



SLOVENSKI STANDARD
oSIST prEN IEC 62382:2023

01-oktober-2023

Nadzorni sistemi v procesni industriji - Preverjanje električnih in merilnih zank

Control systems in the process industry - Electrical and instrumentation loop check

Leittechnische Systeme in der verfahrenstechnischen Industrie - PLT-Stellenprüfung

Systèmes de commande pour les procédés industriels - Contrôle de boucle des circuits électriques et des appareillages

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TITLE:

Control systems in the process industry - Electrical and instrumentation loop check

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**CONTROL SYSTEMS IN THE PROCESS INDUSTRY –
ELECTRICAL AND INSTRUMENTATION LOOP CHECK**

FOREWORD

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International Standard IEC 62382 has been prepared by subcommittee 65E: Devices and integration in enterprise systems, of IEC technical committee 65: Industrial-process measurement, control and automation.

This third edition cancels and replaces the second edition published in 2012. This edition constitutes a technical revision.

The main changes with respect to the previous edition are listed below:

- General re-organization of the content of the previous edition, moving informative content to the annexes.
- Replacing the forms based on I/O type in the annex with an example of a generic loop check form.
- Providing additional references to other applicable standards.

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

FDIS	Report on voting
65E/XXX/FDIS	65E/XXX/RVD

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

101 The language used for the development of this International Standard is English.

102 This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in
103 accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available
104 at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are
105 described in greater detail at www.iec.ch/publications.

106 The committee has decided that the contents of this publication will remain unchanged until the
107 stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to
108 the specific publication. At this date, the publication will be

- 109 • reconfirmed,
- 110 • withdrawn,
- 111 • replaced by a revised edition, or
- 112 • amended.

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114

INTRODUCTION

115 The inspection and verification of the individual measurements and controls in conjunction with
116 the control systems used to monitor these devices (e. g. DCS, PLC) is referred to as loop check.
117 In industry, numerous methods and philosophies are used to check the instrumentation and
118 controls after mechanical installation within projects for modified or new facilities.

119 This standard was created to provide a better understanding of what loop check consists of and
120 also to provide a standard methodology for executing a loop check.

121 The annexes of this standard provide an example of a loop check form and examples of checks
122 for various loop components to aid the user in establishing the desired loop check plans for a specific
123 project.

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CONTROL SYSTEMS IN THE PROCESS INDUSTRY – ELECTRICAL AND INSTRUMENTATION LOOP CHECK

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130 **1 Scope**

131 **1.1 General applicability**

132 This international standard defines procedures and specifications for loop check, which comprises the
133 activities between the completion of the loop construction (including installation and point-to-point
134 checks) and the beginning of cold commissioning. This document is applicable for the construction of
135 new plants and for expansion/retrofits (i.e. revamping) of E&I (Electrical & Instrument) installations in
136 existing plants (including PLC, DCS, panel-mounted and field instrumentation). It does not include a
137 detailed checkout of power distribution systems, except as they relate to the loops being checked (i.e.
138 a motor starter or a power supply to a four-wire transmitter). Loop checks can be performed throughout
139 the lifecycle of the plant. This document is also applicable when loop checks are performed after
140 commissioning. The document describes what is to be tested but not how it is to be tested due
141 to the wide range of technologies and equipment available.

142 The intent of this document is to provide a means for all parties, including the owner, the installer and
143 the vendor, to clearly establish and agree on the scope of activities and responsibilities involved in
144 performing these tests in order to achieve a timely delivery and acceptance of the automation system.
145 The activities described in this document can be taken as a guideline and adapted to the specific
146 requirements of the process/plant/equipment.

147 **1.2 Exclusions**

148 **1.2.1 Prior and post activities**

149 Engineering and manufacturing activities prior to or after the loop checks, such as FAT, SAT, SIT and
150 commissioning, are not covered by this document.

151 **1.2.2 Regulated industries**

152 For applications in the pharmaceutical or other highly specialized industries, additional guidelines (for
153 example, Good Automated Manufacturing Practice (GAMP)), definitions and stipulations apply in
154 accordance with existing standards.

155 **1.2.3 Safety instrumented systems**

156 IEC 61511 provides requirements for checks and validation of Safety Instrumented Systems.

157 **1.2.4 Manufacturing execution systems**

158 Testing and verification of Manufacturing Execution Systems (MES) is not covered by this
159 document.

160 **1.2.5 Advanced process control**

161 Testing and verification of Advanced Process Control (APC) is not covered by this document.

162 **1.2.6 Security for industrial automation and control systems**

163 IEC 62443 provides requirements for network and system security.

164 2 Normative references

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

169 IEC 62381, *Automation Systems in the Process Industry – Factory Acceptance Test (FAT), Site*
170 *Acceptance Test (SAT), and Site Integration Test (SIT)*

171 IEC 62443 (all parts), *Industrial communication networks – Network and system security*

172 IEC 61511 (all parts), *Functional Safety: Safety instrumented systems for the process industry*
173 *sector series*

174 3 Terms, definitions, abbreviated terms and acronyms

175 3.1 Terms and definitions

176 For the purposes of this document, the following terms and definitions apply.

177 ISO and IEC maintain terminology databases for use in standardization at the following
178 addresses:

- 179 • ISO Online browsing platform: available at <https://www.iso.org/obp>
- 180 • IEC Electropedia: available at <https://www.electropedia.org>.

181 3.1.1

182 **Advanced Process Control**

183 **APC**

184 term comprising several tools and techniques whose common characteristic is taking process
185 automation beyond the limits of single-loop control and includes model-based software that is
186 used to direct the process operation and is commonly referred to as multivariable predictive
187 control or model predictive control

188

189 3.1.2

190 **asset management system**

191 software that works with or is a feature of the BPCS and that facilitates setting and recording
192 of configuration, as well as display and recording of diagnostics, of instrumentation connected
193 to BPCS

194

195 3.1.3

196 **automation system**

197 term referring to the complete system for the monitoring and control of production facilities

198 Note 1 to entry: An automation system can include a BPCS and can also include an SIS and other sub-systems

199 3.1.4

200 **Basic Process Control System**

201 **BPCS**

202 system which responds to input signals from the process, its associated equipment, other
203 programmable systems and/or operators and generates output signals causing the process
204 and its associated equipment to operate in the desired manner but which does not perform
205 any SIF

206 Note 1 to entry: A BPCS includes all of the devices necessary to ensure that the process operates in the desired
207 manner.

208 Note 2 to entry: A BPCS typically can implement various functions such as process control functions, monitoring,
209 and alarms.

210 [SOURCE: IEC61511:2016]

211 **3.1.5**

212 **basic software**

213 software containing the graphic faceplates, base-level alarms and switch points, basic interlocking and
214 analogue control, at a minimum

215 Note1 to entry: In the case of safety loops, any safety switch point should be included if it is not in the basic database

216 **3.1.6**

217 **cold commissioning**

218 phase, during which the activities associated with the testing and operation of equipment or facilities
219 using test media such as water or inert substances prior to introducing any chemical in the system take
220 place
221

222 Note 1 to entry: Refer to IEC 62337

223 **3.1.7**

224 **function diagram**

225 logic diagram

226 graphical description of the E&I functions of the control system

227 Note 1 to entry: Refer to IEC 62708 and IEC 61131.

228 **3.1.8**

229 **Functional Design Specification (FDS)**

230 document that contains the complete description of all functional requirements for realization of the
231 user's requirements for the automation system

232 **3.1.9**

233 **hot commissioning**

234 phase during which the activities associated with the testing and operation of equipment or facilities
235 using the actual chemical process prior to making an actual production run take place

236 Note 1 to entry: Refer to IEC 62337

237 **3.1.10**

238 **installer**

239 company that will install or has installed the automation system, subsystem, or component on
240 site

241 **3.1.11**

242 **instrument specification**

243 data sheet with all essential E&I data concerning tagging, function, description, measuring
244 range, accuracy, location, process data, instrument data, etc.

245 Note 1 to entry: Refer to ISA-TR20.00.01 for example of instrument specification.

246 **3.1.12**

247 **loop**

248 all the hardware and software necessary to work together for the measurement, communication,
249 and/or control of a process variable
250

- 251 Note 1 to entry: The loop consists of all associated components and functions including sensor, logic, control,
252 actuator, and HMI.
- 253 **3.1.13**
- 254 **loop list**
255 tabulation of all loops with tagging, function, service description, and PID reference
- 256 **3.1.14**
- 257 **loop diagram**
258 representation of hardware and/or basic software functions of a control loop with graphical symbols
- 259 Note 1 to entry: It shows equipment in its topological order and wiring including the terminals
- 260 Note 2 to entry: Refer to IEC 62708
- 261 **3.1.15**
- 262 **owner**
263 company that operates the production facilities where the automation system is or will be
264 installed
- 265 **3.1.16**
- 266 **precommissioning**
267 phase, during which the activities of non-operating adjustments, cold alignment checks, cleaning, and
268 testing of machinery take place
269
- 270 Note 1 to entry: Refer to IEC 62337
- 271 **3.1.17**
- 272 **Safety Instrumented Function**
273 **SIF**
274 safety function with a specified safety integrity level which is necessary to achieve functional
275 safety and which can be either a safety instrumented protection function or a safety
276 instrumented control function
- 277 **3.1.18**
- 278 **Safety Instrumented System**
- 279 **SIS**
280 instrumented system used to implement one or more SIF's.
- 281 Note 1 to entry: A SIS is composed of any combination of sensor(s), logic solver(s), and final element(s) (e.g., see
282 Figure 6 in IEC 61511). It also includes communication and ancillary equipment (e.g., cables, tubing, power supply,
283 impulse lines, heat tracing)
- 284 Note 2 to entry: A SIS can include software.
- 285 Note 3 to entry: A SIS can include human action as part of a SIF.
- 286 [SOURCE: IEC61511:2016]
- 287 **3.1.19**
- 288 **start-up**
289 milestone marking the end of cold commissioning and formally setting process equipment into operation leading into
290 production
- 291 Note 1 to entry: Refer to IEC 62337
292