
**Cathodic protection — Competence
levels of cathodic protection persons
— Basis for a certification scheme**

*Protection cathodique — Niveaux de compétence des personnes
en protection cathodique — Base pour un dispositif particulier de
certification*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 156, *Corrosion of metals and alloys*.

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Introduction

This document enables the competence of cathodic protection (CP) persons carrying out cathodic protection survey, design, installation, testing and maintenance work to be defined and verified.

The relevant application sectors concern on-land metallic structures, marine metallic structures, reinforced concrete structures and the inner surfaces of metallic structures containing an electrolyte.

Demonstration of competence is possible by certification. This document offers a certification scheme in accordance with ISO/IEC 17024.

In preparation of [Clauses 4, 5](#) and [6](#), a detailed job task analysis (JTA) was undertaken by consensus of the experts in ISO TC 156. This JTA was then subject to review by international experts during the ISO enquiry process. It is considered that [Clauses 4, 5](#) and [6](#) constitute a rigorous JTA. The JTA is largely based on similar work performed by CEN/TC 219, which produced EN 15257, which has been in widespread use since 2007.

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Cathodic protection — Competence levels of cathodic protection persons — Basis for a certification scheme

1 Scope

This document defines five levels of competence (detailed in [Clause 4](#)) for persons working in the field of cathodic protection (CP), including survey, design, installation, testing, maintenance and advancing the science of cathodic protection. It specifies a framework for establishing these competence levels and their minimum requirements.

Competence levels apply to each of the following application sectors:

- on-land metallic structures;
- marine metallic structures;
- reinforced concrete structures;
- inner surfaces of metallic structures containing an electrolyte.

These application sectors are detailed in [Clause 5](#).

This document specifies the requirements to be used for establishing a certification scheme as defined in ISO/IEC 17024. It is not mandatory to apply all of the levels and/or application sectors. This certification scheme is detailed in [Annexes A, B and C](#).

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2 Normative references

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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.

ISO/IEC 17024, *Conformity assessment — General requirements for bodies operating certification of persons*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8044 and the following apply.

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

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

3.1

application sector

particular section of industry or technology where specialized cathodic protection survey, design, installation, testing and maintenance practices are used or the science of cathodic protection is advanced, requiring specific sector-related knowledge, skill, equipment or *training* (3.13)

3.2

assessment committee

group appointed by the certification body which reviews applications and examination results and determines compliance with the requirements for CP certifications offered by the certification body

3.3

CP person **cathodic protection person**

person who devotes a regular and significant percentage of professional activity to the practical application of cathodic protection within one or more of the *application sectors* (3.1)

3.4

competence

ability to apply knowledge and skill to achieve intended results

Note 1 to entry: Within the scope of this document, the ability of *CP persons* (3.3) means to apply defined knowledge and defined skills and undertake defined tasks at specific levels and specific *application sectors* (3.1).

3.5

complex structure

system comprising the structure to be protected connected to one or more foreign electrodes and/or crossing multiple connected electrodes or passing close or through steel-reinforced concrete

EXAMPLE Steel in concrete and earthing installations are examples of foreign electrodes.

3.6

examination centre

place for the examination of *competence* (3.4) in cathodic protection

Note 1 to entry: The centre includes testing facilities to simulate the conditions that normally exist in real cathodic protection of operating industrial structures for a given *application sector* (3.1).

3.7

examiner

person with relevant technical and personal qualifications, and competent to conduct and/or score an examination

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3.8

industrial cathodic protection experience

practice in the applicable cathodic protection techniques and *application sector(s)* (3.1) concerned, which leads to the required skill and knowledge

3.9

significant interruption

period of time in which a *CP person* (3.3) has not practised the duties or undertaken *training* (3.13) corresponding to their level of *competence* (3.4) within an *application sector* (3.1)

Note 1 to entry: A significant interruption comprises a continuous period in excess of 1,5 years or two or more periods for a total time exceeding 3 years during the validity of the certificate.

3.10

simple CP system

simple cathodic protection system

cathodic protection system with no design constraints due to external electrical influences, foreign structure interaction or unpredictable electrolyte changes where the design follows identified and defined, auditable procedural steps as developed by a person certificated to Level 4

3.11

technical instruction

written description, method statement or work instruction stating the precise steps to be followed in a cathodic protection survey, design, installation, testing or maintenance activity to an established standard, code, specification or cathodic protection procedure

3.12

technical report

written report intended to transmit engineering information of a complex, analytical nature

3.13 training

theoretical and practical instructions given in conformity to a pre-established programme in order to furnish or increase the knowledge and the ability of *CP persons* (3.3) in cathodic protection activities

3.14 training centre

centre where *training* (3.13) of *CP persons* (3.3) is carried out

Note 1 to entry: The training centre includes demonstration and testing facilities to simulate the electrical conditions that normally exist in real cathodic protection of operating industrial structures for a given *application sector* (3.1).

4 Levels of competence

4.1 General

The competence of CP persons shall be classified in one or more of the following levels, depending on their competence in particular application sectors.

A detailed description of the requirements of competence is given in [Clause 6](#).

Each defined level of competence shall include also the competence of the corresponding lower levels.

4.2 Level 1, cathodic protection data collector (or tester)

Level 1 CP persons shall be competent to collect CP performance data of simple CP systems and perform other basic CP tasks in accordance with technical instructions and procedures produced by Level 3 or higher persons and record the data to a format produced by Level 3, or higher persons and under their responsibility. Level 1 persons shall not be responsible for analysing the data. Level 1 persons shall understand the fundamentals of the measurements and the related safety issues. The measurements shall include routine system function measurements, as well as a limited number of specific measurements to determine the performance effectiveness of CP systems.

4.3 Level 2, cathodic protection technician

In addition to the competencies for Level 1 CP persons, Level 2 CP persons shall be competent to undertake a range of CP measurement, inspection and supervisory activities in accordance with technical instructions and procedures produced by Level 3 or higher persons, and collate and classify the data under their responsibility.

Level 2 persons shall have knowledge of the fundamentals of electricity, corrosion, coatings, CP and measurement techniques, safety issues and applicable standards related to CP.

Level 2 persons shall be competent to check the calibration validity of the CP measuring and testing equipment, supervise and perform inspection and testing during installation of CP systems and carry out routine maintenance work on CP systems.

Level 2 persons shall not be responsible for the choice of test method, the technique to be used, preparing the technical instructions or the interpretation of test results.

4.4 Level 3, cathodic protection senior technician

In addition to the competencies for Level 2 persons, Level 3 persons shall have knowledge of the general principles of corrosion and CP, the principles of electricity, the significance of coatings and their influence on CP and a detailed knowledge of CP test procedures and safety issues.

Level 3 persons shall understand and be competent to perform CP tasks according to established or recognized procedures. They shall be competent to carry out and supervise all Level 1 and Level 2 duties, provide guidance for persons at Level 1 and Level 2. They shall be competent to prepare technical instructions for all CP persons of lower-level competence and assess all data collected from these tasks.

4.5 Level 4, cathodic protection specialist

In addition to the competences for Level 3 persons, Level 4 persons shall have detailed knowledge of corrosion theory, principles of electricity, CP design, installation, commissioning, testing and performance evaluation, including systems affected by interfering conditions. They shall have competence in establishing testing and performance criteria where none are otherwise available. They shall have a general familiarity with CP in all application sectors.

They shall be competent to design CP systems including those where no pre-set parameters or procedural steps exist. They shall be competent to define the guidelines for specifying, designing and monitoring CP systems. They shall be competent to consider technical and safety aspects.

They shall be competent to prepare technical instructions for all CP persons of lower-level competence and assess all data collected from these tasks.

In all of these activities, Level 4 persons are not required to be supervised by Level 5 or other persons.

4.6 Level 5, cathodic protection expert

In addition to the competencies for Level 4 persons, Level 5 CP persons shall have advanced the state of the art of CP by scientific work and peer-reviewed publications and shall have made a marked and original contribution to the science or practice of corrosion control by CP.

Level 5 persons shall have all the competences required in [Clause 6](#) for Level 4 persons in at least one sector and shall have detailed knowledge of CP and a range of competences in all sectors. They shall have in at least one of the sectors an established and mature reputation as a CP specialist at the highest level. Level 5 persons shall undertake a range of high-level activities such as management of R&D projects, publications in technical or scientific journals or books, lectures at congresses or training courses, participation in standardization or technical committees, lead in the development of new technology or new applications, editing scientific journals and/or other activities as described in [B.5](#).

It is not precluded for Level 4 persons to perform any of the tasks attributed to Level 5.

It is not a requirement that certification bodies, examination centres or training centres utilize Level 5 CP persons in the operation and management of their activities.

4.7 Designation of competence levels

Levels 1 to 5 are the definitive terms. The terms cathodic protection tester, cathodic protection technician, cathodic protection senior technician, cathodic protection specialist and cathodic protection expert are used above in an indicative purpose only.

5 Application sectors

5.1 General

Any of the following application sectors shall be used in the establishment of competence levels of CP persons. For each of the application sectors (see [5.2](#) to [5.5](#)), national and international specific standards may apply.

In addition to the specific knowledge for each application sector, a common core of knowledge is required.

5.2 On-land metallic structures

The following topics are relevant to this application sector:

- CP general principles and specific applications in soils and waters;
- CP measurement techniques;
- protection against corrosion by stray current from direct current systems;
- interference from alternating and direct current;
- the relevance of touch potentials.

This application sector includes, for example, the following:

- a) buried onshore pipelines;
- b) sections of onshore pipelines crossing rivers, lakes or short lengths of sea;
- c) landfalls of offshore pipelines protected by an onshore CP system;
- d) buried tanks;
- e) bottoms (external side) of above-ground tanks;
- f) complex structures (see 3.5);
- g) well casings;
- h) buried plant modules.

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5.3 Marine metallic structures

The following topics are relevant to this application sector:

- CP general principles;
- CP measurement techniques;
- specific applications in seawater and marine sediments.

This application sector includes, for example, the following:

- a) ships (external hulls and ballast tanks filled with sea water);
- b) CP measurement techniques;
- c) fixed offshore structures (platforms, jackets, monopiles, offshore windfarms, tension leg platforms, etc.);
- d) floating structures [buoys, semi-submersible platforms, floating production storage and offloading structures (FPSO)];
- e) underwater structures (well heads, manifolds, piping);
- f) coastal and offshore pipelines, risers;
- g) landfall of offshore pipelines protected by an offshore CP system;
- h) harbour facilities, piers, jetties and lock gates.

5.4 Reinforced concrete structures

The following topics are relevant to this application sector:

- CP general principles;
- CP measurement techniques;
- specific applications of steel in concrete;
- other electrochemical techniques that are also aimed at mitigating corrosion of steel embedded in concrete, such as electrochemical re-alkalization and chloride extraction treatments for reinforced concrete.

This application sector includes, for example, the following:

- a) atmospherically exposed steel-reinforced (both post-tensioned and pre-stressed) concrete, onshore structures (bridges, walls, piles, buildings etc.);
- b) buried steel-reinforced (both post-tensioned and pre-stressed) concrete structures (pipelines, tunnels, foundations, etc.);
- c) steel-reinforced (both post-tensioned and pre-stressed) concrete structures immersed in fresh water (pipe lines, foundations, swimming-pools, water tanks);
- d) steel-reinforced (both post-tensioned and pre-stressed) concrete structures immersed in seawater (harbour facilities, piers, jetties, offshore platforms).

5.5 Inner surfaces of metallic structures containing an electrolyte

The following topics are relevant to this application sector:

- CP general principles; <https://standards.iteh.ai/catalog/standards/sist/14df5d2b-9638-4be0-a3e3-d4fcb85bc527/iso-15257-2017>
- specific applications of inner surfaces;
- CP measurement techniques.

This application sector includes, for example, the following:

- a) fresh water containing equipment (storage tanks, condensers, filters, cooling water systems, etc.);
- b) seawater-containing equipment (ballast tanks, flooded dock gates, flooded compartments, flooded piles, cooling water systems, etc.);
- c) oil field production water storage tanks;
- d) offshore immersed pumps and the internals of their caissons;
- e) inside offshore windfarm monopiles;
- f) other electrolyte-containing equipment (tanks and piping).

6 Requirements for competence of persons at various levels and for various applications sectors

6.1 General

CP persons of competence Levels 1 to 4 shall be knowledgeable in the topics in [Table 1](#) and competent to undertake the tasks detailed in [Table 2](#) to [Table 6](#). CP persons shall have the knowledge and skill