

SLOVENSKI STANDARD

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**Železniške naprave - Stabilne naprave električne vleke - Kontaktni vodniki
električne vleke**

Railway applications - Fixed installations - Electric traction overhead contact lines

Bahnwendungen - Ortsfeste Anlagen - Oberleitungen für den elektrischen Zugbetrieb

Applications ferroviaires - Installations fixes - Lignes aériennes de contact pour la traction
électrique

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29.280 Električna vlečna oprema Electric traction equipment

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English Version

**Railway applications - Fixed installations - Electric traction
overhead contact lines**

Applications ferroviaires - Installations fixes - Lignes
aériennes de contact pour la traction électrique

Bahnanwendungen - Ortsfeste Anlagen - Oberleitungen für
den elektrischen Zugbetrieb

This draft European Standard is submitted to CENELEC members for enquiry.
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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.

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211 European foreword

212 This document has been prepared by CLC/SC 9XC, "Electric supply and earthing systems for public
213 transport equipment and ancillary apparatus (fixed installations) of CLC/TC 9X "Electrical and electronic
214 applications for railways".

215 It is currently submitted to the Enquiry.

216 This document will supersede EN 50119:2009.

217 The following dates are proposed:

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| • latest date by which the national standards conflicting with this document have to be withdrawn | (dow) | dor + 36 months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

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

220 For the relationship with EU Directive(s) 2008/57/EC, see informative Annex ZZ, which is an integral part of
221 this document.

Document Preview

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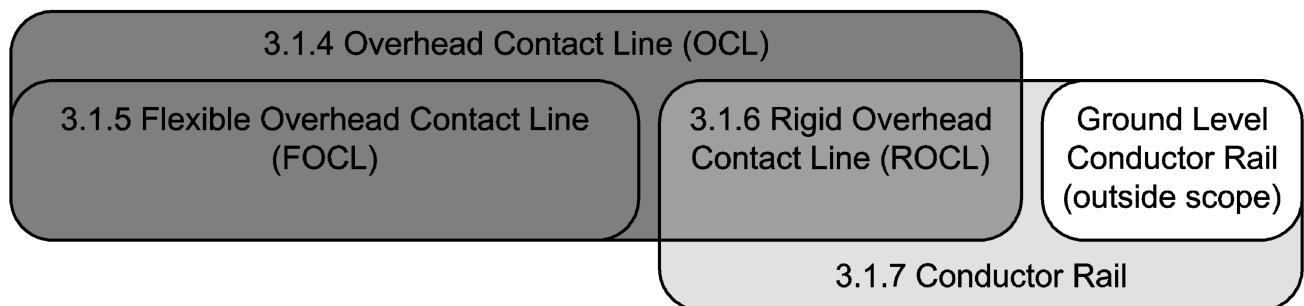
222 1 Scope

223 This European Standard applies to electric traction overhead contact line systems in heavy railways, light
224 railways, trolley busses and industrial railways of public and private operators.

225 It applies to new installations of overhead contact line systems and for the complete reconstruction of
226 existing overhead contact line systems.

227 This standard contains the requirements and tests for the design of overhead contact lines, requirements
228 for structures and their structural calculations and verifications as well as the requirements and tests for the
229 design of assemblies and individual parts.

230 This standard does not provide requirements for conductor rail systems where the conductor rails are
231 located adjacent to the running rails.



232

233 **Figure 1 — Scope of Overhead Contact Line**

234 2 Normative references

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

238 EN 206:2013+A1:2016, *Concrete - Specification, performance, production and conformity*

239 EN 485 (all parts), *Aluminium and aluminium alloys - Sheet, strip and plate*

240 EN 755 (all parts), *Aluminium and aluminium alloys- Extruded rod/bar, tube and profiles*

241 EN ISO 898-1:2013, *Mechanical properties of fasteners made of carbon steel and alloy steel - Part 1: Bolts, screws and studs with specified property classes - Coarse thread and fine pitch thread (ISO 898-1:2013)*

243 EN 1090 (all parts), *Execution of steel structures and aluminium structures*

244 EN ISO 1461:2009, *Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods (ISO 1461:2009)*

246 EN 1536:2010+A1:2015, *Execution of special geotechnical work – Bored piles*

247 EN 1537:2013, *Execution of special geotechnical works - Ground anchors*

248 EN 1991-1-4:2005, *Eurocode 1: Actions on structures - Part 1-4: General actions - Wind actions*

249 EN 1991-2:2003, *Eurocode 1: Actions on structures - Part 2: Traffic loads on bridges*

250 EN 1992 (all parts), *Eurocode 2 – Design of concrete structures*

251 EN 1993 (all parts), *Eurocode 3: Design of steel structures*

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- 252 EN 1995 (all parts), *Eurocode 5: Design of timber structures*
- 253 EN 1997-1:2004, *Eurocode 7: Geotechnical design - Part 1: General rules*
- 254 EN 1997-2:2007, *Eurocode 7 - Geotechnical design - Part 2: Ground investigation and testing*
- 255 EN 1998 (all parts), *Eurocode 8: Design of structures for earthquake resistance*
- 256 EN 1999 (all parts), *Eurocode 9: Design of aluminium structures*
- 257 EN 10025 (all parts), *Hot rolled products of structural steels*
- 258 EN 10149 (all parts), *Hot-rolled flat products made of high yield strength steels for cold forming*
- 259 EN 10164:2004, *Steel products with improved deformation properties perpendicular to the surface of the product - Technical delivery conditions*
- 261 EN 10210 (all parts), *Hot finished structural hollow sections of non-alloy and fine grain steels*
- 262 EN 10219 (all parts), *Hot finished structural hollow sections of non-alloy and fine grain steels*
- 263 EN 12699:2015, *Execution of special geotechnical works - Displacement piles*
- 264 EN 12843:2004, *Precast concrete products - Masts and poles*
- 265 EN 14229:2010, *Structural timber - Wood poles for overhead lines*
- 266 EN 15273 (all parts), *Railway applications Guages*
- 267 EN 50110-1, *Operation of electrical installations - Part 1: General requirements*
- 268 EN 50121-2:2017, *Railway applications – Electromagnetic compatibility – Part 2: Emission of the whole railway system to the outside world*
- 270 EN 50122 (all parts), *Railway applications – Fixed installations – Electrical safety, earthing and bonding*
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- 271 EN 50123 (all parts), *Railway applications – Fixed installations – D.C. switchgear*
- 272 EN 50124 (all parts), *Railway applications – Insulation coordination*
- 273 EN 50125-2:2002, *Railway applications - Environmental conditions for equipment - Part 2: Fixed electrical installations*
- 275 EN 50149:2012, *Railway applications - Fixed installations - Electric traction - Copper and copper alloy grooved contact wires*
- 276 EN 50152 (all parts), *Railway applications - Fixed installations - Particular requirements for alternating current switchgear*
- 279 EN 50163:2004, *Railway applications - Supply voltages of traction systems*
- 280 EN 50182:2001, *Conductors for overhead lines - Round wire concentric lay stranded conductors*
- 281 EN 50206-1:2010, *Railway applications - Rolling stock - Pantographs: Characteristics and tests - Part 1: Pantographs for main line vehicles*

- 283 EN 50206-2:2010, *Railway applications - Rolling stock - Pantographs: Characteristics and tests - Part 2: Pantographs for metros and light rail vehicles*
- 285 EN 50317:2012, *Railway applications - Current collection systems - Requirements for and validation of measurements of the dynamic interaction between pantograph and overhead contact line*
- 287 EN 50318:2002, *Railway applications - Current collection systems - Validation of simulation of the dynamic interaction between pantograph and overhead contact line*
- 289 EN 50341-1:2012, *Overhead electrical lines exceeding AC 1 kV - Part 1: General requirements - Common specifications*
- 291 EN 50345:2009, *Railway applications - Fixed installations - Electric traction - Insulating synthetic rope assemblies for support of overhead contact lines*
- 293 EN 50367:2012, *Railway applications - Current collection systems - Technical criteria for the interaction between pantograph and overhead line (to achieve free access)*
- 295 EN 50388:2012, *Railway Applications - Power supply and rolling stock - Technical criteria for the coordination between power supply (substation) and rolling stock to achieve interoperability*
- 297 EN 50526 (all parts), *Railway applications. Fixed Installations. D.C. surge arresters and voltage limiting device*
- 299 EN 60071 (all parts), *Insulation co-ordination (IEC 60071, all parts)*
- 300 EN 60099 (all parts), *Surge arresters (IEC 60099, all parts)*
- 301 EN 60168:1994, *Tests on indoor and outdoor post insulators of ceramic material or glass for systems with nominal voltages greater than 1 kV (IEC 60168:1994)*
- 303 EN 60305:1996, *Insulators for overhead lines with a nominal voltage above 1 kV - Ceramic or glass insulator units for a.c. systems - Characteristics of insulator units of the cap and pin type (IEC 60305:1995)*
- 305 EN 60383 (all parts), *Insulators for overhead lines with a nominal voltage above 1 kV (IEC 60383, all parts)*
- 306 EN 60433:1998, *Insulators for overhead lines with a nominal voltage above 1 kV - Ceramic insulators for a.c. systems - Characteristics of insulator units of the long rod type IEC 60433:1998)*
- 308 EN 60529:1991, *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*
- 309 EN 60660:1999, *Insulators - Tests on indoor post insulators of organic material for systems with nominal voltages greater than 1 kV up to but not including 300 kV (IEC 60660:1999)*
- 311 EN 60672 (all parts), *Ceramic and glass insulating materials (IEC 60672, all parts)*
- 312 EN 60947-1:2007, *Low-voltage switchgear and controlgear - Part 1: General rules (IEC 60947:1:2007)*
- 313 EN 61109:2008, *Insulators for overhead lines - Composite suspension and tension insulators for a.c. systems with a nominal voltage greater than 1 000 V - Definitions, test methods and acceptance criteria (IEC 61109:2008)*
- 316 EN 61284:1997, *Overhead lines - Requirements and tests for fittings (IEC 61284:1997)*
- 317 EN 61325:1995, *Insulators for overhead lines with a nominal voltage above 1 kV - Ceramic or glass insulator units for d.c. systems - Definitions, test methods and acceptance criteria (IEC 61325:1995)*

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- 319 EN 61773:1996, *Overhead lines - Testing of foundations for structures (IEC 61773:1996)*
- 320 EN 61952:2008, *Insulators for overhead lines - Composite line post insulators for A.C. systems with a nominal voltage greater than 1 000 V - Definitions, test methods and acceptance criteria (IEC 61952:2008)*
- 322 EN 62271-102:2002, *High-voltage switchgear and controlgear - Part 102: Alternating current disconnectors and earthing switches (IEC 62271-102:2001)*
- 324 EN 62271-103:2011, *High-voltage switchgear and controlgear - Part 103: Switches for rated voltages above 1 kV up to and including 52 kV (IEC 62271-103:2011)*
- 326 EN 62621:2016, *Railway applications - Fixed installations - Electric traction - Specific requirements for composite insulators used for overhead contact line systems (IEC 62621:2016)*
- 328 IEC 60050-811:1991, *International Electrotechnical Vocabulary - Chapter 811: Electric traction*
- 329 IEC 60273:1990, *Characteristics of indoor and outdoor post insulators for systems with nominal voltages greater than 1000 V*
- 331 IEC/TS 61245:2015, *Artificial pollution tests on high-voltage ceramic and glass insulators to be used on d.c. systems*

333 **3 Terms and definitions**

334 For the purposes of this document, the terms and definitions given in IEC 60050-811 and the following
335 apply.

336 **3.1 Systems**337 **3.1.1****338 contact line system**

339 support network for supplying electrical energy from substations to electrically powered traction units, which
340 covers both flexible and rigid overhead contact line systems; the electrical limits of which being the feeding
341 point and the contact point to the current collector

342 Note 1 to entry The mechanical system may comprise:

- [SIST EN 50119:2020](https://standards.iteh.ai/catalog/standards/sist/1217219b-f4a2-4559-b762-4b975bbba5bd/sist-en-50119-2020)
<https://standards.iteh.ai/catalog/standards/sist/1217219b-f4a2-4559-b762-4b975bbba5bd/sist-en-50119-2020>
- the contact line;
 - structures and foundations;
 - supports and any components supporting or registering the conductors;
 - head and cross spans;
 - tensioning devices;
 - along-track feeders, reinforcing feeders, and other lines like earth wires and return conductors as far as they are supported from contact line system structures;
 - disconnectors;
 - over-voltage protection devices;
 - conductors connected permanently to the contact line for supply of other electrical equipment such as lights, signal operation, point control and point heating;
 - any other equipment necessary for operating the contact line.

355 **3.1.2****356 contact line**

357 conductor system for supplying traction units with electrical energy via current-collection equipment

358 Note 1 to entry This includes all current-collecting conductors and conducting rails or bars, including the following:

359 — reinforcing feeders;
360 — cross-track feeders;
361 — electrical connectors;
362 — sectioning devices;
363 — supports that are not insulated from the conductors;
364 — insulators connected to live parts;
365 — catenary wires;
366 — auxiliary catenary wires;
367 — stitch wires;
368 — droppers;
369 but excluding other conductors, such as the following:
370 — along-track feeders;
371 — earth wires and return conductors.

372 **3.1.3**
373 **overhead contact line system**

374 contact line system using an overhead contact line to supply current for use by traction units

375 **3.1.4**
376 **overhead contact line**

377 contact line placed above or beside the upper limit of the vehicle gauge, supplying vehicles with electrical
378 energy via roof-mounted current collection equipment

379 Note 1 to entry: The overhead contact line may be of a flexible or rigid configuration.

380 **3.1.5**
381 **flexible overhead contact line**

382 flexible metallic conductor intended to interface with a vehicle mounted current collector

383 Note 1 to entry: The flexible overhead line may be a contact line with catenary suspension (IEC 60050–811–33–05)
384 or a single tramway equipment (IEC 60050–811–33–03). [50119:2020](#)

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385 **3.1.6**
386 **rigid overhead contact line**

387 rigid overhead contact line, of simple or composite section, mounted above or beside the upper limit of the
388 vehicle gauge, supplying traction units with electrical energy via roof-mounted current collection equipment

389 Note 1 to entry: In this standard rigid overhead contact line is used to define conductor rail (3.1.7) mounted in an
390 overhead position.

391 **3.1.7**
392 **conductor rail**

393 rigid metallic conductor mounted on insulators intended to interface with a vehicle mounted current collector

394 Note 1 to entry: See also IEC 60050-811-34-01.

395 Note 2 to entry: The conductor rail may be mounted in a variety of positions including at ground level or overhead.

396 Note 3 to entry: The conductor rail may be of composite construction.

397 **3.1.8**
398 **supporting assembly**

399 assembly of components attached to the main support structure that supports and registers the overhead
400 contact line

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- 401 **3.1.9**
 402 **static load gauge**
 403 maximum cross-sectional profile of the vehicles using the railway line
- 404 **3.1.10**
 405 **kinematic load gauge**
 406 static load gauge enlarged to allow for dynamic movements of the vehicle, e.g. suspension travel and
 407 bounce
- 408 **3.1.11**
 409 **kinematic envelope**
 410 kinematic load gauge further enlarged to allow for possible tolerances in the position of the track
- 411 **3.1.12**
 412 **swept envelope**
 413 kinematic envelope enlarged to allow for centre and end throw of the vehicles on horizontal and vertical
 414 curves
- 415 **3.1.13**
 416 **tensioning device**
 417 device to maintain the tension of conductors within the system design parameters
- 418 **3.1.14**
 419 **urban mass transportation system**
 420 light rail, trolleybus and tramway system, operating in urban areas, excluding heavy rail systems
- 421 **3.2 Conductors**
- 422 **3.2.1**
 423 **along-track feeder**
 424 overhead conductor mounted on the same structure as the overhead contact line to supply successive
 425 feeding points
- 426 **3.2.2**
 427 **catenary wire**
 428 longitudinal conductor supporting the contact wire or wires either directly or indirectly
<https://standards.iteh.ai/catalog/standards/sist/12172190-142-4559-0702-4b975bbba5bd/sist-en-50119-2020>
- 429 **3.2.3**
 430 **reinforcing feeder**
 431 overhead conductor mounted adjacent to the overhead contact line, and directly connected to it at frequent
 432 intervals, in order to increase the effective cross sectional area of the overhead contact line
- 433 **3.3 Electrical**
- 434 **3.3.1**
 435 **nominal voltage**
 436 voltage by which an installation or part of an installation is designated
- 437 Note 1 to entry The voltage of the contact line may differ from the nominal voltage by a quantity within permitted
 438 tolerances given in EN 50163.
- 439 **3.3.2**
 440 **feeding section**
 441 electrical section of the route fed by individual track feeder circuit breakers within the area supplied by the
 442 substation