

# ISO 3095:2025-09 (E)

## Railway applications - Acoustics - Measurement of noise emitted by railbound vehicles

---

<b>Contents</b>		<b>Page</b>
Foreword .....		vi
Introduction .....		vii
<b>1</b>	<b>Scope .....</b>	<b>1</b>
<b>2</b>	<b>Normative references .....</b>	<b>1</b>
<b>3</b>	<b>Terms and definitions .....</b>	<b>2</b>
<b>3.1</b>	<b>General definitions .....</b>	<b>2</b>
<b>3.2</b>	<b>Definitions of track properties .....</b>	<b>3</b>
<b>3.3</b>	<b>Definitions of acoustic measurement quantities .....</b>	<b>4</b>
<b>3.4</b>	<b>Definitions for noise from parked trains .....</b>	<b>6</b>
<b>4</b>	<b>Instrumentation and calibration .....</b>	<b>6</b>
<b>4.1</b>	<b>Instrumentation .....</b>	<b>6</b>
<b>4.2</b>	<b>Calibration .....</b>	<b>7</b>
<b>5</b>	<b>Stationary test .....</b>	<b>7</b>
<b>5.1</b>	<b>General .....</b>	<b>7</b>
<b>5.2</b>	<b>Environmental conditions .....</b>	<b>7</b>
<b>5.2.1</b>	<b>Acoustical environment .....</b>	<b>7</b>
<b>5.2.2</b>	<b>Meteorological conditions .....</b>	<b>8</b>
<b>5.2.3</b>	<b>Background sound pressure level .....</b>	<b>8</b>
<b>5.3</b>	<b>Track conditions .....</b>	<b>8</b>
<b>5.4</b>	<b>Vehicle conditions .....</b>	<b>9</b>
<b>5.4.1</b>	<b>General .....</b>	<b>9</b>
<b>5.4.2</b>	<b>Normal operating conditions .....</b>	<b>9</b>
<b>5.4.3</b>	<b>Additional operating conditions .....</b>	<b>10</b>
<b>5.5</b>	<b>Measurement positions .....</b>	<b>10</b>
<b>5.5.1</b>	<b>Standard measurement positions .....</b>	<b>10</b>
<b>5.5.2</b>	<b>Additional measurement positions .....</b>	<b>11</b>
<b>5.6</b>	<b>Measured quantities .....</b>	<b>11</b>
<b>5.7</b>	<b>Test procedure .....</b>	<b>11</b>
<b>5.8</b>	<b>Data processing .....</b>	<b>12</b>
<b>5.8.1</b>	<b>Standard processing .....</b>	<b>12</b>
<b>5.8.2</b>	<b>Additional processing .....</b>	<b>12</b>
<b>6</b>	<b>Constant speed test .....</b>	<b>13</b>
<b>6.1</b>	<b>Environmental conditions .....</b>	<b>13</b>
<b>6.1.1</b>	<b>Acoustical environment .....</b>	<b>13</b>
<b>6.1.2</b>	<b>Meteorological conditions .....</b>	<b>14</b>
<b>6.1.3</b>	<b>Background sound pressure level .....</b>	<b>14</b>
<b>6.2</b>	<b>Track conditions .....</b>	<b>14</b>
<b>6.2.1</b>	<b>General .....</b>	<b>14</b>
<b>6.2.2</b>	<b>Geometry of the line .....</b>	<b>14</b>
<b>6.2.3</b>	<b>Track superstructure .....</b>	<b>15</b>
<b>6.2.4</b>	<b>Track quality .....</b>	<b>15</b>
<b>6.2.5</b>	<b>Acoustic rail roughness of the test track .....</b>	<b>15</b>
<b>6.2.6</b>	<b>Dynamic properties of the test track .....</b>	<b>16</b>
<b>6.2.7</b>	<b>Special conditions .....</b>	<b>17</b>

6.3	Vehicle conditions .....	17
6.3.1	General .....	17
6.3.2	Normal operating conditions .....	18
6.3.3	Occupancy and load .....	18
6.3.4	Wheel tread conditioning .....	19
6.3.5	Train composition (adjacent vehicles) .....	19
6.4	Measurement positions .....	20
6.4.1	Standard measurement positions .....	20
6.4.2	Additional measurement positions .....	21
6.5	Measured quantities .....	21
6.6	Test procedure .....	21
6.6.1	General .....	21
6.6.2	Pass-by speeds .....	21
6.6.3	Recording and measurement time intervals .....	21
6.7	Data processing .....	24
6.7.1	Standard processing .....	24
6.7.2	Additional processing .....	24
7	Acceleration test from standstill .....	24
7.1	General .....	24
7.2	Environmental conditions .....	25
7.2.1	Acoustical environment .....	25
7.2.2	Meteorological conditions .....	25
7.2.3	Background sound pressure level .....	25
7.3	Track conditions .....	25
7.4	Vehicle conditions .....	26
7.4.1	General .....	26
7.4.2	Normal operating conditions .....	27
7.4.3	Occupancy and load .....	27
7.5	Maximum level method .....	27
7.5.1	Measurement positions .....	27
7.5.2	Measured quantities .....	29
7.5.3	Test procedure .....	30
7.5.4	Data processing .....	30
7.6	Averaged level method .....	30
7.6.1	Measurement positions .....	30
7.6.2	Measurement quantity .....	31
7.6.3	Test procedure .....	31
7.6.4	Data processing .....	31
8	Braking test .....	32
8.1	General .....	32
8.2	Environmental conditions .....	32
8.2.1	Acoustical environment .....	32
8.2.2	Meteorological conditions .....	32
8.2.3	Background sound pressure level .....	32
8.3	Track conditions .....	33
8.4	Vehicle conditions .....	33
8.4.1	General .....	33
8.4.2	Normal operating conditions .....	34
8.4.3	Occupancy and load .....	34
8.4.4	Braking modes .....	34
8.5	Measurement positions .....	34
8.6	Measurement quantity .....	35
8.7	Test procedure .....	35
8.8	Data processing .....	35
8.8.1	Standard processing .....	35
8.8.2	Additional processing .....	36
9	Quality of the measurements .....	36
9.1	General .....	36

9.2	Deviations from the requirements .....	36
9.3	Measurement tolerances .....	36
9.4	Measurement spread .....	36
9.5	Measurement uncertainties .....	36
10	Test report .....	37
Annex A (normative) Method to characterize the impulsive character of the noise .....		38
Annex B (normative) Tests at constant speed -- Special cases .....		41
Annex C (informative) Track influence on the pass-by test result .....		45
Annex D (normative) Method to assess acceptable small deviations from acoustic rail roughness requirements .....		61
Annex E (informative) Guidance for urban rail vehicles measurement .....		63
Annex F (informative) Additional measurements .....		65
Annex G (informative) Quantification of measurement uncertainties according to ISO/IEC Guide 98-3:2008[1] .....		71
Annex H (informative) Noise from parked trains .....		76
Annex I (informative) Data processing for tonal noise assessment at standstill .....		86
Bibliography .....		89