screens;
- replaced 39,000 interlocked turnouts;
- ground 17,000 interlocked turnouts.

### Installation of noise protection screens | km

2021	43.6
2020	61.0
2019	26.2
2018	46.7

In 2022, the Company plans to install more than 99 km of noise screens as part of the comprehensive railway upgrade and construction.

Russian Railways also looks for innovative solutions to reduce noise and vibration in the infrastructure.

The Company is piloting technologies to reduce acoustic impact at marshalling yards, including the use of a composite braking bar of a car retarder with damping steel gaskets, an automatic noise reduction system, small noise protection screens, etc.

In 2022, the Company plans to finalise the technology of applying sound insulation materials to internal surfaces of VL locomotive bodies. The materials will be installed in 2023 as part of the programme for improving operational reliability and bringing the railway infrastructure in line with Russian Railways' requirements.