



SLOVENSKI STANDARD
oSIST prEN IEC 60372:2019

01-december-2019

**Zaklepni mehanizmi za spojke z betičem in ponvico za člene izolatorskih verig -
Dimenzije in preskusi**

Locking devices for ball and socket couplings of string insulator units - Dimensions and tests

Sicherungsvorrichtungen für Klöppel- und Pfannen-Verbindungen von Kettenisolatoren -
Maße und Prüfungen

Dispositifs de verrouillage pour les assemblages à rotule et logement de rotule des
éléments de chaînes d'isolateurs - Dimensions et essais

Ta slovenski standard je istoveten z: prEN IEC 60372:2019

ICS:

29.080.99	Drugi standardi v zvezi z izolacijo	Other standards related to insulation
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TITLE:

Locking devices for ball and socket couplings of string insulator units - Dimensions and tests

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16 **LOCKING DEVICES FOR BALL AND SOCKET COUPLINGS OF STRING**

17 **INSULATOR UNITS: DIMENSIONS AND TESTS**

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21 **FOREWORD**

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56 International Standard IEC 60372 has been prepared by IEC technical committee 36: Insulator.

57 This 4th edition cancels and replaces the 3rd edition published in 1984. This edition constitutes a technical revision.

58 This edition includes the following significant technical changes with respect to the previous

59 edition:

- 60 a) Two new designated size of couplings, 36 and 40 was introduced;
- 61 b) According to the results of the questionnaire(36/424/Q), the relevant content of the 28B
- 62 W-clip was deleted;
- 63 c) Annex A is informative, Annex B is normative, Annex C is informative.

64 The text of this International Standard is based on the following documents:

FDIS	Report on voting
XX/XX/FDIS	XX/XX/RVD

66 Full information on the voting for the approval of this International Standard can be found in
67 the report on voting indicated in the above table.

68 This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

69 The committee has decided that the contents of this document will remain unchanged until the
70 stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to
71 the specific document. At this date, the document will be

- 72 • reconfirmed,
- 73 • withdrawn,
- 74 • replaced by a revised edition, or
- 75 • amended.

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LOCKING DEVICES FOR BALL AND SOCKET COUPLINGS OF STRING INSULATOR UNITS: DIMENSIONS AND TESTS

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1 Scope and object

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82 This standard is applicable to locking devices used with ball and socket couplings of string
83 insulator units and used with the corresponding metal fittings standardized in IEC 60120,
84 when they are supplied separately.

85 When these locking devices are supplied with an insulator or fitting, they shall be considered
86 as an integral part of it. In this case, the relevant test shall be included with those of
87 insulators, as specified in IEC 60383-1 and IEC 61325. On request, a certificate shall be
88 delivered confirming that the tests on locking devices as specified in this standard have been
89 carried out. The locking devices are usually supplied with the insulator or corresponding metal
90 fittings.

91 The object of this standard is

- 92 • to define the shapes and some standard dimensions for locking devices,
- 93 • to define the test methods for locking devices,
- 94 • to state the acceptance conditions for supply,
- 95 • to give other dimensions for guidance of manufacturing only.

96 The object of this standard does not include the specification of the nature of the material, but
97 it is recommended that this material does not have a surface coating for corrosion protection.
98 Moreover, the material shall not give rise to significant contact corrosion (chemical reaction)
99 between the locking device and the ball and socket coupling.

2 Normative references

100
101 The following documents are referred to in the text in such a way that some or all of their
102 content constitutes requirements of this document. For dated references, only the edition
103 cited applies. For undated references, the latest edition of the referenced document (including
104 any amendments) applies.

105 IEC 60050-471, *International Electrotechnical Vocabulary – Part 471: Insulators*

106 IEC 60120, *Dimensions of Ball and Socket Couplings of String Insulator Unit*

107 IEC 60383-1, *Insulators for Overhead Lines with a Nominal Voltage Greater than 1 000 V*
108 *Part 1: Ceramic or Glass insulator units for a.c. systems – Definitions, Test Methods and*
109 *Acceptance criteria*

110 IEC 61325, *Insulators for Overhead Lines with a Nominal Voltage Above 1 000 V Ceramic or*
111 *Glass insulator units for d.c. systems – Definitions, Test Methods and Acceptance criteria*

112 ISO 6506-1, *Metallic materials-Brinell Hardness-Test Part 1: Test Method*

113 ISO 6507-1, *Metallic materials-Vickers Hardness-Test Part 1: Test Method*

114 ISO 6508-1, *Metallic materials- Rockwell Hardness-Test Part 1: Test Method*

115 ISO 2859-1:1999/Amd1:2011, *Sampling procedures for inspection by attributes-Part 1:*
116 *Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

117 3 Terms and definitions

118 For the purposes of this document, the terms and definitions of IEC 60050-471 and the
119 following apply.

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

- 122 • IEC Electropedia: available at <http://www.electropedia.org/>
- 123 • ISO Online browsing platform: available at <http://www.iso.org/obp>

124 3.1 125 locking device (for ball and socket coupling)

126 component which prevents pin ball decoupling from socket, when it is in locking position, by
127 using its shape and material properties

128 NOTE See schematic of locking position in Annex C.

129 4 Shapes and dimensions

130 4.1 General

131 Two types of locking devices are standardized, one using a split-pin, the other a W- shaped
132 clip.

133 The first type requires a circular hole and the second a rectangular hole.

134 Two split-pins are proposed.

- 135 • standard split-pin this split-pin is a tight-fit in the socket-hole,
- 136 • alternative split-pin this split-pin is a loose fit in the socket-hole.

137 NOTE This alternative may be used by agreement between the manufacturer and the purchaser when the problems
138 of stress corrosion are possible for the split-pin metal due to the permanent stress in the tight-fit system, e.g. when
139 certain types of stainless steel are used.

140 The socket-hole into which the locking device fits is the same of both the standard and
141 alternative split-pin, so it is possible to use the alternative split-pin in a socket designed for
142 the standard split-pin.

143 4.2 Shapes of the locking devices

144 4.2.1 Split-pin

145 One of the legs of the split-pin has a hump and the free ends are bent outwards after insertion
146 into the socket. These features provide two distinct positions for the split-pin when operated
147 for locking and coupling, and complete withdrawal from the socket is effectively prevented
148 (see Annex C).

149 4.2.2 W-clip

150 The W-clip is so shaped that it will remain in two distinct positions when operated for coupling
151 and locking. The shape of the W-clip is such that complete withdrawal from the socket when
152 moving from the locking to the coupling position is prevented (see Annex C).

153 4.3 Dimensions of locking devices

154 4.3.1 The split-pins (standard and alternative type)

155 The shape of split-pins is given in Figure 1. The dimensions of split-pins are given in Table 1.

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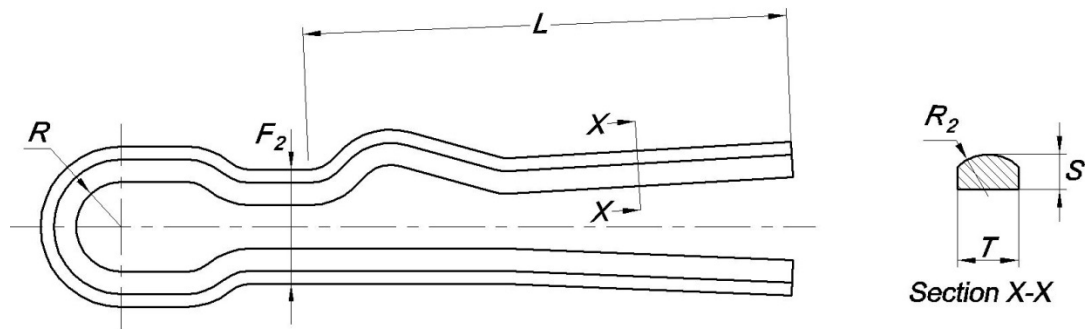


Figure 1 –Shape of split-pins

Table 1 –Dimensions of the split-pins

Designated size of coupling	Standard split-pins						Alternative split-pins ¹⁾
	S mm	T mm	R ₂ mm	F _{2Min.} mm	R _{Min.} mm	L _{Min.} mm	F _{2' Max.} mm
11	2,2 ± 0,1	4,8 ^{+0,2} ₀	3,3	8,2	2,5	29	7,3
16	3,2 ± 0,1	A ³⁾	5,5 ^{+0,2} ₀	3,8	10,3	43 ²⁾	9,2
		B ³⁾	7,9 ^{+0,2} ₀	4,8	10,7		
20	3,2 ± 0,1	7,0 ^{+0,2} ₀	4,8	10,7	3,0	49	9,7
24	4,0 ± 0,1	8,7 ^{+0,2} ₀	5,7	12,8	3,5	60	11,7
28	4,5 ± 0,1	10,0 ^{+0,2} ₀	6,2	13,8	3,5	71	12,7
32	5,2 ± 0,1	11,5 ^{+0,2} ₀	7,2	15,8	3,5	81	14,7
36	6,5 ± 0,1	11,5 ^{+0,2} ₀	8,7	17,8	4,0	91	16,7
40	6,5 ± 0,1	11,5 ^{+0,2} ₀	8,7	17,8	4,0	102	16,7

1) All the dimensions are the same as for standard split-pins, except the value F₂ replaced by F_{2'}.

2) Many existing designs of the inside of the socket still prevent uncoupling with lower values of L_{min.} In this case L_{min.} can be reduced to 38mm.

3) See NOTE 2 of Clause 6 in IEC 60120.

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160 The dimension L_{max.} shall be specified by the purchaser of the split-pin (see 5.3.4.1)

161 4.3.2 The W-clips

162 The shape of W-clips is given in Figure 2. The dimensions of W-clips are given in Table2.

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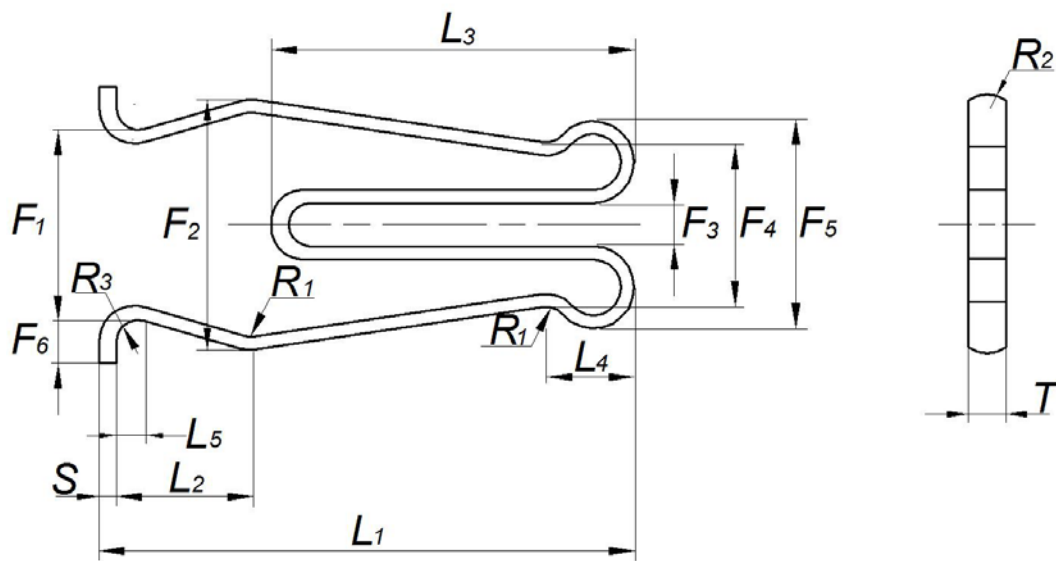


Figure 2 – Shape of W-clips

Table 2 – Dimensions of W-clips

Designated size of coupling	F_1 mm	F_2 mm	F_3 mm	F_4 mm	F_5 mm	F_6 mm	L_1 mm	L_2 mm	L_3 mm	L_4 mm	L_5 mm	R_1 mm	R_2 mm	R_3 (max.) mm	S mm	T mm
11	15	20	4	13	19	$4^{+0,6}_0$	$37 \pm 1,5$	12,0	$24 \pm 1,5$	8,0	3	2,5	3,0	1,5	$1,2^{+0,2}_0$	$4,8^{+0,2}_0$
16	A ¹⁾	22	28	5	19	24	$50 \pm 1,5$	15,5	$36 \pm 1,5$	10,5	3	2,5	3,0	2,5	$1,5^{+0,2}_0$	$5,5^{+0,2}_0$
	B ¹⁾												4,5			$7,9^{+0,2}_0$
20	22	30	5	19	24	5^{+1}_0	$62 \pm 1,5$	15,5	$42 \pm 1,5$	10,5	3	2,5	4,5	2,5	$2,0^{+0,2}_0$	$7,0^{+0,2}_0$
24	22	30	5	19	25	5^{+1}_0	$72 \pm 1,5$	15,5	$50 \pm 1,5$	10,5	3	2,5	5,0	2,5	$2,0^{+0,2}_0$	$8,7^{+0,2}_0$
28	24	32	6	21	28	6^{+1}_0	$83 \pm 1,5$	16,0	$62 \pm 1,5$	12,5	4	3,0	6,0	3,0	$2,2^{+0,2}_0$	$10,0^{+0,2}_0$
32	26	36	6	24	33	7^{+1}_0	$96 \pm 1,5$	18,0	$71 \pm 1,5$	16,0	4	3,0	7,0	3,0	$2,6^{+0,2}_0$	$11,5^{+0,2}_0$

1) See NOTE 2 of Clause 6 in IEC 60120.

168 5 Tests

169 5.1 Classification of tests

170 The tests are divided into two groups:

171 - *Group I qualification tests*

172 The qualification tests are made in order to verify the suitability of the type of material to be
173 used in the manufacture of locking device.

174 - *Group II sample tests*

175 Sample tests are made in order to verify the quality of a manufacture, they are made on
176 samples taken at random from each lot.

177 5.2 Qualification tests

178 5.2.1 Test items and the samples

179 Qualification tests consist of