

# DIN EN 15273-1:2014-06 (E)

## Railway applications - Gauges - Part 1: General - Common rules for infrastructure and rolling stock

---

| <b>Contents</b>    |                                                                                                                                                             | <b>Page</b> |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Foreword .....     |                                                                                                                                                             | 6           |
| Introduction ..... |                                                                                                                                                             | 12          |
| <b>1</b>           | <b>Scope .....</b>                                                                                                                                          | <b>13</b>   |
| <b>2</b>           | <b>Normative references .....</b>                                                                                                                           | <b>13</b>   |
| <b>3</b>           | <b>Terms and definitions .....</b>                                                                                                                          | <b>14</b>   |
| <b>4</b>           | <b>Symbols and abbreviations .....</b>                                                                                                                      | <b>21</b>   |
| <b>5</b>           | <b>Specific considerations for determination of parameters .....</b>                                                                                        | <b>36</b>   |
| 5.1                | Geometric overthrow .....                                                                                                                                   | 36          |
| 5.1.1              | Geometric overthrow between the vehicle body .....                                                                                                          | 36          |
| 5.1.2              | Additional geometric overthrow due to the bogies .....                                                                                                      | 37          |
| 5.2                | Flexibility coefficient .....                                                                                                                               | 37          |
| 5.3                | Dissymmetry .....                                                                                                                                           | 38          |
| 5.4                | Clearance between the wheelsets and the track .....                                                                                                         | 39          |
| 5.5                | Additional overthrow .....                                                                                                                                  | 40          |
| 5.6                | Roll centre .....                                                                                                                                           | 41          |
| <b>6</b>           | <b>Gauges and gauging methods .....</b>                                                                                                                     | <b>42</b>   |
| 6.1                | General .....                                                                                                                                               | 42          |
| 6.1.1              | Introduction .....                                                                                                                                          | 42          |
| 6.1.2              | Static gauge .....                                                                                                                                          | 43          |
| 6.1.3              | Kinematic gauge .....                                                                                                                                       | 44          |
| 6.1.4              | Dynamic gauge .....                                                                                                                                         | 44          |
| 6.1.5              | Uniform structure gauge .....                                                                                                                               | 45          |
| 6.1.6              | Gauges and interoperability .....                                                                                                                           | 45          |
| 6.1.7              | Illustration and comparison of static and kinematic gauges in the transverse direction ...                                                                  | 46          |
| 6.1.8              | Illustration of the dynamic gauge .....                                                                                                                     | 49          |
| 6.2                | Other gauging methods: General .....                                                                                                                        | 50          |
| 6.3                | Absolute gauging method .....                                                                                                                               | 50          |
| 6.4                | Comparative gauging method .....                                                                                                                            | 52          |
| <b>7</b>           | <b>Elements involved in the determination of a gauge .....</b>                                                                                              | <b>52</b>   |
| 7.1                | Introduction .....                                                                                                                                          | 52          |
| 7.2                | General .....                                                                                                                                               | 52          |
| 7.2.1              | In the transverse direction .....                                                                                                                           | 52          |
| 7.2.2              | In the vertical direction .....                                                                                                                             | 55          |
| 7.3                | Detailed analysis of the details to be shared between rolling stock and infrastructure depending of the method of determination of each of the gauges ..... | 56          |
| 7.3.1              | In the transverse direction .....                                                                                                                           | 56          |
| 7.3.2              | In the vertical direction .....                                                                                                                             | 81          |
| 7.3.3              | Contact ramps .....                                                                                                                                         | 92          |
| 7.3.4              | Rail and rail brake zone .....                                                                                                                              | 93          |
| <b>8</b>           | <b>Pantograph gauge .....</b>                                                                                                                               | <b>97</b>   |
| 8.1                | Pantograph kinematic gauge .....                                                                                                                            | 97          |
| 8.1.1              | General principle .....                                                                                                                                     | 97          |

|                                                                                         |                                                                         |     |
|-----------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-----|
| 8.1.2                                                                                   | Elements to be taken into account by the infrastructure .....           | 101 |
| 8.1.3                                                                                   | For the rolling stock .....                                             | 102 |
| 8.2                                                                                     | Pantograph dynamic gauge .....                                          | 106 |
| 8.2.1                                                                                   | Values taken into account by the rolling stock .....                    | 106 |
| 8.2.2                                                                                   | Values taken into account by the infrastructure .....                   | 106 |
| Annexe A (normative) Catalogue of gauges .....                                          |                                                                         | 107 |
| A.1                                                                                     | Static gauges .....                                                     | 107 |
| A.2                                                                                     | Kinematic gauges .....                                                  | 108 |
| A.3                                                                                     | Dynamic gauges .....                                                    | 109 |
| A.4                                                                                     | Uniform gauges .....                                                    | 109 |
| Annexe B (normative) Reference profiles and associated rules for static gauges .....    |                                                                         | 110 |
| B.1                                                                                     | Static gauges G1 and G2 .....                                           | 110 |
| B.1.1                                                                                   | Upper parts of static gauges G1 and G2 .....                            | 110 |
| B.1.2                                                                                   | Lower parts of static gauges G1 and G2 .....                            | 112 |
| B.2                                                                                     | Static gauges GA, GB and GC .....                                       | 115 |
| B.2.1                                                                                   | Lateral part .....                                                      | 115 |
| B.2.2                                                                                   | Static reference profiles for the upper parts .....                     | 115 |
| B.2.3                                                                                   | Associated rules .....                                                  | 116 |
| B.3                                                                                     | Static gauge GB1 and GB2 .....                                          | 120 |
| B.3.1                                                                                   | Lateral part .....                                                      | 120 |
| B.3.2                                                                                   | Static reference profiles for the upper parts .....                     | 120 |
| B.3.3                                                                                   | Associated rules .....                                                  | 121 |
| B.4                                                                                     | Static gauges OSJD .....                                                | 123 |
| B.4.1                                                                                   | General comment .....                                                   | 123 |
| B.4.2                                                                                   | Static reference profiles for the upper parts .....                     | 123 |
| B.4.3                                                                                   | Associated rules .....                                                  | 126 |
| B.4.4                                                                                   | Static reference profiles for the lower parts .....                     | 127 |
| B.5                                                                                     | Static gauge FIN 1 .....                                                | 128 |
| B.5.1                                                                                   | General comment .....                                                   | 128 |
| B.5.2                                                                                   | Static reference profile for the upper parts .....                      | 128 |
| B.5.3                                                                                   | Associated rules .....                                                  | 130 |
| B.5.4                                                                                   | Position of the platforms .....                                         | 130 |
| B.6                                                                                     | Spanish static gauges GHE16, GEA16, GEB16, GEC16, GEE10 and GED10 ..... | 131 |
| B.6.1                                                                                   | Reference profiles for static gauges .....                              | 131 |
| B.6.2                                                                                   | Basic rules .....                                                       | 137 |
| Annexe C (normative) Reference profiles and associated rules for kinematic gauges ..... |                                                                         | 141 |
| C.1                                                                                     | Kinematic gauges G1 and G2 .....                                        | 141 |
| C.1.1                                                                                   | Upper part of gauges G1 and G2 .....                                    | 141 |
| C.1.2                                                                                   | Gauges of the lower parts of G1, G2 .....                               | 143 |
| C.2                                                                                     | Kinematic gauges GA, GB, and GC .....                                   | 146 |
| C.2.1                                                                                   | Lateral part .....                                                      | 146 |
| C.2.2                                                                                   | Kinematic reference profiles for the upper parts .....                  | 146 |
| C.2.3                                                                                   | Associated rules .....                                                  | 147 |
| C.3                                                                                     | Kinematic gauges GB1 and GB2 .....                                      | 149 |
| C.3.1                                                                                   | Lateral part .....                                                      | 149 |
| C.3.2                                                                                   | Kinematic reference profiles for the upper parts .....                  | 149 |
| C.3.3                                                                                   | Associated rules .....                                                  | 150 |
| C.4                                                                                     | Kinematic gauge GI3 .....                                               | 151 |
| C.4.1                                                                                   | Upper parts .....                                                       | 151 |
| C.4.2                                                                                   | Reference profile for the lower parts .....                             | 152 |
| C.4.3                                                                                   | Associated rules .....                                                  | 153 |
| C.5                                                                                     | Kinematic gauge FR3.3 .....                                             | 153 |
| C.5.1                                                                                   | Lateral part .....                                                      | 153 |
| C.5.2                                                                                   | Kinematic reference profile for upper parts .....                       | 153 |
| C.5.3                                                                                   | Associated rules .....                                                  | 154 |
| C.6                                                                                     | Kinematic gauges BE1, BE2 and BE3 .....                                 | 156 |

|                                                                                              |                                                                                                                                                      |            |
|----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| C.6.1                                                                                        | Lateral part .....                                                                                                                                   | 156        |
| C.6.2                                                                                        | Kinematic reference profiles for the upper parts .....                                                                                               | 156        |
| C.6.3                                                                                        | Associated rules .....                                                                                                                               | 158        |
| C.6.4                                                                                        | Kinematic reference profiles for the lower parts .....                                                                                               | 159        |
| C.7                                                                                          | Kinematic gauges NL1 and NL2 .....                                                                                                                   | 160        |
| C.7.1                                                                                        | Reference profiles of kinematic gauges NL1 and NL2 .....                                                                                             | 160        |
| C.7.2                                                                                        | Associated rules .....                                                                                                                               | 161        |
| C.8                                                                                          | Kinematic gauges PTb, PTb+ and PTc .....                                                                                                             | 162        |
| C.8.1                                                                                        | Lateral part .....                                                                                                                                   | 162        |
| C.8.2                                                                                        | Associated rules .....                                                                                                                               | 164        |
| C.8.3                                                                                        | Taking the roll into account .....                                                                                                                   | 165        |
| C.8.4                                                                                        | Vertical geometric overthrow upwards and vertical allowance of the infrastructure .....                                                              | 165        |
| C.8.5                                                                                        | Kinematic reference profiles for the lower parts .....                                                                                               | 165        |
| C.8.6                                                                                        | Vertical geometric overthrow downwards and vertical allowance of the infrastructure ....                                                             | 166        |
| C.9                                                                                          | Kinematic gauge DE1 .....                                                                                                                            | 166        |
| C.9.1                                                                                        | General .....                                                                                                                                        | 166        |
| C.9.2                                                                                        | Kinematic reference profiles .....                                                                                                                   | 167        |
| C.9.3                                                                                        | Associated rules .....                                                                                                                               | 168        |
| C.9.4                                                                                        | Taking the roll into account .....                                                                                                                   | 168        |
| C.9.5                                                                                        | Vertical geometric overthrow downwards and vertical allowance of the infrastructure ....                                                             | 169        |
| C.10                                                                                         | Kinematic gauge DE2 .....                                                                                                                            | 169        |
| C.10.1                                                                                       | General .....                                                                                                                                        | 169        |
| C.10.2                                                                                       | Kinematic reference profiles .....                                                                                                                   | 169        |
| C.10.3                                                                                       | Associated rules .....                                                                                                                               | 170        |
| C.10.4                                                                                       | Taking the roll into account .....                                                                                                                   | 170        |
| C.10.5                                                                                       | Vertical geometric overthrow downwards and vertical allowance of the infrastructure ....                                                             | 171        |
| C.11                                                                                         | Kinematic gauge DE3 .....                                                                                                                            | 171        |
| C.11.1                                                                                       | Kinematic reference profiles .....                                                                                                                   | 171        |
| C.11.2                                                                                       | Associated rules .....                                                                                                                               | 171        |
| C.12                                                                                         | Spanish kinematic gauges GHE16, GEA16, GEB16, GEC16, GEC14, GEE10 and GED10 ..                                                                       | 172        |
| C.12.1                                                                                       | Reference profiles for kinematic gauges .....                                                                                                        | 172        |
| C.12.2                                                                                       | Associated rules .....                                                                                                                               | 181        |
| <b>Annexe D (normative) Reference profiles and associated rules for dynamic gauges .....</b> |                                                                                                                                                      | <b>184</b> |
| D.1                                                                                          | General .....                                                                                                                                        | 184        |
| D.2                                                                                          | Dynamic gauge SEa and SEc .....                                                                                                                      | 184        |
| D.2.1                                                                                        | Dynamic reference profile SEa .....                                                                                                                  | 184        |
| D.2.2                                                                                        | Dynamic reference profile SEc .....                                                                                                                  | 186        |
| D.2.3                                                                                        | Associated rules .....                                                                                                                               | 186        |
| <b>Annexe E (normative) Uniform gauges .....</b>                                             |                                                                                                                                                      | <b>188</b> |
| E.1                                                                                          | General information on gauges GUC, GU1, GU2 and Z-GCD .....                                                                                          | 188        |
| E.2                                                                                          | Uniform gauge GU1 .....                                                                                                                              | 188        |
| General                                                                                      | .....                                                                                                                                                | 188        |
| E.2.1                                                                                        | Basic data .....                                                                                                                                     | 189        |
| E.3                                                                                          | Uniform gauge Z -GCD .....                                                                                                                           | 190        |
| E.3.1                                                                                        | Uniform reference profile .....                                                                                                                      | 190        |
| E.3.2                                                                                        | Basic data .....                                                                                                                                     | 191        |
| <b>Annexe F (normative) Specific rules in the vertical direction .....</b>                   |                                                                                                                                                      | <b>192</b> |
| F.1                                                                                          | General .....                                                                                                                                        | 192        |
| F.2                                                                                          | Passing over link spans onto ferries .....                                                                                                           | 192        |
| F.3                                                                                          | Marshalling humps .....                                                                                                                              | 193        |
| F.3.1                                                                                        | Convention for gauges in groups G1, G2, GA, GB, GB1, GB2, GC, FR3.3, BE1, BE2, BE3,<br>GHE16, GEA16, GEB16, GEC16, GEC14, GEE10 AND GED10, etc ..... | 193        |
| F.3.2                                                                                        | Other agreements .....                                                                                                                               | 196        |
| <b>Annexe G (normative) Rules relating to pantographs .....</b>                              |                                                                                                                                                      | <b>197</b> |

|                                                                                                                                                                                                 |                                                                                             |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-----|
| G.1                                                                                                                                                                                             | Catalogue of standard heads .....                                                           | 197 |
| G.2                                                                                                                                                                                             | Reference vehicle parameters .....                                                          | 197 |
| G.3                                                                                                                                                                                             | Electrical insulating allowances .....                                                      | 198 |
| G.4                                                                                                                                                                                             | Characteristics of the collection system .....                                              | 198 |
| G.5                                                                                                                                                                                             | Specific cases .....                                                                        | 199 |
| G.5.1                                                                                                                                                                                           | Pantograph gauges linked to gauges BE1, BE2 and BE3, 3kV network .....                      | 199 |
| G.5.2                                                                                                                                                                                           | Pantograph gauges linked to gauges BE1, BE2 and BE3, 25 kV network .....                    | 200 |
| Annexe H (normative) Rules relating to access steps and platform installation .....                                                                                                             |                                                                                             | 201 |
| H.1                                                                                                                                                                                             | Actual and conventional gap between step and platform: general .....                        | 201 |
| H.2                                                                                                                                                                                             | Actual and conventional gap between step and platform: position of the platforms .....      | 203 |
| H.2.1                                                                                                                                                                                           | Actual position of the platforms .....                                                      | 203 |
| H.2.2                                                                                                                                                                                           | Conventional position of the platforms .....                                                | 204 |
| H.3                                                                                                                                                                                             | Actual and conventional gap between step and platform: position of the steps .....          | 206 |
| Annexe I (informative) Widening of the vehicles according to the possibilities offered by the infrastructure .....                                                                              |                                                                                             | 208 |
| I.1                                                                                                                                                                                             | General .....                                                                               | 208 |
| I.2                                                                                                                                                                                             | Possible gain on the track centre side .....                                                | 208 |
| I.2.1                                                                                                                                                                                           | Basic principle .....                                                                       | 208 |
| I.2.2                                                                                                                                                                                           | Application .....                                                                           | 210 |
| I.3                                                                                                                                                                                             | Possible gain on the structure side .....                                                   | 211 |
| Annexe J (normative) Application of the probability theory in conjunction with the limit values taking into account the oscillations and dissymmetry in the determination of allowance M1 ..... |                                                                                             | 212 |
| J.1                                                                                                                                                                                             | General .....                                                                               | 212 |
| J.2                                                                                                                                                                                             | Reminder of some principles of the probability theory .....                                 | 212 |
| J.3                                                                                                                                                                                             | Taking into account oscillations and dissymmetry in the determination of allowance M1 ..... | 213 |
| J.3.1                                                                                                                                                                                           | General .....                                                                               | 213 |
| J.3.2                                                                                                                                                                                           | Additional comments .....                                                                   | 214 |
| Annexe K (informative) A-deviations .....                                                                                                                                                       |                                                                                             | 216 |
| Bibliography .....                                                                                                                                                                              |                                                                                             | 218 |