IEC TS 63165

Edition 1.0 2024-12

TECHNICAL SPECIFICATION

Requirements for industrial water quality analyzer system – Photometry

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IEC TS 63165:2024-12(en)

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 13.060.25

ISBN 978-2-8327-0089-1

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REQUIREMENTS FOR INDUSTRIAL WATER QUALITY ANALYZER SYSTEM – PHOTOMETRY

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IEC TS 63165 has been prepared by subcommittee 65B: Measurement and control devices, of IEC technical committee 65: Industrial-process measurement, control and automation. It is a Technical Specification.

The text of this Technical Specification is based on the following documents:

Draft	Report on voting
65B/1253/DTS	65B/1274/RVDTS

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

The language used for the development of this Technical Specification: is English.

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

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

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REQUIREMENTS FOR INDUSTRIAL WATER QUALITY ANALYZER SYSTEM – PHOTOMETRY

1 Scope

This document applies to the industrial water quality analyzer system that uses a photometric method to determine the concentration of one or more chemical components in industrial water (water used in manufacturing, processing, cooling, washing, boiler, etc).

The objective of this document is to:

– specify the terminology and definitions related to the performance characteristics of a photometric industrial water quality analyzer system;
– unify the performance expression and verifying methods of such an analyzer system;
– specify the test procedures to be used in making statements on the performance characteristics of a photometric industrial water quality analyzer system.

2 Normative references

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

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IEC 62443-3-3, *Industrial communication networks – Network and system security – Part 3-3: System security requirements and security levels*

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IEC 62443-4-2, *Security for industrial automation and control systems – Part 4-2: Technical security requirements for IACS components*

3 Terms and definitions

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

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

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1
photometry
determination of the concentration of a dissolved substance in a solution by using the absorption of light by this substance

[SOURCE: ISO 14532:2014, 2.4.12]

3.2
measurand
particular quantity subject to measurement

[SOURCE: IEC 60050-311:2001, 311-01-03]

3.3
measuring range
range defined by two values of the measurand, or quantity to be supplied, within which the limits of uncertainty of the measuring instrument are specified

Note 1 to entry: An instrument can have several measuring ranges.

[SOURCE: IEC 60050-311:2001, 311-03-12]

3.4
90 %response time
T_{90}
time interval from the instant a step change occurs in the value of the property being measured to the instant when the change in the indicated value passes (and remains beyond) 90 % of its steady-state amplitude difference, i.e., T_{90} = T_{10} + T_r(or T_f). For cases where the rising and falling response times differ, the different response times should be specified

[SOURCE: IEC 60746-1:2003, 3.38]

3.5
calibration
set of operations which establishes, by reference to standards, the relationship which exists, under specified conditions, between an indication and a result of a measurement

Note 1 to entry: This term is based on the "uncertainty" approach.

Note 2 to entry: The relationship between the indications and the results of measurement can be expressed, in principle, by a calibration diagram.

[SOURCE: IEC 60050-311:2001, 311-01-09]

3.6
calibration interval
period between routine calibrations over which the performance of the analyser meets specified requirements

[SOURCE: ISO 14532:2014, 2.5.1.6]

3.7
blank calibration solution
solution prepared in the same way as the calibration solution but leaving out the analyte

[SOURCE: ISO 17294-1:2004, 3.3]

3.8
calibration solution
solution of known value of the property being measured, used for periodic calibration and for various performance tests

Note 1 to entry: The value should be expressed in SI units compatible with ISO 31.

Note 2 to entry: For the purposes of this document, the value of this solution represents the conventional true value against which the indicated value is compared.

Note 3 to entry: The values of calibration solutions should be traceable to reference material according to international or national standards, or agreed upon by the manufacturer and the user, and the conventional true values shall be stated.

[SOURCE: IEC 60746-1:2003, 3.5]

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3.9
accuracy
quality which characterizes the ability of a measuring instrument to provide an indicated value close to a true value of the measurand

Note 1 to entry: This term is used in the "true value" approach.

Note 2 to entry: Accuracy is all the better when the indicated value is closer to the corresponding true value.

[SOURCE: IEC 60050-311:2001, 311-06-08]

3.10
precision
measurement precision
closeness of agreement between independent test/measurement results obtained under stipulated conditions

Note 1 to entry: Precision can be expressed as a standard deviation or relative standard deviation (coefficient of variation).

[SOURCE: ISO 18158:2016, 2.4.3.3]

3.11
span drift
change in analyzer system output in response to a standard of 90 % of the measuring range(s) of the analyzer system over a stated period of unattended operation

[SOURCE: ISO 11042-2:1996, 3.5.4, modified – in the term “span instability (drift)” has been replaced by “span drift”, and in the definition, “instrument” has been replaced with “analyzer system”.]

3.12
zero drift
change in analyzer system output in response to a zero sample over a stated period of unattended operation

3.13
memory effect
effect of previous values of the measurand on the current measurement results

Note 1 to entry: This effect mainly occurs in the residue of solutions or water samples.

[SOURCE: ISO 9169:2006, 2.1.21, modified – the note has been added.]

3.14
limit of detection
measured quantity value, obtained by a given measurement procedure, for which the probability of falsely claiming the absence of a component in a material is β, given a probability α of falsely claiming its presence

Note 1 to entry: IUPAC recommends default values for α and β equal to 0.05.

Note 2 to entry: The abbreviation LOD is sometimes used.

Note 3 to entry: The term “sensitivity” is discouraged for ‘detection limit’.

Note 4 to entry: The LOD is the lowest concentration of measurand in a sample that can be detected, but not necessarily quantitated under the stated conditions of the test.

[SOURCE:ISO 6107:2021, 3.169, modified – “detection level” has been removed from the term.]

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3.15
limit of quantification
lowest concentration of a measurand that can be determined with acceptable precision under the stated conditions of the test

Note 1 to entry: As such defined, LOQ is based on evaluation of precision. This does not encompass neither any eventual bias, nor laboratory measurement uncertainty at LOQ level`.

[SOURCE: ISO 6107:2021, 3.320]

3.16
parallel measurements
measurements by different analyzer systems with sampling the same industrial water over the same time period

[SOURCE: ISO 9169:2006, 2.1.22, modified – in the definition, “measuring” has been replaced with “analyzer”.]

3.17
consistency of parallel measurements
evaluation of the maximum difference among different analyzer systems by parallel measurements

3.18
bias
difference between the expectation of a measurement result and a test result by laboratory methods

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3.19
period of unattended operation
maximum interval of time for which the performance characteristics remains within a predefined range without external servicing, e.g. refill, adjustment

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[SOURCE: ISO 9169:2006, 2.2.11]

3.20
rate of valid data
ratio of valid data to total data during the period of unattended operation

3.21
interference of ambient temperature
relative deviation between the measured value and the reference value of the standard solution under different ambient temperature

3.22
interference of supply voltage
deviation between the measured value and the reference value of the standard solution under different supply voltage

3.23
interference of colour and suspended particles
accuracy of a measured value after adding a standard solution with a specific colour and suspended particles in comparison with the reference value

3.24
ion interference
accuracy of a measured value after adding a standard solution with a specific interfering ion in comparison with the reference value