



SLOVENSKI STANDARD
oSIST prEN IEC 60652:2020
01-marec-2020

Preskusi obremenitev nosilnih konstrukcij nadzemnih vodov

Loading tests on overhead line structures

Belastungsprüfungen an Freileitungstragwerken

Essais mécaniques des structures de lignes aériennes

Ta slovenski standard je istoveten z: prEN IEC 60652:2019

[oSIST prEN IEC 60652:2020](https://standards.iteh.ai/catalog/standards/sist/8d3cb6b7-82f7-48cf-8f89-7e2e264dcd00/osist-pren-iec-60652-2020)

<https://standards.iteh.ai/catalog/standards/sist/8d3cb6b7-82f7-48cf-8f89-7e2e264dcd00/osist-pren-iec-60652-2020>

ICS:

29.240.20 Daljnovodi Power transmission and
distribution lines

oSIST prEN IEC 60652:2020

en,fr,de

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[oSIST prEN IEC 60652:2020](https://standards.iteh.ai/catalog/standards/sist/8d3cb6b7-82f7-48cf-8f89-7e2e264dcd00/osist-pren-iec-60652-2020)

<https://standards.iteh.ai/catalog/standards/sist/8d3cb6b7-82f7-48cf-8f89-7e2e264dcd00/osist-pren-iec-60652-2020>



11/270/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: IEC 60652 ED3	
DATE OF CIRCULATION: 2019-12-27	CLOSING DATE FOR VOTING: 2020-03-20
SUPERSEDES DOCUMENTS:	

IEC TC 11 : OVERHEAD LINES	
SECRETARIAT: South Africa	SECRETARY: Mr John Dlamini
OF INTEREST TO THE FOLLOWING COMMITTEES: TC 7,TC 115,TC 122	PROPOSED HORIZONTAL STANDARD: <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: <input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input type="checkbox"/> QUALITY ASSURANCE <input checked="" type="checkbox"/> SAFETY	
<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING	<input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING
<p>Attention IEC-CENELEC parallel voting oSIST prEN IEC 60652:2020 https://standards.iteh.ai/catalog/standards/sist/8d3cb6b7-82f7-48cf-8f89-2020-03-01-pr-en-iec-60652-2020 Committee Draft for pr-en-iec-60652-2020</p> <p>The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting.</p> <p>The CENELEC members are invited to vote through the CENELEC online voting system.</p>	

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE:

Loading tests on overhead line structures

PROPOSED STABILITY DATE: 2026

NOTE FROM TC/SC OFFICERS:

Copyright © 2019 International Electrotechnical Commission, IEC. All rights reserved. It is permitted to download this electronic file, to make a copy and to print out the content for the sole purpose of preparing National Committee positions. You may not copy or "mirror" the file or printed version of the document, or any part of it, for any other purpose without permission in writing from IEC.

1	1.	Scope	4
2	2.	Normative references	4
3	3.	Definitions	4
4	4.	Categories of tests	5
5	4.1	Design tests	5
6	4.2	Sample tests	5
7	5.	General test criteria	6
8	6.	Acceptability of test station	6
9	7.	Test specification	6
10	8.	Test programme.....	8
11	9.	Assembly of support	8
12	10.	Load application.....	8
13	10.1	Combined loads	8
14	10.2	Precautions for load application	9
15	10.3	Load levels.....	9
16	10.4	Destruction tests	9
17	10.5	Tolerances on applied loads.....	9
18	10.6	Loading rate and holding period	9
19	11.	Measurements	11
20	11.1	Load and angle measurements.....	11
21	11.2	Deflection measurements.....	11
22	11.3	Strain measurements	11
23	12.	Sequence of test loading cases.....	11
24	13.	Video documentation	11
25	14.	Acceptance criteria	11
26	15.	Premature failure	12
27	15.1	Design tests	12
28	15.2	Sample tests	12
29	15.3	Replacement of components	12
30	16.	Material specification	12
31	17.	Test report	13
32	18.	Record and traceability	14

33

34

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**LOADING TESTS ON OVERHEAD
LINE STRUCTURES**
FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60652 has been prepared by IEC technical committee 11: Overhead lines.

This second edition cancels and replaces the first edition, published in 1979, and constitutes a technical revision.

The text of this standard is based on the following documents:

FDIS	Report on voting
11/167/FDIS	11/168/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

The committee has decided that the contents of this publication will remain unchanged until 2004. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

LOADING TESTS ON OVERHEAD LINE STRUCTURES

79
80
81
82
83

84 1. Scope

85 This International Standard specifies the methods and procedures of testing supports for overhead
86 lines.

87 It is applicable to the testing of supports and structures of overhead lines.

88 There is no restriction on the type of material used in the fabrication of the supports which may
89 include, but not be limited to, metallic alloys, concrete, timber, laminated wood and composite
90 materials. If required by the client, this standard may also be applied to the testing of
91 telecommunication supports, railway/tramway overhead electrification supports, electrical substation
92 gantries, street lighting columns, wind turbine towers, ski-lift supports, etc.

93 Tests on reduced scale models of supports are not covered by this standard.

94 2. Normative references

95 The following referenced documents are indispensable for the application of this document. For dated
96 references, only the edition cited applies. For undated references, the latest edition of the referenced
97 document (including any amendments) applies.

98 IEC 60050(466):1990, *International Electrotechnical Vocabulary (IEV) – Chapter 466: Overhead lines*

99 ISO/IEC 17025:1999, *General requirements for the competence of testing and calibration laboratories*

100 3. Definitions

101 For the purposes of this International Standard, the following definitions apply. The definitions listed
102 below supplement those given in IEC 60050(466).

103 1.1 3.1

104 **client**

105 organization which contracts with the testing station and provides the test specification

106 1.2 3.2

107 **design load**

108 load for which the support has been designed

109

110 **1.3 3.3**
111 **failure load**
112 point at which the support cannot carry any additional load

113 NOTE It is also known as the limit state failure load and is determined during a destruction test on the support.

114 **1.4 3.4**
115 **Realignment**

116 Realignment is the process used for restoring the original 'vertical' position of the tower after being
117 permanently deformed due to an intermediate loading case testing. This process usually requires
118 release of bolts in connections, pulling back the tower to its original position, and finally re-tightening
119 bolts. This procedure is not recommended.

120 **1.5 3.4**
121 **test report**

122 document summarizing all the relevant aspects of the tests

123 **4. Categories of tests**

124 The objective of support tests is to verify the design method and inherent assumptions, the method of
125 member detailing and the quality of fabrication, manufacture and material.

126 With respect to the purpose of the test, the level of instrumentation and the method of execution, this
127 standard refers to two categories of tests:

- 128 a) design tests;
129 b) sample tests.

130 **4.1 Design tests**

131 Design tests are normally carried out on prototype supports, with one or more of the following
132 objectives:

- 133 a) as part of a research and/or development programme in the design of an innovative support;
134 b) to verify compliance of the support design with the specifications (also known as type tests on a
135 prototype support);
136 c) to develop and/or validate a new design standard or methodology;
137 d) to develop and/or validate new fabrication processes.

138 When tests are carried out to verify design parameters, the test support shall be identical as far as
139 possible to the serial production supports (see clause 5, first paragraph). Tests on full scale sections
140 or part of the support may also be undertaken.

141 Design tests shall be carried out to at least the design load or to failure, especially when testing
142 according to 4.1b) and/or 4.1c).

143 **4.2 Sample tests**

144 These are intended for use either prior to or during the fabrication of the production of a batch of
145 supports to act as a check on the quality of the fabrication, or on the materials being used. The
146 support shall be taken at random from the serial production supports during manufacture. The test
147 constitutes the acceptance of the production.

148 Sample tests are taken to a specific percentage of the design load (usually 100 %), as stipulated in
149 the test specification.

150

iTeh STANDARD PREVIEW
(standards.iteh.ai)

oSIST prEN IEC 60652:2020
<https://standards.iteh.ai/catalog/standards/sist/7e2e264d-e400-4000-osist-pr-en-iec-60652-2020>

151 **5. General test criteria**

152 For a design test (according to 4.1b) or 4.1c)), the material(s) and the manufacturing processes used
153 in the fabrication of the prototype support shall be to the same specifications as those used during the
154 serial fabrication of the supports. These specifications shall include the member sectional properties,
155 connection details, e.g. bolt or weld sizes, material grades and fabrication processes. Prior to the
156 commencement of the prototype support fabrication, agreement shall be made with regard to the
157 surface coating of the support.

158 Agreement shall also be made with respect to the organization responsible for the checking of the
159 support prior to the testing.

160 If a sample test is required on a production support, the components may be chosen at random from
161 the batch.

162 Whether it is for the design test (according to 4.1b)) or the sample test, the support shall successfully
163 withstand the loads specified by the client.

164 **6. Acceptability of test station**

165 If required by the client, the testing station shall be accredited by an external organization to
166 perform this type of test according to the procedures of quality assurance defined by ISO/IEC
167 17025.

168 The following minimum requirements shall be fulfilled by the test station:

- 169 – the layout of the station is generally safe (e.g. in case of structure collapse the control building and
170 the observation area are not located in the danger zone)
- 171 – the station has adequate provision to limit the severity of the collapse of the tower in the event of a
172 failure (e.g. back-stays or others)
- 173 – all personnel is provided with adequate personal safety equipment, have received proper training,
174 and all procedures has been validated from the safety point of view
- 175 – all lifting equipment has been regularly maintained, tested and certified
- 176 – the station pad is clear of loose material during the test
- 177 – the rigging equipment is well maintained (e.g. pulley blocks greased), tested and certified
- 178 – the load application devices (e.g. winches, hydraulic rams) do not impart dynamic effects when
179 operated
- 180 – the equipment employed for the mechanical testing of the steel is calibrated
- 181 – the load measuring devices are calibrated against an instrument which itself is calibrated by a
182 recognized independent calibration organization.

183

184 **7. Test specification**

185 The client shall prepare and transmit to the testing station, at an agreed time prior to the delivery of
186 the support, the following appropriate information:

- 187 – Workshop and/or erection drawings of the support.
- 188 – The mass of each section of the support.
- 189 – Precautions to be observed during the unloading and unpacking.
- 190 – Requirements for the support assembly or disassembly, including if necessary details for lifting the
191 support from the horizontal.
- 192 – Bolt tightening requirements.
- 193 – The tensions for any guys.

- 194 – Nominal force to be applied during slip-joining of sections and/or slip-joint length and their
195 respective tolerances.
- 196 – Foundation setting tolerances and verticality tolerances of the support.
- 197 – The category of the test (design or sample).
- 198 – The exact position of the load application points for each loading case.
- 199 (The point of application of the wind loads to be applied on the tower body shall be agreed
200 between the designer and the test station.)
- 201 – The loading cases to be used for tower testing as selected from the tower design load cases as
202 well as the detailed tower forces at attachment points and tower body to be applied on the support
203 for each loading case.
- 204 – All reactions induced on the foundations of the test support for each loading case to be tested.
- 205 – The location of the deflection measuring points for each loading case.
- 206 – The position and the orientation of strain gauges, if applicable.
- 207 – The areas of the test support to be filmed during the test.
- 208

iTeh STANDARD PREVIEW (standards.iteh.ai)

[oSIST prEN IEC 60652:2020](https://standards.iteh.ai/catalog/standards/sist/8d3cb6b7-82f7-48cf-8f89-7e2e264dcd00/osist-pren-iec-60652-2020)

<https://standards.iteh.ai/catalog/standards/sist/8d3cb6b7-82f7-48cf-8f89-7e2e264dcd00/osist-pren-iec-60652-2020>

209 **8. Test programme**

210 The test programme shall be submitted to the client at an agreed date before the test. This document
211 shall be approved by the client and returned to the testing station within an agreed period.

212 The test programme shall include but not be limited to the following information:

- 213 – The expected test date.
- 214 – A description of the proposed foundations for the test support.
- 215 – The method of load application.
- 216 – A drawing of the test rigging arrangement and attachment details.
- 217 – The position of the dynamometers and/or load cells and the position of angle transducers in the
218 case of resultant load applications.
- 219 – The position of deflection measurement points.
- 220 – The position and orientation of strain gauges if appropriate.
- 221 – The tolerances (loads, resultant angles, deflections, strain gauges).
- 222 – Details of applied loads for each test load case, load increment and holding period.
- 223 – Holding period for the final level.
- 224 – Loading rate for elastic-plastic materials and creep-sensitive materials. This requirement is not
225 important or required for steel towers, but could be for some tower types such as reinforced
226 concrete structures subjected to permanent bending or to fibre reinforced structures.
- 227 – The category of the test (design or sample).

228 **9. Assembly of support**

229 The test support shall be erected on a footing that simulates the design assumption.

230 The testing station shall proceed with the assembly of the support in accordance with the instructions
231 provided by the client. [https://standards.iteh.ai/catalog/standards/sist/8d3cb6b7-82f7-48cf-8f89-](https://standards.iteh.ai/catalog/standards/sist/8d3cb6b7-82f7-48cf-8f89-7e2e264dcd00/osist-pr-en-iec-60652-2020)

232 In the case where the testing station encounters a difficulty in the assembly or erection of the support,
233 the client shall be informed and shall decide on the modifications required.

234 If requested by the client, a report of assembly shall be provided by the testing station. This report
235 may include a video of the different phases of the assembly and any particular difficulty encountered.

236 **10. Load application**

237 Loading cases (loads, directions, and load application points) are stated by the client in the test
238 specification.

239 **10.1 Combined loads**

240 If, for practical purposes, certain loads (e.g. due to wind on the support) have to be combined, the
241 value of the resultant, its direction, and its application point shall be shown in the test programme.

242