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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- withdrawn,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.

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).

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

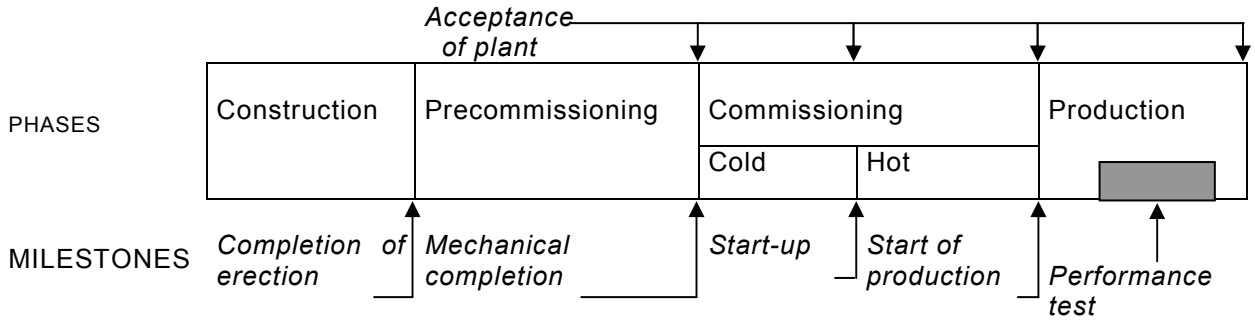
3 Abbreviations

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.



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.

- The basic software components (including the graphic faceplates, base level alarms and switch points, basic interlocking and basic analogue control) to test the field devices. The loop check uses the basic graphics/faceplates of the control system (see Figure 2). Note that primary inputs and outputs may be connected not only to DCS but also to ESD, PLC, unit controllers and other subsystems. They all are visualized on DCS.

  In the case of safety loops, all safety switch points should be included if they are not in the basic database.

The actual loop check involves three phases.

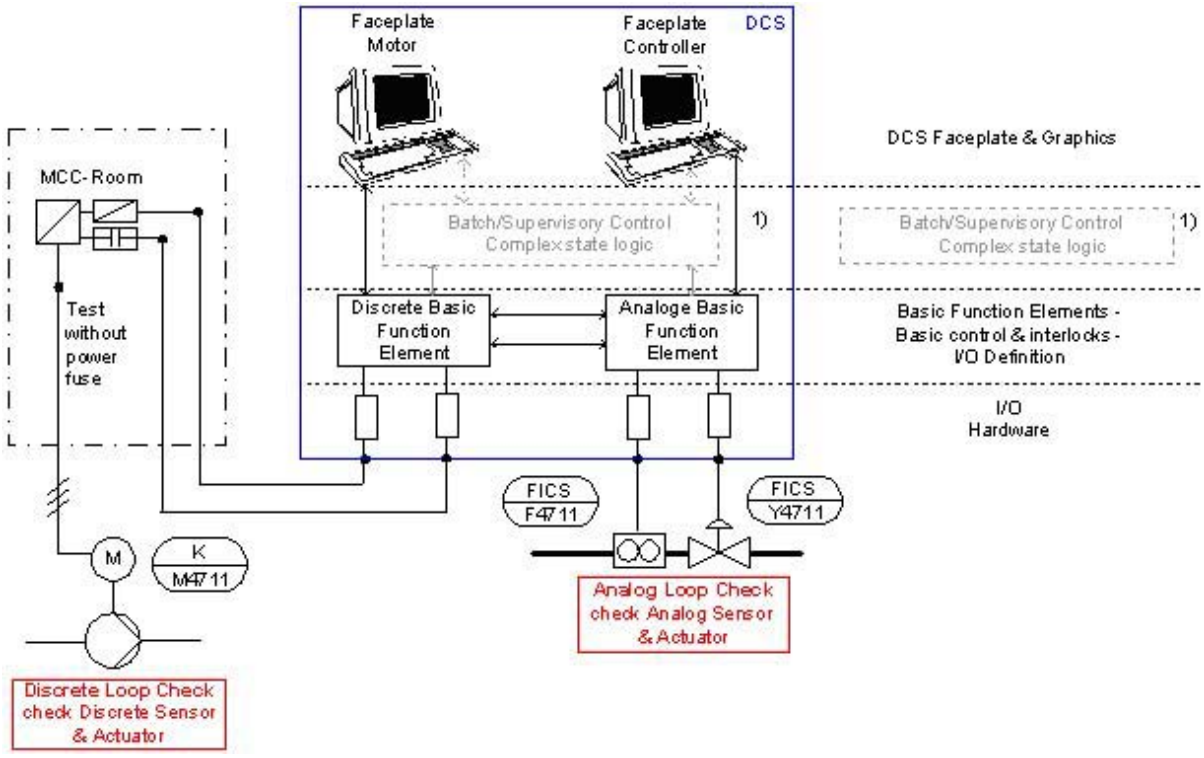
a) Documentation checkout

   Check for the completeness and consistency of loop documents, including any documents from the installation or FAT.

b) Visual inspection of loop devices for correct installation and tagging.

c) Function check

   A testing device is used to exercise all the components of the loop (including hardware, wiring and software). It checks that all the components function correctly and that the DCS or panel readouts are accurate.



[1] Check of "Operational configuration" is completed during "Cold Commissioning" or "Hot Commissioning"

Figure 2 – Loop check

There are three types of deficiencies that can be found during the loop check.

a) Installation failures

   Installation failures are discrepancies with the specified hardware or the method of installation (wrong installation, wrong instruments, etc.). The construction contractor should fix these problems.

b) Configuration failures

   Configuration failures are discrepancies with the original software specification. The programming contractor or E&I engineering should fix these problems.

c) E&I engineering failures

Engineering failures are to be suspected when, despite good installation of the right instruments, the desired functionality cannot be realized (for example, fault in wiring diagram; wrong measurement principle has been chosen, etc.) These problems should be corrected by E&I engineering.

Additional deficiencies might be in the process design, but this can only be determined after process start-up.

5.2 Activities excluded

The loop check does not consist of

- test activities possible without construction being completed:
  - software testing using simulation tools;
  - other factory acceptance tests performed at the contractor or vendor's factories;
- other software checkout activities (FAT,etc.);
- detailed construction and mechanical inspections performed during the construction phase:
  - cable testing during construction (Hipot, Meggering et al.);
  - point-to-point wiring checks;
- the testing of the internal workings of package units (i.e. process subunits, machinery, complex analysers, etc.) is excluded; only the I/O testing of this equipment is included in the loop check;
- activities belonging to the commissioning phase: tuning of loops, instruments and control schemes (for example, calibrating of level transmitters by filling tanks; verification of complex control schemes; tuning of continuous control schemes; etc.).

6 Loop check procedure

6.1 Documentation check

– The checkout of the loop should first establish that all documentation pertaining to that loop is available, consistent and correctly labelled if the loop is a safety, quality or environmental loop.

– The pertinent documentation must, as a minimum, contain a wiring diagram of the loop and a specification containing all calibration and functional data necessary to verify the correct operation of the loop.

6.2 Visual inspection

– The installation should be visually checked against the documents to ensure that the correct instruments were installed and that the installation is in accordance with the hardware specifications and circuit diagrams.

–- Valves and flowmeters are checked for correct installation with the direction of flow.

– Can local instrumentation be easily read?

– Are all the elements of the loop available, accessible, labelled and installed in a clean and neat manner (including junction boxes, panels, cabinets, racks)?

– Is the tagging clear and unambiguous (no danger of false interpretation)? Are the field elements adequately protected from mechanical or environmental damage?

6.3 Function check

The function checks are ideally performed in well-defined blocks. (Related technical blocks like process units or related racks in E&I rooms.) The actual method and order of checkout should be defined by the project team prior to starting the loop check.

The purpose of the function check is to exercise all the components of a loop during one test and measure their accuracy. Checking out a loop in pieces does not qualify as a function check and shall not substitute for the function check.

The actual check involves connecting a testing device to the transmitter and increasing the signal, in increments, to full span to insure that the DCS or panel readout follows the input. Also, if the loop has an output, the actuator should be observed to verify that it follows the incremental output changes within a specified tolerance. In the final element (actuator) a failure should be enforced or simulated to verify the correct failure reaction. The test results (P = Pass, PR = Pass after repair, F = Fail) can be recorded either on the loop diagram and signed and dated, or signed and dated on a separate form. This information shall be kept with the checkout package and filed with the project files to be kept for record.

Motor loops should be checked for correct operation and overload protection before coupling the motor to the driven device. Note that the grounding checks (meggering) should be done as part of the construction phase, though this may be repeated in the checkout phase.

Check of inter-loop functionality (like analogue control loops or interlock functions) is preferably carried out for integrated units after a successful checkout of the separate sensor and actuator loop. This is most effectively completed during cold commissioning.

Safety, quality and environmental loops

– For these loops, the function check should be as close to the actual function as possible (i.e. putting pressure on the transmitter diaphragm while it is hooked up to its loop wiring or introducing a sample gas to an analyser). The test should check the actuation of the safety or major plant interlock to ensure proper function, in addition to the loop's other functions. If the actual measurement cannot be simulated (as in a flowmeter), the test should be completed during cold commissioning.
– Flowmeters shall be specifically checked either by testing at a plant flow lab or by flowing water through them in their field location to a calibrated weighing vessel and timed for flow rate. If this is impractical, the meter should be specified to be separately tested by the manufacturer and the test report included with meter. Also, if a tank has a secondary level switch that is deemed to be a safety device, the tank level should be increased to trip the switch as installed. If this is not practical, a test method should be devised to ensure that the device functions correctly as installed. In particular, that it actuates at the correct level to prevent overflow.
– For safety systems and systems with major plant shutdown implications, it is mandatory that the functionality of the entire E&I measure as a whole be verified (sensor loop + binary control loop/or/interlock + actuator loop).
– Quality and environmental loops may also require added special testing and documentation as defined by the project team.

IMPORTANT: A recheck is required for E&I loops that have been modified or disconnected after successful checkout has been completed.

6.4 Checkout of E&I Infrastructure and E&I concepts

Prior to, or during, loop checkout, E&I infrastructure should be checked for mechanical completion and full functionality. This covers a checklist on the overall condition of E&I rooms, field installations, energy supplies, grounding systems and cabinet equipment.

During the function check of loops, it is good practice to checkout E&I fundamentals and concepts.

- Check of loop reaction during a failure or malfunction
  - Check of the "fail-safe" action – does the loop go to a safe state when a component malfunctions?
  - What happens when the span limits are exceeded – do the readings and alarms conform to manufacturers specifications?
  - If the DCS malfunctions, do the final element's actions conform to the specifications?
- Check of the function of redundant controls or power supplies
  - Does the redundancy function works as specified during the failure of the primary element? Does it switch back correctly?

The loop-related concept checkout results are to be recorded on the loop test report. Loop-related concept checkout is performed for each loop typical and for all safety and quality loops. For non-safety loops, these tests are performed only frequently enough that each concept is checked.

Results of infrastructure concept checkout are recorded on the E&I general infrastructure test report.

6.5 Additional tests – Quality and safety relevant loops

– All quality-relevant and safety-measure-relevant tags are to be rechecked after successful completion of the loop check.

– For safety measures it is important that the functionality of the entire E&I measurement as a whole is verified (sensor loop + binary control loop/or/interlock + actuator loop).

– These specific additional checks are to be verified by a second E&I checkout crew or specifically tested during cold commissioning.

7 Documents and test sheets

7.1 Input documents

The prepared documentation set according to the process unit contains

a) E&I index;

b) specification sheets (hardware and software);

c) loop wiring diagrams;

d) list of spans, alarms and switches;

e) test reports;

f) calculation and documents (i.e., intrinsic safety);

g) if any certificates (i.e., motor megger checks or point-to-point checks) from the construction phase are available, they should also be included as part of the documentation package.

NOTE All project, safety, code, local regulations/law-related documents as required by the specific project should be available

7.2 Test sheets

The following annexes or PC tools (Excel files) contain examples of test reports per loop type.

– Test report for analogue input loop Annex A

– Test report for binary input loop Annex B

– Test report for analogue output loop (control valve) Annex C
– Test report for binary output loop (on/off valve) Annex D
– Test report for motors and variable frequency drives Annex E

7.3 Documents generated upon completion of loop check

– Marked-up E&I documentation to reflect as-built condition.
– Loop test report: signed and completed with loop check results.

7.4 Loop check results

The results of the loop checks shall be indicated as follows.

P = Pass (correct when checked)

F = Fail (not passed when checked; shall include a clear problem description; may require engineering involvement)

PR = Pass after repair (repair action by checkout/repair crew required)

8 Quality assurance

The test reports are drafted in such a way that all relevant items are covered at least once.

Quality is guaranteed by the following measures.

– The loop check is always performed in the same manner (independent of the particular tester).
– Test reports are updated with the latest information.
– The testers confirm with their signature that a complete loop check agrees with the test procedures.

9 Safety aspects

For safety installations, extra checklists and working plans are set up in addition to the normal loop-check procedure. These documents typically describe a very detailed check procedure and are periodically repeated after production start-up.

Annex A
(informative)

Test report for analogue input loop

Function	Purpose	Phase	Temp. PA001
TIAS	Loop check after installation	Precommissioning	

Remark: This check is performed/documented after successful point-t-point wiring check and base software implementation.
Changes in installation or software functionality require recheck.
Irrelevant boxes are crossed out or filled in with N/A (not applicable).

Instrument type:

1. Documentation check *(Italics denote: normally not present)*

Loop documentation complete? Cable test - point-to-point connection test complete	P	PR	F

				Results
PCS specification HW present		Wiring diagram present		Date
Instrument certificates present		*Test sheet SW-FAT present*		Name
Release of construction present		*PCS Specification SW present*		Signature

2. Visual inspection

Are the elements of the loop complete, coded, installed in a clean and neat manner?	P	PR	F

				Results
Cable glands and connections tight?		Construction/flow direction OK		Date
All cards and nests installed and properly labeled?				Name
Do the instruments conform to the circuit diagrams (loop diagram) and specification sheets?				Signature
Individual configuration of cards, transmitters, etc. complete (e.g. dip switches properly set)?				

3. Function check

Function of PCS loop successful?	P	PR	F

		Results
Fuses placed in system		Date
Cards, nests and instruments operational?		Name
		Signature

Accept. error of span %					
Accept. error of meas. %	1,5	Span	-30	200	gradC

Calibration device	Value	Accepted error	Indicator Field /PU	DCS	Panel	Rec./other	Results
3,5 mA	**False measurement**						
4 mA	-30	0,45					
12 mA	85	1,5					
20 mA	200	3					
22 mA	**False measurement**						
Open circuit							

Span and units on read out OK?	
SW/Spec: alarm and switch levels OK?	
Loop brought back ready for commissioning?	

No check due to operational reasons?

Explanation:	
P	Pass
PR	Pass after repair
F	Fail

Description of failure (use other side)

Description of repair (use other side)

Status:	Date
Issued to checkout crew	
Issued to repair crew	
Issued to constr. for repair	
Issued to progr. for repair	
Issued to engineering	
Loop filed and complete	

Annex B
(informative)

Test report for binary input loop

Test report for binary input loop — January 2002

Complex	Process area	Subprocess	Techn. item	Business unit	Building	xyz-coord	**L0001**
ANTPCS6	**V401**	**TA10**		**KU**	**80**	**317**	Tag-description
Function **LSA**			Purpose Loop check after installation		Phase Precommissioning		Min. Level BA001

Remark: This check is performed/documented after successful point-to-point wiring check and base software implementation.
Changes in installation or software functionality require recheck.
Irrelevant boxes are crossed out or filled in with N/A (not pplicable).

Instrument type: Liquiphant

Results

1. Documentation check *(Italics denote: normally not present)*

Loop documentation complete? Cable test - point to point connection test complete — P | PR | F

PCS specification HW present		Wiring diagram present	
Instrument certificates present		*Test sheet SW-FAT present*	
Release of construction present		*PCS specification SW present*	

Date / Name / Signature

2. Visual inspection

Are the elements of the loop complete, coded, installed in a clean and neat manner? — P | PR | F

Cable glands and connections tight?		Construction/flow direction OK	
All cards & nests installed and properly labeled?			
Do the instruments conform to the circuit diagrams (loop diagram) and specification sheets?			
Individual configuration of cards, transmitters, etc. complete (e.g. dip switches properly set)?			

Date / Name / Signature

3. Function check

Function of PCS loop successful? — P | PR | F

Fuses placed in system	
Cards, nests and instruments operational?	

Date / Name / Signature

Calibration device	Value	Indicator: Field /PU	DCS	Panel	Rec./other	Result
0/0 V						
1/24 V						
Device alarm						
Open circuit						

No check due to operational reasons?

SW/Spec: alarm and switch levels OK?	
Loop brought back ready for commissioning?	

Explanation:	
P	Pass
PR	Pass after repair
F	Fail

Description of failure (use other side)

Description of repair (use other side)

Status:	Date
Issued to checkout rew	
Issued to repair crew	
Issued to constr. for repair	
Issued to progr. for repair	
Issued to engineering	
Loop filed and complete	

Annex C
(informative)

Test report for analogue output loop

Test report for analogue output loop (control valve) Janaury 2002

Complex	Process area	Subprocess	Techn. item	Business unit	Building	xyz-coord	**Y0001**
ANTPCS6	**V401**	**TA10**		**KU**	**80**	**115.2**	Tag-description
Function **YCOS**			Purpose Loop check after installation		Phase Precommissioning		Product out BA001

Remark: This check is performed/documented after successful point-to-point wiring check and base software implementation.
Changes in installation or software functionality require recheck.
Irrelevant boxes are crossed out or filled in with N/A (not applicable).

Instrument type: Control membranevalve CT

Results

1. Documentation check *(Italics denote: normally not present)*

Loop documentation complete? Cable test - point-to-point connection test complete — P / PR / F

PCS specification HW present		Wiring diagram present	
Instrument certificates present		*PCS specification SW present*	
Release of construction present		*Test sheet SW-FAT present*	

Date / Name / Signature

2. Visual inspection

Are the elements of the loop complete, coded, installed in a clean and neat manner? — P / PR / F

Cable glands and connections tight?		Construction/flow direction OK	
All cards and nests installed and properly labelled?			
Do the instruments conform to the circuit diagrams (loop diagram) and specification sheets?			
Individual configuration of cards, transmitters, etc. complete (e.g. dip switches properly set)?			

Date / Name / Signature

3. Function check

Function of PCS loop successful? — P / PR / F

Fuses placed in system	
Instrument air open	
Cards, nests and instruments operational?	

Date / Name / Signature

Indication limit switches

Setpoint	Field /PU	DCS	Panel	Recorder/other	Results
OPEN					
CLOSE					

Setpoint device	Analog output Air to open	Air to close	Indication analog output Field /PU	DCS	Panel	Recorder/other	Results
3,5 mA	**False value**						
0%	4,0 mA	20,0 mA					
10%	5,6 mA	18,4 mA					
50%	12,0 mA	12,0 mA					
100%	20,0 mA	4,0 mA					
22 mA	**False value**						

SW/Spec: control functions OK?		SW/Spec: interlock functions OK?	
Solenoid forced?		Valve operation as specified?	
Air fail position		**CLOSE** of valve OK?	
DCS malfunctioning: action final element (valve) conform to specification?			
Loop brought back ready for commissioning?			

No check due to operational reasons?

Description of Failure (use other side)

Explanation:	
P	Pass
PR	Pass after repair
F	Fail

Description of Repair (use other side)

Status:	Date
Issued to checkout crew	
Issued to repair crew	
Issued to constr. for repair	
Issued to progr. for repair	

Annex D
(informative)

Test report for binary output loop

Complex	Process area	Subprocess	Techn. item	Business unit	Building	xyz-coord	**Y0029**
ANTPCS6	**V401**	**TA10**		**KU**	**80**		Tag-description
Function			Purpose		Phase		Input to BA001
YOS			Loop check after installation		Precommissioning		

Remark: This check is performed/documented after successful point-to-point wiring check and base software implementation.
Changes in installation or software functionality require recheck.
Irrelevant boxes are crossed out or filled in with N/A (not applicable).

Instrument type: Ball valve

1. Documentation check *(Italics denote: normally not present)*

Loop documentation complete? Cable test - point-to-point connection test complete	P	PR	F
	Date		
PCS specification HW present	Wiring diagram present	Name	
Instrument certificates present	*PCS specification SW present*	Signature	
Release of construction present	*Test sheet SW-FAT present*		

2. Visual inspection

Are the elements of the loop complete, coded, installed in a clean and neat manner?	P	PR	F
Cable glands and connections tight?	Construction/flow direction OK	Date	
All cards and nests installed and properly labelled?		Name	
Do the instruments conform to the circuit diagrams (loop diagram) and specification sheets?		Signature	
Individual configuration of cards, transmitters, etc. complete (e.g. dip switches properly set)?			

3. Function check

Function of PCS loop successful?	P	PR	F
	Date		
Fuses placed in system	Name		
Instrument air open	Signature		
Cards, nests and instruments operational?			

Set on DCS	Indication limit switches: Field /PU	DCS	Panel	Rec./other	Results
OPEN					
CLOSE					

Air fail position **CLOSE** of valve OK?	
SW/Spec: interlock functions OK?	
DCS malfunctioning: action final element (valve) conform to specification?	
Loop brought back ready for commissioning?	

No check due to operational reasons?

Explanation:	
P	Pass
PR	Pass after repair
F	Fail

Description of failure (use other side)

Description of Repair (use other side)

Status:	Date
Issued to checkout crew	
Issued to repair crew	
Issued to constr. for repair	
Issued to progr. for repair	
Issued to engineering	
Loop filed and complete	

Annex E
(informative)

Test report for motors and variable frequency drives

Test report for motor var. freq. drive — January 2002

Complex	Process area	Subprocess	Techn. item	Business unit	Building	xyz-coord	**M0001**
ANTPCS6	**V401**	**TA10**		**KU**	**80**		Tag-description
Function **MCOS**			Purpose Loop check after installation		Phase Precommissioning		Mixer BA001

Remark: This check is performed/documented after successful point-to-point wiring check and base software implementation.
Changes in installation or software functionality require recheck.
Irrelevant boxes are crossed out or filled in with N/A (not applicable).

Instrument type: F&G CD100L1/4

Results

1. Documentation check ***(Italics denote: normally not present)***

Loop documentation complete? Cable test - point-to-point connection test complete	P	PR	F

				Date / Name / Signature
PCS specification HW present		Wiring diagram present		
Instrument certificates present		*PCS specification SW present*		
Release of construction present		*Test sheet SW-FAT present*		

2. Visual inspection

Are the elements of the loop complete, coded, installed in a clean and neat manner?	P	PR	F

				Date / Name / Signature
Cable glands and connections tight?		Construction/flow direction OK		
All cards and nests installed and properly labeled?				
Do the instruments conform to the circuit diagrams (loop diagram) and specification sheets?				
Individual configuration of cards, transmitters, etc. complete (e.g. dip switches properly set)?				

3. Function check

			P	PR	F
Power fuses removed		Function of PCS loop successful?			
Control fuses installed			Date		
Cards, nests and instruments operational			Name		
Field repair disconnect - closed			Signature		

Operation/ indication at	**Field**	**PU**	**DCS**	**Panel**	**Other**	**Result**
Mode	Manual/Auto	Manual/Auto	Manual/Auto	Manual/Auto	Manual/Auto	
Operation	/	/	/ **AUTO**	/	/	
On	/	/	/	/	/	
Off	/	/	/	/	/	
Disturbance	/	/	/	/	/	

Setpoint device	**Setpoint RPM**	**Analogue output**	**Indication at var. freq. drive S313 K706 E01.1**	**Result**
0%	0	4 mA		
50%	710	12 mA		
100%	1420	20 mA		

Overtemp.				Thermal overloads	
Run dry prot.		Power monitor		Overload lockout	
Repair disc.					
SW/spec: control functions OK?				Span and units on readout OK?	
SW/spec: interlock functions OK?					
DCS malfunctioning: action final element (motor) conform to specification?					
			Loop brought back ready for commissioning?		

No check due to operational reasons?

Description of Failure (use other side)

Explanation:	
P	Pass
PR	Pass after repair
F	Fail

Status:	Date
Issued to checkout crew	
Issued to repair crew	
Issued to constr. for repair	
Issued to progr. for repair	

Description of Repair (use other side)

Standards Survey

The IEC would like to offer you the best quality standards possible. To make sure that we continue to meet your needs, your feedback is essential. Would you please take a minute to answer the questions overleaf and fax them to us at +41 22 919 03 00 or mail them to the address below. Thank you!

Customer Service Centre (CSC)

International Electrotechnical Commission
3, rue de Varembé
1211 Genève 20
Switzerland

or

Fax to: **IEC**/CSC at +41 22 919 03 00

Thank you for your contribution to the standards-making process.

Nicht frankieren
Ne pas affranchir

Non affrancare
No stamp required

A Prioritaire

RÉPONSE PAYÉE

SUISSE

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International Electrotechnical Commission
3, rue de Varembé
1211 GENEVA 20
Switzerland

Q1 Please report on **ONE STANDARD** and **ONE STANDARD ONLY**. Enter the exact number of the standard: *(e.g. 60601-1-1)*

.....

Q2 Please tell us in what capacity(ies) you bought the standard *(tick all that apply).* I am the/a:

purchasing agent ❑
librarian ❑
researcher ❑
design engineer ❑
safety engineer ❑
testing engineer ❑
marketing specialist ❑
other.....

Q3 I work for/in/as a: *(tick all that apply)*

manufacturing ❑
consultant ❑
government ❑
test/certification facility ❑
public utility ❑
education ❑
military ❑
other.....

Q4 This standard will be used for: *(tick all that apply)*

general reference ❑
product research ❑
product design/development ❑
specifications ❑
tenders ❑
quality assessment ❑
certification ❑
technical documentation ❑
thesis ❑
manufacturing ❑
other.....

Q5 This standard meets my needs: *(tick one)*

not at all ❑
nearly ❑
fairly well ❑
exactly ❑

Q6 If you ticked NOT AT ALL in Question 5 the reason is: *(tick all that apply)*

standard is out of date ❑
standard is incomplete ❑
standard is too academic ❑
standard is too superficial ❑
title is misleading ❑
I made the wrong choice ❑
other .....

Q7 Please assess the standard in the following categories, using the numbers:
(1) unacceptable,
(2) below average,
(3) average,
(4) above average,
(5) exceptional,
(6) not applicable

timeliness.....
quality of writing.....
technical contents.....
logic of arrangement of contents .....
tables, charts, graphs, figures.....
other .....

Q8 I read/use the: *(tick one)*

French text only ❑
English text only ❑
both English and French texts ❑

Q9 Please share any comment on any aspect of the IEC that you would like us to know:

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