



**SLOVENSKI STANDARD**  
**oSIST prEN 50367:2018**  
**01-april-2018**

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**Železniške naprave - Sistemi za odjem toka - Tehnični kriteriji za interaktivnost med odjemnikom toka in kontaktnim vodnikom (za doseganje prostega dostopa)**

Railway applications - Current collection systems - Technical criteria for the interaction between pantograph and overhead line (to achieve free access)

Bahnanwendungen - Zusammenwirken der Systeme - Technische Kriterien für das Zusammenwirken zwischen Stromabnehmer und Oberleitung für einen freien Zugang

Applications ferroviaires - Systèmes de captage de courant - Critères techniques d'interaction entre le pantographe et la ligne aérienne de contact (réalisation du libre accès)

**Ta slovenski standard je istoveten z: prEN 50367:2017**

<https://standards.iteh.ai/catalog/standards/sist/41233e19-e0e9-4990-ac56-1bad9ae76bd6/sist-en-50367-2020>

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**ICS:**

29.280      Električna vlečna oprema      Electric traction equipment

**oSIST prEN 50367:2018**

**en**



EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**DRAFT**  
**prEN 50367**

January 2018

ICS 29.280

Will supersede EN 50367:2012

English Version

## Railway applications - Current collection systems - Technical criteria for the interaction between pantograph and overhead line (to achieve free access)

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- Critères techniques d'interaction entre le pantographe et la  
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Stromabnehmer und Oberleitung für einen freien Zugang

This draft European Standard is submitted to CENELEC members for enquiry.  
Deadline for CENELEC: 2018-04-20.

It has been drawn up by CLC/SC 9XC.

If this draft becomes a European Standard, CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CENELEC in three official versions (English, French, German).  
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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

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202 **European foreword**

203 This document (prEN 50367:2018) has been prepared by CLC/TC 9XC "Electric supply and earthing  
204 systems for public transport equipment and ancillary apparatus (Fixed installations)".

205 This document is currently submitted to the Enquiry.

206 The following dates are proposed:

- latest date by which the existence of (doa) dor + 6 months  
this document has to be announced  
at national level
- latest date by which this document has to be (dop) dor + 12 months  
implemented at national level by publication of an  
identical national standard or by endorsement
- latest date by which the national standards (dow) dor + 36 months  
conflicting with this document have to (to be confirmed or  
be withdrawn modified when voting)

207 This document has been prepared under a mandate given to CENELEC by the European Commission and  
208 the European Free Trade Association, and supports essential requirements of EU Directive(s).

209 For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this  
210 document.

211 Compared with the previous version, the most significant changes in this version are:

- 212 • testing method for DC contact strips: 6.3, A.3;
- 213 • lateral deviation: changes to 5.2.5 based on RfS 51 from the European Union Agency for Railways;
- 214 • revision of 5.3.2, including updating of figures; <https://standards.iteh.ai/catalog/standards/sist/41233ef9-e0c9-4990-ac56-1bad9ae76bd6/sist-en-50367-2020>
- 215 • addition of an introduction for Annex B;
- 216 • addition and revision of Table 8;
- 217 • addition and revision of the assessment rules in Clause 9.

**prEN 50367:2018 (E)**218 **1 Scope**

219 This European Standard specifies requirements for the interaction between pantographs and overhead  
220 contact lines, to achieve to achieve free access.

221 NOTE These requirements are defined for a limited number of pantograph types, referred to as an 'interoperable  
222 pantograph' according to 5.3, together with the geometry and characteristics of compatible overhead contact lines.

223 This European Standard describes parameters and values for planned and future lines.

224 Annex B gives some parameters for existing lines (informative).

225 **2 Normative references**

226 The following documents are referred to in the text in such a way that some or all of their content constitutes  
227 requirements of this document. For dated references, only the edition cited applies. For undated references,  
228 the latest edition of the referenced document (including any amendments) applies.

229 EN 15273-1:2013+A1:2016, *Railway applications - Gauges - Part 1: General - Common rules for*  
230 *infrastructure and rolling stock*

231 EN 15273-2:2013+A1:2016, *Railway applications - Gauges - Part 2: Rolling stock gauge*

232 EN 15273-3:2013+A1:2016, *Railway applications - Gauges - Part 3: Structure gauges*

233 EN 50119:2009<sup>1</sup>, *Railway applications - Fixed installations - Electric traction overhead contact lines*

234 EN 50149:2012, *Railway applications - Fixed installations - Electric traction - Copper and copper alloy*  
235 *grooved contact wires*

236 EN 50206-1:2010, *Railway applications - Rolling stock - Pantographs: Characteristics and tests - Part 1:*  
237 *Pantographs for main line vehicles*

238 EN 50317:2012, *Railway applications - Current collection systems - Requirements for and validation of*  
239 *measurements of the dynamic interaction between pantograph and overhead contact line*

240 EN 50318:2002, *Railway applications - Current collection systems - Validation of simulation of the dynamic*  
241 *interaction between pantograph and overhead contact line*

242 EN 50388:2012, *Railway applications – Power supply and rolling stock – Technical criteria for the*  
243 *coordination between power supply (substation) and rolling stock to achieve interoperability*

244 EN 50405:2015<sup>2</sup>, *Railway applications – Current collection systems – Pantographs, testing methods for*  
245 *carbon contact strips*

246 IEC 60050-811:1991, *International Electrotechnical Vocabulary – Chapter 811: Electrical traction*

247 **3 Terms and definitions**

248 For the purposes of this document, the terms and definitions given in IEC 60050-811:1991 and the following  
249 apply.

250 ISO and IEC maintain terminological databases for use in standardization at the following addresses:

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<sup>1</sup> As impacted by EN 50119:2009/A1:2013.

<sup>2</sup> As impacted by EN 50405:2015/A1:2016.

- 251 • IEC Electropedia: available at <http://www.electropedia.org/>
- 252 • ISO Online browsing platform: available at <http://www.iso.org/obp>
- 253 **3.1**
- 254 **arcing**
- 255 flow of current through an air gap between a contact strip and a contact wire usually indicated by the
- 256 emission of intense light
- 257 [SOURCE: EN 50317:2012]
- 258 **3.2**
- 259 **automatic dropping device**
- 260 device that lowers the pantograph in the event of pantograph head failure or damage of the pantograph
- 261 head
- 262 [SOURCE: EN 50206-1:2010]
- 263 **3.3**
- 264 **contact force**
- 265 vertical force applied by the pantograph to the overhead contact line
- 266 Note 1 to entry: The contact force is the sum of forces of all contact points.
- 267 [SOURCE: EN 50317:2012]
- 268 **3.4**
- 269 **contact plane**
- 270 plane parallel to the base frame of the pantograph at the contact point
- 271 **3.5**
- 272 **contact point**
- 273 point of the mechanical contact between a contact strip and a contact wire
- 274 [SOURCE: EN 50317:2012]
- 275 **3.6**
- 276 **contact wire height**
- 277 distance from the top of the rail to the lower face of the contact wire, measured perpendicular to the track
- 278 [SOURCE: EN 50119:2013]
- 279 **3.7**
- 280 **continuous pantograph head profile**
- 281 pantograph head with collector strips and horns suspended in one piece
- 282 **3.8**
- 283 **encroachment of the pantograph head above the contact plane**
- 284 perpendicular distance from the contact plane to the highest point of the pantograph head
- 285 Note 1 to entry: Additional information is given in EN 15273-1:2013+A1:2016, Figure 45.
- 286 **3.9**
- 287 **maximum contact wire height**
- 288 maximum possible contact wire height which the pantograph is required to reach, in all cases
- 289 [SOURCE: EN 50119:2013]

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- 290 **3.10**  
 291 **maximum design contact wire height**  
 292 maximum theoretical contact wire height not including tolerances and uplift, which the pantograph is  
 293 required to reach
- 294 **3.11**  
 295 **maximum width of pantograph head**  
 296 maximum distance measured along the axis of the track between the outer edges of the contact strips
- 297 **3.12**  
 298 **mean contact force ( $F_m$ )**  
 299 statistical mean value of the contact force
- 300 Note 1 to entry:  $F_m$  is formed by the static and aerodynamic components of the pantograph contact force.
- 301 [SOURCE: EN 50206-1:2010]
- 302 **3.13**  
 303 **mechanical kinematic pantograph gauge**  
 304 maximum gauge of the pantograph head under all operating conditions
- 305 Note 1 to entry: Additional information is given in EN 15273-1:2013+A1:2016, Clause 3.
- 306 **3.14**  
 307 **minimum contact wire height**  
 308 minimum value of the contact wire height in the span to avoid arcing between one or more contact wires  
 309 and vehicles in all conditions
- 310 [SOURCE: EN 50119:2013]
- 311 **3.15**  
 312 **neutral section**  
 313 section of a contact line provided with a sectioning point at each end, to prevent successive electrical  
 314 sections differing in voltage or phase being connected together by the passage of current collectors
- 315 [SOURCE: IEC 60050-811:1991, 36-16]
- 316 **3.16**  
 317 **nominal contact wire height**  
 318 nominal value of the contact wire height at a support in normal conditions
- 319 [SOURCE: EN 50119:2013]
- 320 **3.17**  
 321 **non-continuous pantograph head profile**  
 322 pantograph head with collector strips separately (independently) suspended from the main horns
- 323 **3.18**  
 324 **overhead contact line**  
 325 contact line placed above (or beside) the upper limit of the vehicle gauge and supplying vehicles with  
 326 electric energy through roof mounted current collection equipment
- 327 [SOURCE: IEC 60050-811:1991, 33-02]
- 328 **3.19**  
 329 **percentage of arcing**  
 330 proportion of driving time with arcing

331 **3.20**  
 332 **static contact force**  
 333 vertical force exerted upward by the pantograph head on the overhead contact line, caused by the  
 334 pantograph-raising device, whilst the pantograph is raised and the vehicle is stationary

335 **3.21**  
 336 **transition zone of pantograph head**  
 337 range for the transition point between non-independently suspended parts and independently suspended  
 338 parts of the pantograph head (see Figures 1 to 3)

339 **3.22**  
 340 **working range in height**  
 341 range of permissible contact wire heights for interaction

342 **3.23**  
 343 **limit of dewirement  $b_v$**   
 344 maximum permissible lateral deviation of contact wire position from pantograph head center to prevent  
 345 dewirement (limit of stability for lateral interaction between contact wire and pantograph, described by the  
 346 transition point at head profile, where the angle exceed  $40^\circ$  (unit m)

347 **3.24**  
 348 **working range of pantograph head**  
 349 lateral range of contact point at pantograph head for operation under normal conditions (serviceability)

350 **3.25**  
 351 **reference height**  
 352 height of contact point used for calculation of lateral position of contact wire at pantograph head

## 353 **4 Symbols and abbreviations**

354 For the purposes of this document, the following symbols and abbreviations apply.

$A$	inner distance between two adjacent pantographs
$A'$	outer distance between first and last operating pantographs
$A''$	inner distance between one and the second following operating pantographs
AC	Alternating Current
$b'_h$	length of mechanical kinematic pantograph gauge at contact wire height, $h$
$b'_{h,mec}$	width of mechanical kinematic pantograph gauge at reference height for interaction between contact wire and pantograph [m] (inclusive of tolerances of overhead contact line)
$b'_{o,mec}$	width of mechanical kinematic pantograph gauge at maximum verification height of the pantograph gauge in a raised position [m] (inclusive of tolerances of overhead contact line)
$b'_{u,mec}$	width of mechanical kinematic pantograph gauge at minimum verification height of the pantograph gauge in a raised position [m] (inclusive of tolerances of overhead contact line)
$b'_{h,OCL}$	width of mechanical kinematic gauge for serviceability of overhead contact line at reference height for interaction between contact wire and pantograph [m]
$b'_{o,OCL}$	width of mechanical kinematic gauge for serviceability of overhead contact line at maximum verification height of the pantograph gauge in a raised position [m]
$b'_{u,OCL}$	width of mechanical kinematic gauge for serviceability of overhead contact line at minimum verification height of the pantograph gauge in a raised position [m]
$b_v$	maximum permissible lateral deviation of contact wire position from pantograph head centre to prevent dewirement (limit of stability for lateral interaction between contact wire and pantograph, described by the transition point at head profile, where the angle exceeds $40^\circ$ ) [m]

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$b_w$	half-length of the pantograph head [m]
$b_{w,c}$	half-length of the pantograph head conducting length (with insulating horns) or working length (with conducting horns) [m]
$b'_{h, OCL}$	width of mechanical kinematic gauge for serviceability of overhead contact line at reference height for interaction between contact wire and pantograph [m]
$d$	dimension over wheel flanges [m]
$d_{cant}$	lateral deviation of contact wire position by vertical uplift at tracks with cant [m]
$d_{instl}$	tolerance of static lateral position of contact wire height [m]
$d_{instv}$	tolerance of static vertical position of contact wire [m]
$d_l$	permissible lateral deviation of contact wire from track centre line [m]
$d_{stab}$	permissible lateral deviation of contact wire from track centre for stability against dewirement [m]
$d_{serv}$	permissible lateral deviation of contact wire from track centre line to meet the serviceability limit state [m]
$d_{mess}$	tolerance of measurement, measuring errors refer to horizontal position of contact wire [m]
$d_{pole}$	lateral deviation of contact wire position issued on change of pole deflection under additional load due to wind speed for serviceability in nominal contact wire height [m]
$d_{supp}$	lateral deviation of contact wire position issued on movement of cantilever for change wire temperature [m]
$d_{tens}$	lateral deviation of contact wire position issued on reduced tension force of wires considering efficiency of tensioning devices [m]
$D$	overall length of neutral section as distance between adjacent systems/phases including overlapping parts taking into account the uplift by pantograph passage and insulation clearances [m]
$Dl'_o$	reference cant, which is the maximum value from cant $D_o$ and cant deficiency $l_o$ [m]
$D'$	length of neutral section excluding overlapping parts taking into account the uplift by pantograph passage and insulation clearances [m]
$D_o$	fixed cant value taken into account by agreement between the rolling stock and the infrastructure with regard to the kinematic gauge [m]
$d$	length of insulator inserted in contact wire [m]
$d_l$	lateral deviation of contact wire [m]
DC	Direct Current
$e_{po}$	pantograph sway at the maximum verification height of the pantograph gauge in a raised position [m]
$e_{pu}$	pantograph sway at the minimum verification height of the pantograph gauge in a raised position [m]
$e_{phref}$	pantograph sway at the reference height for interaction between contact wire and pantograph [m]
$F_m$	mean contact force [N]
$F_{max}$	maximum contact force [N]
$F_{m, min}$	minimum mean contact force [N]
$F_{m, max}$	maximum mean contact force [N]
$F_{min}$	minimum contact force [N]
$F_{stat}$	static contact force [N]
$f_s$	maximum uplift of contact wire within the span length [m]