

# INTERNATIONAL STANDARD

# IEC 62382

First edition  
2006-11

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## Electrical and instrumentation loop check

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International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland  
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: [inmail@iec.ch](mailto:inmail@iec.ch) Web: [www.iec.ch](http://www.iec.ch)



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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## ELECTRICAL AND INSTRUMENTATION LOOP CHECK

## FOREWORD

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International Standard IEC 62382 has been prepared by IEC technical committee 65: Industrial process measurement and control.

This standard cancels and replaces IEC/PAS 62382 published in 2004. This first edition constitutes a technical revision.

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

FDIS	Report on voting
65/386/FDIS	65/395/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 2.

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

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- withdrawn,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

A bilingual version of this publication may be issued at a later date.

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## INTRODUCTION

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

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

The annexes of this standard contain forms which may be used in the check procedures. Buyers of this publication may copy these forms for their own purposes only in the required amount.

For application in the pharmaceutical or other highly specialized industries, additional guidelines (for example, Good Automated Manufacturing Practice (GAMP)), definitions and stipulations should apply in accordance with existing standards, for example, for GMP Compliance 21 CFR (FDA) and the Standard Operating Procedure of the European Medicines Agency (SOP/INSP/2003).

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WITHDRAWN

# ELECTRICAL AND INSTRUMENTATION LOOP CHECK

## 1 Scope

This International Standard describes the steps recommended to complete a loop check, which comprises the activities between the completion of the loop construction (including installation and point-to-point checks) and the start-up of cold commissioning. This standard is applicable for the construction of new plants and for expansion/retrofits (i.e. revamping) of E&I installations in existing plants (including PLC, BAS, DCS, panel-mounted and field instrumentation). It does not include a detailed checkout of power distribution systems, except as they relate to the loops being checked (i.e. a motor starter or a power supply to a four-wire transmitter).

## 2 Terms and definitions

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

### 2.1 precommissioning

phase, during which the activities of non-operating adjustments, cold alignment checks, cleaning, and testing of machinery take place.

NOTE Please refer to the enclosed annexes as an example.

### 2.2 mechanical completion

milestone, which is achieved when the plant, or any part thereof, has been erected and tested in accordance with drawings, specifications, instructions, and applicable codes and regulations to the extent necessary to permit cold commissioning

NOTE This includes completion of all necessary electrical and instrumentation work. This is a milestone marking the end of the precommissioning activities.

### 2.3 cold commissioning

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

### 2.4 start-up

milestone marking the end of cold commissioning.

NOTE At this stage, the operating range of every instrument loop is already adjusted to reflect the actual working condition.

### 2.5 hot commissioning

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

### 2.6 start of production

milestone marking the end of hot commissioning.

NOTE At this stage, the plant is ready for full and continuous operation.



## 2.7

### **performance test**

milestone at which time the production plant runs to its design capacity

NOTE This test, carried out by the owner's personnel with the help and supervision of the contractor, should demonstrate the contractor's process performance and consumption guarantees as specified in the contract.

## 2.8

### **acceptance of plant**

milestone at which the formal turn over of the plant from the contractor to the owner is carried out

## 2.9

### **basic software**

software which, at a minimum, contains the graphic faceplates, base-level alarms and switch points, basic interlocking and analogue control. In the case of safety loops, any safety switch point should be included if it is not in the basic database

## 3 Abbreviations

BAS Building automation systems

C&E Cause and effect diagram

DCS Distributed control system

E&I Electrical and instrumentation and control systems

ESD Emergency shut-down system

FAT Factory acceptance testing

FBD Functional block diagram

FUP Function plan

HMI Human machine interface

HW Hardware

MC Mechanical completion

PDS Project design specifications

PFS Project functional specification

PLC Programmable logic controller

SAT Site acceptance test

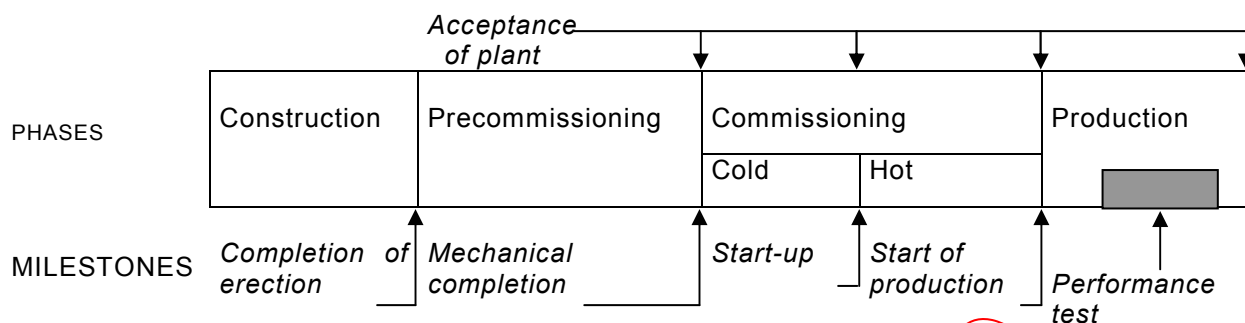
SIT Site integration test

SW Software

## 4 The order of loop check and cold commissioning in the project schedule

The loop checks will ideally occur in the precommissioning phase of the schedule shown in Figure 1.

However, normal occurrence is that the loop checks begin when any specific loop is completed and turned over to the checkout crew even if it is during the "construction" phase. The loop check could substantially overlap the "construction" phase.



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Note – Construction and Precommissioning activities could be overlapping.

**Figure 1 – Definition of phases and milestones**

The loop check

- follows the E&I construction phase and FAT of the DCS in a project;
- is the last systematic check before mechanical completion to assure that
  - all E&I documents (loop sheets, etc.) are available and correspond to their latest revision;
  - all instrumentation and equipment is delivered according to the design specifications;
  - installation has occurred in accordance to engineering documents, applicable codes and local regulations;
  - loop functionality is correct.

This provides

- in a project, the quality check for E&I engineering, procurement and installation;
- the base for the commissioning phase which consists of
  - a) cold commissioning  
phase during which functional testing of equipment and facilities, using test media such as water or inert substances, takes place;
  - b) hot commissioning (chemical start-up)  
phase during which activities associated with the testing and operation of equipment using the actual process chemicals (initial start-up of process) are performed.

The main activities in the cold and hot commissioning phases are system verification tuning of loops and instruments and control schemes.

## 5 Loop check content

### 5.1 Included activities

The loop check includes the following elements of a "single loop" (sensor and/or actuator).

- Hardware components:
  - the installed instruments or components in the field or their final destination;
  - the equipment in E&I rooms;
  - hard wired functionality between sensor and actuator loops (if applicable);
  - the input and output (if applicable) cards of process control systems.