BRITISH STANDARD

BS EN
15257:2006

# Cathodic protection — Competence levels and certification of cathodic protection personnel

The European Standard EN 15257:2006 has the status of a British Standard

ICS 77.060



BSI
British Standards

# National foreword

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This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

**Compliance with a British Standard cannot confer immunity from legal obligations.**

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EUROPEAN STANDARD

NORME EUROPÉENNE

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**EN 15257**

December 2006

ICS 77.060

English Version

# Cathodic protection - Competence levels and certification of cathodic protection personnel

Protection cathodique - Niveaux de compétence et certification du personnel en protection cathodique

Kathodischer Korrosionsschutz - Qualifikationsgrade und Zertifizierung von für den kathodischen Korrosionsschutz geschultem Personal

This European Standard was approved by CEN on 28 October 2006.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
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# Foreword

This document (EN 15257:2006) has been prepared by Technical Committee CEN/TC 219 “Cathodic protection”, the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2007, and conflicting national standards shall be withdrawn at the latest by June 2007.

This document is aimed at enabling the competence of personnel carrying out cathodic protection studies, execution work, inspections and maintenance work to be defined and verified. The relevant application sectors concern underground or immersed metallic structures, marine metallic structures, reinforced concrete structures and the inner surfaces of metallic container structures.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

# 1 Scope

This European Standard defines three competence levels (Annex B) of personnel acting in the field of cathodic protection, including survey, design, installation, testing and maintenance. It specifies a framework of procedures for the training and certification for the personnel to reach and demonstrate the competence levels. It defines the minimum requirements for certification bodies responsible for this certification.

The procedures for certification of cathodic protection personnel should be in accordance with EN ISO/IEC 17024.

Competence levels and certification schemes apply to each of the following application sectors:

— underground and immersed metallic structures;

— marine metallic structures;

— reinforced concrete structures;

— inner surfaces of metallic container structures.

These application sectors are detailed in Annex A.

It is not mandatory for a certification body to establish certification in all application sectors or to all levels of competence.

A certification body may subdivide application sectors and may combine levels of competence. If such subdivision and/or combination are used by the certification body, it should ensure that the certificates discriminate these divided sectors or combined levels from those defined in this standard.

NOTE 1 This European Standard does not incorporate the certification of companies or services.

NOTE 2 This European Standard does not include internal corporate assessment and qualification of personnel.

NOTE 3 Wherever gender specific words such as "his", "her", "he" or "she" appears in this standard the other gender is also applicable.

# 2 Normative references

The following referenced documents are indispensable for the application 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.

EN 12473, *General principles of cathodic protection in sea water*

EN 12474, *Cathodic protection for submarine pipelines*

EN 12495, *Cathodic protection for fixed steel offshore structures*

EN 12499, *Internal cathodic protection of metallic structures*

EN 12696, *Cathodic protection of steel in concrete*

EN 12954, *Cathodic protection of buried or immersed metallic structures - General principles and application for pipelines*

EN 13173, *Cathodic protection for steel offshore floating structures*

EN 13174, *Cathodic protection for harbour installations*

EN 13509, *Cathodic protection measurement techniques*

EN 13636, *Cathodic protection of buried metallic tanks and related piping*

EN 14505, *Cathodic protection of complex structures*

EN 15112, *External cathodic protection of well casings*

EN 50162, *Protection against corrosion by stray current from direct current systems*

EN ISO/IEC 17024*, Conformity assessment - General requirements for bodies operating certification for persons (ISO/IEC 17024:2003)*

EN ISO 8044:1999, *Corrosion of metals and alloys - Basic terms and definitions (ISO 8044:1999)*

CEN/TS 14038-1, *Electrochemical realkalization and chloride extraction treatments for reinforced concrete - Part 1: Realkalization*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 8044:1999 and the following apply.

**3.1**
**application sector**
particular section of industry or technology where specialised cathodic protection design, testing and maintenance practices are used requiring specific system related knowledge, skill, equipment or training

NOTE Application sectors are detailed in Annex A.

**3.2**
**candidate**
person applying for certification for a given level in a given application sector

**3.3**
**cathodic protection personnel**
personnel who devote a regular and significant percentage of their professional activity to the practical application of cathodic protection within one or more of the application sectors

**3.4**
**certificate**
document issued under the rules of the certification system defined in this standard indicating that the named person has demonstrated that he is competent to perform the tasks defined in this standard for the given level and application sector identified on the certificate

**3.5**
**certification assessment**
assessment of competence by examination or general assessment (for level 3 only)

**3.6**
**certification body**
body that administers procedures for certification of cathodic personnel according to the requirements of this standard and which fulfils the requirements of EN ISO/IEC 17024

**3.7**
**certification examination**
procedure that is part of the certification assessment, which measures a candidate's competence by one or more means such as written, oral, practical and observational examination

**3.8**
**competence**
ability of personnel to undertake tasks at specific levels and in specific cathodic protection application sectors in accordance with existing European Standards on cathodic protection. This is demonstrated by appropriate levels of training, professional knowledge, skill and experience

**3.9**
**delegated body**
body, independent of any single predominant interest, subcontracted by the certification body to perform any of its tasks, except the issue of certification, in compliance with EN ISO/IEC 17024

NOTE The delegated body constitutes one of the elements of the system governed by the certification body.

**3.10**
**examination centre**
centre approved by the certification body for the examination of competence in cathodic protection. The centre includes testing facilities to simulate the electrical conditions which normally exist in real cathodic protection of operating industrial structures, for a given application sector

NOTE The examination centre constitutes one of the elements of the system governed by the certification body.

**3.11**
**examiner**
person with relevant technical and personal qualifications, and competent to conduct and/or score an examination under the authorisation of the certification body or the delegated body

**3.12**
**industrial cathodic protection experience**
experience in the applicable cathodic protection techniques and field of application concerned, which leads to the required skill and knowledge

**3.13**
**provisional certification**
document from the certification body or delegated body confirming successful completion of examination

**3.14**
**significant interruption**
absence from, or change in activity, which prevents the certificated person from practising the duties corresponding to his level of certification within the application sector(s) for which he is certificated, for:

a) a continuous period in excess of 365 days or;

b) two or more periods for a total time exceeding two fifths of the total period of validity of the certificate

**3.15**
**technical instruction, method statement or work instruction**
written description stating the precise steps to be followed in a cathodic protection design, testing or maintenance activity to an established standard, code, specification or cathodic protection procedure

**3.16**
**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 the personnel in cathodic protection activities

**3.17**
**training centre**
centre where training of candidates is carried out for preparation to certification examination. The training centre includes demonstration and testing facilities to simulate the electrical conditions which normally exist in real cathodic protection of operating industrial structures, for a given application sector

# 4 General principles, duties and responsibilities

## 4.1 Certification body

The certification body shall fulfil the requirements of EN ISO/IEC 17024 and this standard in respect of the certification of cathodic protection personnel.

The certification body shall:

a) initiate, promote, maintain and administer the certification scheme according to this standard;

b) determine which competence levels and application sectors shall be the subject of certification;

c) establish and publish the requirements for training and industrial experience for levels 1, 2 and 3 personnel in the application sectors detailed in Annex A for the levels and sectors selected for certification;

d) assess and approve examination centres;

e) monitor and document all delegated functions, in accordance with a documented procedure.

The certification body may delegate, under its direct responsibility, to a delegated body:

i) the detailed administration of the certification procedure;

ii) the approval of properly staffed and equipped training centres and their monitoring on a periodic basis if a training centre is part of the certification procedure;

iii) the establishment of properly staffed and equipped examination centres and their monitoring on a periodic basis;

iv) the establishment of an appropriate system for the maintenance of training, competence and examination records, which shall be retained for at least one certification cycle (see Clause 9).

### 4.2 Delegated body

Where established, the delegated body shall:

a) work under the control of the certification body;

b) have the resources and expertise needed to undertake all the tasks delegated by the certification body;

c) apply a documented quality management system approved by the certification body in accordance with EN ISO/IEC 17024.

### 4.3 Training centre

The establishment of a training centre is not mandatory. A training centre may be situated at an employer's premises or at an examination centre or independently. A training centre may be used as an examination centre, provided that it satisfies the minimum characteristics listed in 4.4.

1) A training centre may be established for one or more application sectors.

2) A training centre shall provide the following components, any of which may be combined:

a) demonstration and testing facilities to simulate the electrical conditions which normally exist in real cathodic protection of operating industrial structures, for the appropriate application sector(s);

b) a classroom having appropriate equipment and facilities for teaching the theoretical principles;

c) a workshop with appropriate equipment, facilities and equipped with cathodic protection instruments, materials and samples for practical training and testing.

Up to date calibration certificates and repair records for all devices, instrumentation and equipment shall be maintained by the training centre.

### 4.4 Examination centre

An examination centre shall:

a) have adequately qualified staff, suitable premises and sufficient equipment to ensure successful examinations for the levels and application sectors concerned;

b) work under the control of the certification body or delegated body;

c) apply a documented quality management procedure approved by the certification body;

d) have the resources needed to administer examinations, including the calibration and control of any equipment used;

e) prepare and conduct examinations under the responsibility of an examiner(s) authorised by the certification body;

f) use only those examination documents established or approved by the certification body;

g) use only test facilities prepared or approved by the certification body for the practical examinations conducted at that centre;

h) use only those assessment procedures established or approved by the certification body;

i) include testing facilities to simulate the electrical conditions which normally exist in real cathodic protection of operating industrial structures, for a given application sector.

An examination centre may be situated at a training centre or at an employer's premises. Examinations and their assessments shall be conducted only in the presence of, and under the control of an authorised representative of the certification body or delegated body, which shall be independent of the employer of the candidate.

# 5 Levels of competence

## 5.1 General

An individual who has been certificated in accordance with this standard shall be classified in one or more of the three following levels, depending upon his respective competence in particular application sectors.

A detailed description of competence levels is given in Annex B.

## 5.2 Level 1

An individual certificated to level 1 shall have demonstrated outline knowledge of:

a) the fundamentals of electricity, corrosion and coatings;

b) cathodic protection and measurement techniques;

c) safety issues and applicable standards related to cathodic protection.

He shall be competent to carry out cathodic protection tasks according to written technical instructions and under the supervision of level 2 or level 3 personnel.

Within the scope of the competence defined in Annex B, level 1 personnel shall be competent to:

i) check the calibration validity of the cathodic protection measuring and testing equipment;

ii) perform measurements and tests as instructed;

iii) record and classify the results of the measurements and the tests;

iv) report the results in a comprehensible format;

v) supervise and perform inspection and testing during installation of cathodic protection systems;

vi) carry out routine maintenance work on cathodic protection systems.

NOTE Some installation works may be carried out by the level 1 personnel. If installation is undertaken by these personnel the responsibility for supervision, inspection and testing tasks by the level 1 personnel is unchanged.

Level 1 certificated personnel shall not be responsible for the choice of test method or technique to be used, nor for preparing the written technical instructions, nor for the interpretation of test results.

## 5.3 Level 2

In addition to the competences for level 1 personnel, an individual certificated to level 2 shall have demonstrated competence in:

a) general principles of corrosion and cathodic protection;

b) the principles of electricity;

c) the significance of coatings and their influence on cathodic protection;

d) a detailed knowledge of cathodic protection test procedures and safety issues.

He shall understand and be competent to perform cathodic protection tasks according to established or recognised procedures. Within the scope of the competence defined in Annex B, level 2 personnel shall be competent to:

i) carry out and supervise all level 1 duties;

ii) provide guidance for personnel at level 1;

iii) select the cathodic protection measuring and testing technique for the purpose required;

iv) define the limitations of application of the testing method according to established procedures;

v) translate cathodic protection measuring and testing standards and specifications into written technical instructions for cathodic protection measuring and testing, routine maintenance, and installations procedures;

vi) set up measuring and testing equipment and verify equipment settings;

vii) organise and report the results of cathodic protection measuring and testing;

viii) interpret and evaluate results according to applicable standards, codes or specifications;

ix) determine routine remedial actions;

x) undertake cathodic protection design work under the supervision of an individual certificated to level 3. If not prevented by local regulations, an individual certificated to level 2 may undertake cathodic protection design work as described in Annex B, according to established procedures in a known environment, without supervision;

xi) supervise and test the installation of cathodic protection systems;

xii) commission cathodic protection systems under the responsibility of an individual certificated to level 3. If not prevented by local regulations, an individual certificated to level 2 may undertake cathodic protection commissioning as described in Annex B, according to established procedures in a known environment, without supervision;

xiii) undertake maintenance of cathodic protection system.

### 5.4 Level 3

An individual certificated to level 3 personnel shall have demonstrated:

a) detailed knowledge of corrosion theory, principles of electricity, cathodic protection design, installation, commissioning, testing and performance evaluation including safety in at least one application sector;

b) competence to undertake without supervision the design of cathodic protection systems in at least one application sector;

c) sufficient theoretical knowledge and practical experience of cathodic protection to select cathodic protection testing methods, survey requirements and performance criteria;

d) competence to evaluate and interpret results of cathodic protection performance in accordance with existing standards, codes and specifications;

e) competence to assist in establishing testing and performance criteria where none are otherwise available;

f) a general familiarity with cathodic protection in other application sectors.

Within the scope of the competence defined in Annex B, level 3 personnel shall be competent to:

i) design cathodic protection systems;

ii) establish and validate cathodic protection measuring and testing procedures;

iii) interpret standards, codes, specifications and procedures;

iv) designate the particular cathodic protection test methods and procedures to be used;

v) interpret the reported results of cathodic protection measuring and testing and use them in performance verification;

vi) determine any remedial actions;

vii) carry out, supervise and validate all level 1 and level 2 duties;

viii) assume full technical responsibility for a training centre or examination centre and staff;

ix) utilise field performance experience in developing improvements to cathodic protection designs, operations, performance assessments and maintenance procedures.

Level 3 personnel may be authorised by the certification body or the delegated body to manage and supervise training and/or examinations to level 1 and level 2 on its behalf.

# 6 Eligibility for certification

## 6.1 General

Candidates may be employed, self employed or unemployed.

The candidate shall document to the certification body, or the delegated body, personal information which includes a declaration of the candidate's education, training and experience. This shall contain sufficient detail to demonstrate the eligibility of the candidate for certification.

To be eligible for certification, the candidate shall fulfil the requirements for cathodic protection training and practical experience as defined in this clause and shall pass the relevant examination or assessment as detailed in Clause 7.

Candidates for levels 1 and 2 may complete the training as in 6.2 and the examination as in 7.2 before completion of industrial experience as in 6.3. The certification body or delegated body may issue a provisional certificate confirming successful completion of the examination but making clear that full certification of the candidate will not be issued until successful completion of the industrial experience as in 6.3.

The issue of the attestation shall be recorded by the certification body as in 4.1 (iv) and shall comply with 8.2.

## 6.2 Training

### 6.2.1 General

A documented record of training is required. Documentation may be retrospective. Training may be by the employer or through a recognised course at a training centre or by self study.

Attendance at a training centre may be a mandatory requirement for certification, depending upon the requirements of the certification body.

### 6.2.2 Level 1 and level 2

The candidate shall provide documentary proof that he has completed a period of training, in the application sector and level for which the certification is sought. The training period, method and syllabus, shall be established by the certification body in accordance with Annex B.

The minimum duration of training undertaken by the candidate for certification shall be 40 h of formal or documented on-the-job training in each particular application sector and for both level 1 and level 2. Candidates without level 1 certification shall undertake a minimum of 80 h training for level 2. Training hours shall include both practical and theory components.

### 6.2.3 Level 3

Taking into account the required scientific and technical competence of candidates for level 3 certification as described in 5.4, preparation for certification at level 3 may be by, for example:

a) completing a relevant engineering or scientific degree or period of post graduate education at a reputable school of higher education,

b) attending training courses, conferences or seminars (such as those organised by established industrial or independent associations),

c) studying scientific or engineering text books, periodicals, and other specialised materials.

The certification body shall establish, publish and from time to time update the certification requirements for level 3 personnel.

The candidate shall submit documentary evidence of training, experience, theoretical knowledge and practical skills in cathodic protection to enable the certification body to assess the competence of the candidate in accordance with 5.4.

### 6.3 Industrial experience

Industrial practical experience in cathodic protection shall be acquired prior to certification.

Documentary evidence of industrial experience shall be confirmed by the employer and/or independent referees and submitted to the certification body.

The minimum requirements for duration of cathodic protection experience to be gained prior to certification in all application sectors for a particular level of certification shall be as defined in Table 1. Candidates shall demonstrate that they have a minimum of 50 % of the minimum total experience requirements in Table 1 for the application sector for which they are applying for certification.

Level 3 competence requires knowledge beyond the technical scope of any one application sector. This broad knowledge may be acquired through a variety of combinations of education, training and experience.

All candidates for level 3 certification in any application sector shall demonstrate by documentary evidence that they are competent in both practical and theory to level 2 in the appropriate application sector or they shall have successfully completed the level 2 examination as detailed in 7.2.

**Table 1 - Minimum experience requirements for candidates**

| Target level | Candidates educational qualification in relevant scientific or engineering disciplines | Min. total number of years of experience in cathodic protection |
|---|---|---|
| 1 | All cases | 1 |
| 2 | Specialised education in corrosion field | 2 |
| | Technical education | 3 |
| | All other cases | 4 |
| 3 | Specialised education in corrosion field | 5 if assessment<br>or 3 if examination |
| | Technical Education | 8 if assessment<br>or 5 if examination |
| | All other cases | 12 if assessment<br>or 8 if examination |

## 7 Competence assessment for certification

### 7.1 General

Assessment of the competence level of candidates shall be undertaken in accordance with detailed regulations established by the certification body in compliance with the general framework defined by this standard. It shall be achieved through examinations for levels 1 and 2. For level 3 assessment is based on a detailed dossier of documentary evidence and optionally an examination.

### 7.2 Examination for level 1 and level 2

#### 7.2.1 General

The examination system for level 1 and level 2 shall be established and maintained by the certification body in order to assess the competence of level 1 and level 2 candidates in accordance with 5.2 and 5.3 respectively.

Publication of multiple choice examination questions is permitted when the certification body utilises these as a basis of a training programme. In this case, answers to questions shall not be published and there shall be at least 10 times the number of questions that are used in any one examination.

For each level, the examination shall comprise three examination sessions. Two examination sessions shall be theoretical: the so-called "common-core examination session" and the so-called "sectoral theoretical

examination session", specific to each application sector. In addition, the examination shall be completed by a "sectoral practical examination session" specific to each application sector.

Theoretical sessions may be combined.

### 7.2.2 Common-core examination session

The common-core examination session shall enable a candidate to demonstrate that he possesses the general knowledge required for understanding the corrosion phenomena, cathodic protection and coatings in accordance with 5.2 or 5.3.

The common-core examination session shall include only questions selected in an unpredictable way from the certification bodies or delegated body's collection of basic knowledge questions valid at the date of examination.

The time allowed to the candidates for completion of each examination shall be based upon the number and difficulty of the questions.

### 7.2.3 Sectoral theoretical examination session

The sectoral theoretical examination session shall enable the candidate to demonstrate his knowledge and competence to undertake tasks used within the application sector in question in accordance with 5.2 or 5.3.

The sectoral theoretical examination session shall include only questions selected from the certification bodies or delegated body's current collection of specific questions related to the application sector concerned.

The time allowed for the candidates to complete each examination shall be based upon the number and difficulty of the questions.

The sectoral theoretical examination session shall include a series of written questions on the processes and testing procedures used within the relevant application sector.

### 7.2.4 Sectoral practical examination session

A sectoral practical examination session organised on structures or simulated structures and systems shall be provided by the examination centre.

For Level 1, the candidate shall demonstrate his competence to fulfil the requirements of 5.2 in particular to:

— operate the instruments in order to collect accurate data;

— carry out the adjustments to cathodic protection equipment as necessary to obtain defined results;

— record and report the results.

For level 2, the candidate shall demonstrate his competence to fulfil the requirements of 5.3, in particular to:

— draw up a written report with an interpretation of the results;

— prepare written instructions to carry out a level 1 task;

— interpret particular cathodic protection problems.

The time allowed for the sectoral practical examination session shall depend on the number of tasks specific to that sector and their complexity.

### 7.2.5 Conduct of examinations

All examinations shall be conducted in examination centres, established, approved and monitored by the certification body, either directly or through a delegated body.

At the examination, the candidate shall have in his possession valid and unambiguous proof of identification (e.g. identity card, passport, or driving licence incorporating photograph) and an official notification of the examination, which shall be shown to the examiner or invigilator upon demand.

Any candidate who, during the course of the examination, does not abide by the examination rules or who perpetrates, or is an accessory to, fraudulent conduct shall be excluded from a period to be determined by the certification body.

Examinations shall be approved by at least one examiner. The examination shall be invigilated and evaluated by an examiner, or by one or more trained and authorised invigilators placed under one examiner's responsibility.

At least one examiner shall be responsible for grading the examination in accordance with procedures established by the certification body.

A candidate shall not be examined only by an examiner who:

- has personally trained him for that particular examination
- or is employed in the same company.

The examiners shall attest their independence in the assessment of the candidates and that all information received in the assessment process shall be maintained in confidence.

#### 7.2.6 Grading of the Level 1 and Level 2 certification examination

At least one examiner shall be responsible for the grading of the examinations by comparison with model answers.

The common-core, sectoral theoretical and practical examination sessions shall be graded separately. Each examination session and the overall examination shall have minimum pass grades set by the certification body in order that the theoretical knowledge and the practical competence required in Annex B are properly verified.

The candidate shall successfully complete each of the examination sessions prior to certification

In establishing the examination marking scheme the certification body or delegated body shall determine that there is greater weight allocated to the sectoral practical examination session in level 1 than the theoretical examinations. For level 2 the certification body or delegated body shall determine that the theoretical examinations have equal or greater weight than the sectoral practical examination session.

The written tests of the common-core part shall be marked separately in order to allow the candidate to apply, without re-sitting the common-core part, for another certification in another application sector.

If a certification body only operates in a single application sector the common core and the sectoral theoretical examination sessions may be marked together.

#### 7.2.7 Final assessment

The certification body or the delegated body shall establish an assessment committee that shall review the results of the examination sessions and the recommendations from the examiners in order to determine the acceptance of the candidates for certification.

### 7.3 Assessment for level 3

The competence of level 3 candidates in accordance with all aspects detailed in 5.4, shall be assessed by an assessment committee appointed by the certification body or delegated body on the basis of a dossier detailing and documenting:

- The educational, scientific or engineering qualifications of the candidate
- The extent of responsible experience in the particular application sector for which he is a candidate
- Examples of design documents, reports or technical papers prepared by the candidate

The dossier shall demonstrate knowledge of general and specific theory of cathodic protection and the ability to prepare technical reports.

The dossier shall be supported by a minimum of two independent referees familiar with the work of the candidate who shall attest to the veracity and accuracy of the dossier and the suitability of the candidate to be certificated to level 3 in the application sector (s).

The assessment committee shall comprise a minimum of five members experienced in cathodic protection of which at least two shall be certificated to level 3 and may in addition include representatives of the certification body and/or delegated body.

The members of assessment committee and any supplementary experts shall attest their independence in the assessment of the candidates and that all information received in the assessment process shall be maintained in confidence.

The certification body, the delegated body or the assessment committee may require in addition to the dossier the preparation of a specific document to demonstrate practical and theoretical competence and/or a presentation by the candidate to the assessment committee possibly supplemented by other experts.

Alternatively, the certification body or the delegated body may require a general and sectoral theoretical examination in addition to the preparation and assessment of the dossier.

### 7.4 Re-assessment

A candidate failing for reasons of unethical behaviour shall wait for a period of time as determined by the certification body before reapplying. .

A candidate who fails to obtain the pass grade required for level 1 or level 2 certification may retake any of the examination sessions (general, specific or practical) once, provided further training acceptable to the certification body is satisfactorily completed and the re-examination takes place not later than twelve months after the original examination.

A candidate failing re-examination may apply for and shall take the examination in accordance with the procedure established for new candidates.

For level 3, the certification body or delegate body shall determine the re-examination procedure.

### 7.5 Competence assessment exemptions

Certificated level 1 or level 2 personnel changing from one application sector to another shall be required to re-sit only the sectoral theoretical and practical examination sessions concerning the new application sector.

## 8 Administration of certification

### 8.1 Certificates and/or wallet cards

A candidate fulfilling all conditions for certification shall be issued with a certificate and/or corresponding wallet card by the certification body.

Certificates and/or corresponding wallet cards shall include at least:

a) the name and forename of the certificated individual;

b) the date of issue of the certification;

c) the date upon which certification expires;

d) the level of certification;

e) the name of the certification body;

f) the application sector(s);

g) a unique personal identification number;

h) the signature of the certificated individual;

i) a photograph of the certificated individual in the case of the wallet card;

j) a device to prevent falsification of the wallet card, e.g., use of a cold seal, welding into plastic, etc;

k) the signature, on the certificate, of a designated representative of the certification body.

### 8.2 Provisional certification

A candidate who has successfully completed the examination for level 1 or level 2 may receive a provisional certificate from the certification body or delegated body attesting the successful completion of the examination which shall declare that full certification of the candidates will not be issued until successful completion of the industrial experience as in 6.3.

### 8.3 Validity period of certificate

The maximum period of validity of the certificate and/or wallet card shall be five years. The initial period of validity shall commence when all of the requirements for certification (training, experience, success in competence assessment) are fulfilled.

Certification shall become invalid:

- at the option of the certification body, e.g., after reviewing evidence of unethical behaviour incompatible with the certification procedures;
- if a significant interruption (see 3.14) takes place in the application sector for which the individual is certificated.

## 9 Re-certification

### 9.1 General

Upon expiry of the first period of validity and every ten years thereafter, certification may be renewed by the certification body for a new period of five years on production of documentary evidence of continued successful work activity without significant interruption (see 3.14) and updating of technical knowledge in the application sector for which certificate renewal is sought.

If the criterion for renewal is not satisfied, the individual shall be permitted to attempt a recertification examination. Failure in this examination shall result in the individual being considered an initial candidate for certification in the application sector and level concerned.

Upon completion of each second period of validity (every ten years) certification shall be renewed by the certification body for a new period of 5 years on the basis of the requirements given in 9.2 and 9.3.

### 9.2 Levels 1 and 2

The individual shall successfully complete a sectoral practical examination session organised to a simplified procedure which assesses ongoing competence to carry out corresponding cathodic protection tasks. This shall include tasks appropriate to the scope of certification to be revalidated and, for level 2, the production of a written instruction suitable for the use of level 1 personnel. If the individual fails to achieve this examination, one re-examination session of the whole re-certification examination scheme shall be allowed after 7 days and before 6 months. In the event of failure in the one allowable re-examination session, the certificate shall not be revalidated and, to regain certification for that level and application sector the candidate shall apply for new certification. In this case, no examination exemptions shall be awarded by virtue of any other valid certification held.

### 9.3 Level 3

The certification body shall establish a re-certification scheme for level 3 personnel by which the personnel demonstrate their continued competence to meet the requirements of 5.4 by the submission of a dossier detailing the professional development training of the personnel (training courses, conferences, etc), the continued responsible activity of the personnel in undertaking the tasks in 5.4 in the applicable sector(s) and evidence of continued competence (reports, designs, technical papers, etc). The certification body may require the personnel to provide confirmation of this dossier by the employer and/or independent referees.

## 10 Files

The certification body or the delegated body shall maintain, either in hard copy, microfilm or read only digitised form:

- updated list of all certificated individuals classified according to levels and application sectors;
- individual file(s) for each candidate containing application forms, dossiers, examination documents, answers, records, results of examinations and assessments of level 3 dossiers;
- renewal and re-certification documents, including evidence of continuous activity.

Individual files shall be kept under suitable conditions of safety and confidentiality for as long as the certificate remains valid and for at least ten years after the certification has lapsed or the application has failed.

# 11 Establishment of new certification schemes, extension of schemes, transition periods

## 11.1 General

The following requirements apply to the transition period for a certification body commencing the certification of cathodic protection personnel in one or more application sectors.

The transition period shall not last more than five years after the establishment of the scheme.

NOTE It is recommended that there should be only one cathodic protection personnel certification body in any country.

## 11.2 Certification body

The certification body shall comply with the requirements of 4.1 of this standard.

## 11.3 Certification scheme and training

### 11.3.1 General

The certification scheme and any associated training shall comply with this standard.

### 11.3.2 Appointment of trustees

In order to establish a certification scheme, or to extend an existing scheme to (a) new application sector(s), the certification body shall appoint trustees for the scheme or the new sector(s).

The certification body shall consider in appointing the trustees the need to ensure that all participants of the cathodic protection industry in a country for the application sector(s) proposed for inclusion in the scheme are adequately and ideally equally represented. The trustees should include representatives from, for example:

- operating companies/users with their own cathodic protection expertise
- cathodic protection contracting companies
- cathodic protection consulting companies and individuals
- academics with particular competence in cathodic protection.

The certification body shall appoint a minimum of three trustees who shall not be from the same companies and who shall not be commercially linked.

The trustees shall each comply with 5.4 and shall each have a minimum of ten years continuous experience in cathodic protection in the sector(s) proposed for inclusion in the scheme and shall demonstrate by a dossier to the certification body that they have completed cathodic protection designs, testing, commissioning and performance verification in the application sector(s) in the previous five years.

### 11.3.3 Establishment of certification scheme

The certification body and the trustees shall work together to establish the examination elements of the scheme for the application sector(s) in accordance with this standard.

### 11.3.4 Liaisons with existing schemes

The certification body shall consider whether the scheme would be advantaged if liaisons and exchanges are established between the certification body, the trustees and the certification body and examiners of existing schemes in accordance with this standard in the application sector(s).

## 11.4 Transition period for examiners and assessment committee

During the transition period, the examiners shall be appointed from the trustees and as defined in 11.3.2. After the five years of transition period for the establishment of the scheme, examiners shall be appointed who have been formally assessed and certificated to level 3 in accordance with 7.3 in the application sector(s).

During the transition period, the assessment committee shall comprise a minimum of five personnel each with a minimum of ten years experience in cathodic protection and shall in addition include representatives of the certification body and/or delegated body. At least three members of the assessment committee shall be trustees as defined in 11.3.2.

### 11.5 Transition period for previously certificated personnel

Cathodic protection personnel who are certificated with one of the existing schemes in application in European countries before the implementation of this standard shall maintain their certification for the remaining period of validity of their existing certification up to a maximum of 5 years and shall then be subject to re-certification as in Clause 9.

### 11.6 National boundaries

Cathodic protection personnel who are certificated with one certification scheme in application in a European country in which they are not resident may continue with re-certification in that country as in Clause 9 even if a subsequent certification scheme is established in their country of domicile. Personnel may select to undergo training and certification in a country other than their country of domicile.

# Annex A
# Application sectors
(normative)

## A.1 General

Any of the following application sectors shall be used in the establishment of competence levels and certification of cathodic protection personnel.

Any new EN standard prepared by the CEN/TC 219 that will be published further the edition of the present standard shall apply for the corresponding application sector.

## A.2 Underground and immersed metallic structures

The following standards apply to this application sector:

- **EN 12954**, Cathodic protection of buried or immersed metallic structures - General principles and application for pipelines
- **EN 13509**, Cathodic protection measurement techniques
- **EN 13636**, Cathodic protection of buried metallic tanks and related piping
- **EN 14505**, Cathodic protection of complex structures
- **EN 50162**, Protection against corrosion by stray current from direct current systems
- **EN 15112**, External cathodic protection of well casings

NOTE This application sector includes for example:

- Buried pipelines,
- Sections of onshore pipelines crossing rivers, lakes or short lengths of sea,
- Buried tanks,
- Bottoms (external side) of above-ground tanks;
- Well casings.

## A.3 Marine metallic structures

The following standards apply to this application sector:

- **EN 12473**, General principles of cathodic protection in sea water
- **EN 12474**, Cathodic protection of submarine pipelines
- **EN 12495**, Cathodic protection for fixed steel offshore structures
- **EN 13173**, Cathodic protection for steel offshore floating structures
- **EN 13174**, Cathodic protection of harbour installations

NOTE This application sector includes for example:

- Ships (external hulls and ballast tanks),
- Fixed offshore structures (platforms, jackets, tension leg platforms etc),
- Floating structures,
- Underwater structures (well heads, manifolds, piping),
- Coastal and offshore pipelines, risers,

- Buoys,
- Harbour facilities, piers, jetties and lock gates.

## A.4 Reinforced concrete structures

The following standard applies to this application sector:

- **EN 12696**, Cathodic protection of steel in concrete
- **CEN/TS 14038-1**, Electrochemical realkalization and chloride extraction treatments for reinforced concrete - Part 1: Realkalization

NOTE This application sector includes for example:

- Air-exposed reinforced (and pre-stressed) concrete onshore structures (bridges, walls, piles, buildings etc);
- Buried reinforced (and pre-stressed) concrete structures (pipelines, tunnels, foundations, etc);
- Reinforced (and pre-stressed) concrete structures immersed in fresh water (pipe lines, foundations, swimming-pools, water tanks);
- Reinforced (and pre-stressed) concrete structures immersed in seawater (harbour facilities, piers, jetties, offshore platforms).

Other electrochemical techniques than cathodic protection also aimed at mitigating corrosion of steel embedded in concrete (such as re-alkalisation or chloride removal) are included in the issues covered by this application sector.

## A.5 Inner surfaces of metallic container structures

The following standard applies to this application sector:

- **EN 12499**, Internal cathodic protection of metallic structures

NOTE This application sector includes for example:

- Fresh water containers capacities (water tanks, filters…)
- Seawater containing equipment (heat-exchangers, filters, pipelines, …)
- Internal surfaces in contact with fresh water and sea water
- Tanks, condensers, filters

# Annex B
# Competence levels
(normative)

## B.1 General

### B.1.1 Introduction

The certification body shall publish a detailed syllabus for each level of certification being administered, detailing the tasks and the associated theoretical knowledge related to them.

The candidate shall be competent to undertake the tasks detailed in B.1 to B.5 and shall have the theoretical knowledge to properly undertake these tasks, to understand their purposes, to recognise possible problems with their execution and the significance of the data arising from them.

The candidate shall, upon certification to the appropriate level, be trained, competent and authorised to carry out the tasks detailed in B.1 to B.5.

For some of the tasks, specific conditions may apply. The following codification applies in the Tables B.1 to B.5:

- **YES (T)** means: Subject to sufficient documented training and competence in the specific task and/or equipment and/or safety training. This additional equipment and safety training is NOT part of certification;
- **YES (M)** means: Participates as a team member under direct supervision of a higher level who shall maintain responsibility;
- **YES (I)** means: Works to a technical instruction (method statement, procedure) by level 3;
- **YES (O)** means: Level 2 working with an organisation allowing supervision by a personnel certificated to level 3.

All work by level 1 shall be to technical instructions issued by level 2 or 3 personnel.

Personnel certificated to a particular level may undertake tasks at one level higher than defined in Tables B.1 to B.5 for his/her certification level following additional documented training and assessment of competence under the supervision of personnel certificated to the higher level.

### B.1.2 Level 1

An individual certificated to level 1 is capable of executing appropriate measurements with which the performance of CP systems can be assessed. These measurements shall be undertaken in accordance with written instructions from and under the supervision of level 2 or level 3 personnel. These measurements shall include routine system function measurements as well as a limited number of specific measurements to determine the performance effectiveness of cathodic protection systems.

It is not the role of the level 1 personnel to interpret the data collected.

### B.1.3 Level 2

An individual certificated to level 2 is capable of performing CP measurements and assessments in accordance with established methods. He/she shall be also capable of designing simple CP systems, i.e. where the design follows identified and defined, auditable procedural steps as determined, developed and agreed by personnel certificated to level 3. Level 2 certificated personnel shall not undertake any cathodic protection design where no preset parameters or procedural steps exist.

He/she has the skills of level 1 and further.

### B.1.4 Level 3

An individual certificated to level 3 is capable of drafting policy for the choice, the design and the monitoring of CP systems. For this purpose he/she shall be able to consider technical, financial and safety aspects.

He/she has the skills of level 2 and further. He/she shall be capable of preparing written instructions for all tasks of level 1 or level 2 personnel and of assessing all data collected from these tasks.

### B.1.5 Tasks to be fulfilled in all application sectors

Table B.1 details tasks which shall be fulfilled for each competence level whatever the application sector. The field of application of each of these tasks covers only the application sector of the certificated individual.

**Table B.1 - Tasks to be fulfilled by the various competence levels whatever the application sector**

| Task number | Description of task | Level 1 | Level 2 | Level 3 |
|---|---|---|---|---|
| 1 | Organisation of training | NO | NO | YES |
| 2 | Training for the lower level(s) | NO | YES | YES |
| 3 | Preparation of specifications | NO | NO | YES |
| 4 | Preparation of technical instructions | NO | YES for Level 1 | YES |
| 5 | Collection of general information for design purposes based on technical instructions for simple conditions (as defined in B.1.3) | YES | YES | YES |
| 6 | Collection of detailed information and data for design purposes | NO | YES | YES |
| 7 | Pre-commissioning testing and energising of power supplies and check polarity | YES (T) | YES | YES |
| 8 | Interpretation of commissioning or performance verification data and preparation of commissioning report, performance verification report or system review report for simple cathodic protection systems (as defined in B.1.3) | NO | YES | YES |
| 9 | Interpretation of commissioning or performance verification data and preparation of commissioning report, performance verification report or system review report for the other systems | NO | YES (I) | YES |
| 10 | Interpretation of function check data and preparation of function check report | NO | YES | YES |
| 11 | Determination of routine increase/decrease in current output to maintain optimum performance | NO | YES | YES |
| 12 | Determination of increase/decrease in current output to maintain optimum performance including remedial actions to correct anomalies and interferences | NO | YES (T) | YES |
| 13 | Awareness and compliance with safety requirements related to application of CP in the application sector, task and competence level | YES | YES | YES |
| 14 | Risk assessment of safety requirements related to application of cathodic protection in the application sector, task and competence level | YES | YES | YES |
| 15 | Expertise to investigate any case of material weight loss corrosion when application of cathodic protection may be involved | NO | YES (O) | YES |
| 16 | Expertise to investigate any case of material cracking when application of cathodic protection may be involved | NO | NO | YES |
| 17 | Utilise field performance experience in developing improvements to cathodic protection designs, operations, performance assessments and maintenance procedures | NO | NO | YES |

## B.2 Specific tasks for underground and immersed metallic structures application sector

Level 1 certificated personnel shall have general knowledge of: EN 12954 and EN 13509.

Level 2 certificated personnel shall have a good understanding of: EN 12954, EN 13509, EN 14505, EN 13636, EN 15112 and EN 50162.

Level 3 certificated personnel shall have a good understanding and full theoretical knowledge of EN 12954, EN 13509, EN 13636, EN 14505, EN 15112 and EN 50162.

Table B.2 indicates which specific tasks can be fulfilled by each competence level in the underground and immersed metallic structures application sector.

**Table B.2 - Specific tasks to be fulfilled by the various competence levels in the underground and immersed metallic structures application sector**

| Task number | Description of task | Level 1 | Level 2 | Level 3 |
|---|---|---|---|---|
| 1 | Measurement of metal to electrolyte natural (free corrosion) potential | YES | YES | YES |
| 2 | Measurement of resistivity: four pins Wenner and soil box methods | YES | YES | YES |
| 3 | Design of simple CP systems for simple conditions (as defined in 5.3.ix and B.1.3). Examples are buried tanks or limited length pipelines | NO | YES | YES |
| 4 | Design of all other cathodic protection systems | NO | YES (M) | YES |
| 5 | Supervision of the preparation of steel for making cable connection and for repairing coating | YES | YES | YES |
| 6 | Supervision of the installation of cable connections: bolting, compression and conductive adhesive | YES | YES | YES |
| 7 | Supervision of the installation of cable connections: soldered, exothermic welded, pin brazed | YES (T) | YES (T) | YES (T) |
| 8 | Supervision of installation of galvanic anodes | YES | YES | YES |
| 9 | Supervision of installation of d.c. power supply (electrical a.c. supply excluded, depending on regulations) | YES | YES | YES |
| 10 | Supervision of the installation of deepwell anode groundbeds | YES (T) | YES | YES |
| 11 | Supervision of the installation of other impressed current anode groundbeds | YES | YES | YES |
| 12 | Supervision of installation of isolation devices | YES | YES | YES |
| 13 | Supervision of installation of permanent reference electrodes (including calibration) and coupons (monitoring systems may be complex instrumentation, remote control or telecommunication systems requiring specialist knowledge and training) | YES | YES | YES |
| 14 | Supervision of installation of a.c. mitigation earthing electrodes and d.c. decoupling devices | YES | YES | YES |
| 15 | Verification of the electrical continuity of all parts of the structure to be protected | YES | YES | YES |
| 16 | Localisation of pipeline, concrete steel reinforcement and foreign metallic structures | YES | YES | YES |
| 17 | Checking of d.c. power supply output polarity | YES | YES | YES |
| 18 | Inspection & testing of isolation and surge protection devices | YES | YES | YES |
| 19 | Measurement of current and voltage in the CP circuit | YES | YES | YES |
| 20 | Inspection & measurement of d.c. power supply output current and voltage | YES | YES | YES |
| 21 | Inspection & verification of d.c. power supply overall operations | YES | YES | YES |
| 22 | Inspection & maintenance of d.c. power supply output terminations | YES | YES | YES |
| 23 | Inspection & maintenance of d.c. power supply components (extent depending on regulations) | YES | YES | YES |
| 24 | Verification of d.c. power supply voltage and current outputs with portable calibrated meter | YES | YES | YES |
| 25 | Measurement of metal to electrolyte ON potential | YES | YES | YES |
| 26 | Measurement of metal to electrolyte instant OFF potential | YES | YES | YES |
| 27 | Close interval potential survey (ON) | YES (T) | YES | YES |
| 28 | Close interval polarised potential survey (ON/Instant OFF) | YES (T) | YES | YES |
| 29 | Establishment and confirmation of synchronisation of current interruptions for instant OFF measurements | YES (M) | YES | YES |
| 30 | Measurement of ON and IR free potential and current both d.c. and a.c. on coupons | YES | YES | YES |
| 31 | Measurement of potential gradients in soil | YES | YES | YES |
| 32 | Intensive measurements as defined in EN 13509 | YES (M) | YES | YES |
| 33 | a.c. frequency current signal attenuation measurements | YES (T) | YES | YES |
| 34 | Direct Current Voltage Gradient (DCVG), non recording, as defined in EN 13509 | YES (T) | YES | YES |
| 35 | Direct Current Voltage Gradient (DCVG) with recording of digital | YES (M) | YES | YES |

| | | | | |
|---|---|---|---|---|
| | measurements | | | |
| 36 | Pearson surveys | YES (T) | YES | YES |
| 37 | Interference testing | YES (M) | YES | YES |
| 38 | Analysis and treatment of dc interferences | NO | YES (O) | YES |
| 39 | Analysis and treatment of ac interferences | NO | YES (M) | YES |
| 40 | Supervision of cable and connection repair | YES | YES | YES |
| 41 | Test casings for isolation from carrier pipe | YES | YES | YES |
| 42 | Interpretation of data and analysis of anomalies detected | NO | YES | YES |
| 43 | Visual inspection of pipeline and cathodic protection system components: Physical damage to pipeline and cathodic protection system, coating damage, corrosion damage. | YES (T) | YES | YES |

## B.3 Specific tasks for marine metallic structures application sector

Level 1 certificated personnel shall have general knowledge of: EN 12473 and EN 13509.

Level 2 certificated personnel shall have a good understanding of: EN 12473, EN 13509, EN 12474, EN 13173, EN 13174 and EN 15112.

Level 3 certificated personnel shall have a good understanding and full theoretical knowledge of EN 12473, EN 13509, EN 12474, EN 13173, EN 13174 and EN 15112.

Table B.3 indicates which specific tasks can be fulfilled by each competence level in the Marine metallic structures application sector.

**Table B.3 - Specific tasks to be fulfilled by the various competence levels in the marine metallic structures application sector**

| Task number | Description of task | Level 1 | Level 2 | Level 3 |
|---|---|---|---|---|
| 1 | Design of simple cathodic protection systems for simple conditions (as defined in 5.3.ix and B.1.3). Examples are systems for buoys, small boats | NO | YES | YES |
| 2 | Design of all other cathodic protection systems. Examples are systems for coastal, offshore and submarine facilities, floating production and storage structures, ships | NO | YES (M) | YES |
| 3 | Supervision of installation of galvanic or impressed current anodes and monitoring systems | YES | YES | YES |
| 4 | Supervision of installation of d.c. power sources (a.c. power supply excluded, depending on regulations) | YES | YES | YES |
| 5 | Supervision of installation of isolation devices | YES | YES | YES |
| 6 | Verification of the electrical continuity of all parts of the structure to be protected | YES | YES | YES |
| 7 | Measurement of metal to electrolyte potential in seawater by simple methods from surface with mobile reference electrode | YES | YES | YES |
| 8 | Measurement of metal to electrolyte potential in seawater from surface with monitoring systems (permanent reference electrodes and connection by cables or acoustic transmission) | YES | YES | YES |
| 9 | Supervision of measurement of metal to electrolyte potential in seawater by diving with mobile reference electrode connected to measurement system in surface (diving operation and certification excluded) | YES | YES | YES |
| 10 | Supervision of measurement of metal to electrolyte potential in seawater by autonomous measurement device combining reference electrode, voltmeter and contact tip (diving operation and certification excluded) | YES | YES | YES |
| 11 | Measurement of anode current output from surface using monitoring systems (monitored anodes and connection by cables or acoustic transmission) | YES | YES | YES |
| 12 | Supervision of measurement of current output of stand-off anodes using underwater clamp meter (diving operation and certification excluded) | YES | YES | YES |
| 13 | Checking of calibration of measurement equipment before use | YES | YES | YES |
| 14 | Supervision of measurement of potential gradient in seawater (diving operation and certification excluded) | YES | YES | YES |
| 15 | Organisation of underwater potential and/or anode current output surveys for | NO | YES | YES |

| | | | | |
|---|---|---|---|---|
| | simple cathodic protection systems and simple conditions (as defined in 5.3.ix and B.1.3). Examples are systems for buoys, small boats | | | |
| 16 | Organisation of underwater potential and/or anode current output surveys for all other applications of the application sector | NO | YES (O) | YES |
| 17 | Analyse of the results of potential and/or anode current output surveys for simple cathodic protection systems for simple conditions (as defined in 5.3.ix and B.1.3). Examples are systems for buoys, small boats | NO | YES | YES |
| 18 | Analyse of the results of potential and/or anode current output surveys for all other applications of the application sector | NO | YES (O) | YES |
| 19 | Measurement of current and voltage in the cathodic protection circuit | YES | YES | YES |
| 20 | Inspection & measurement of d.c. power sources output current and voltage | YES | YES | YES |
| 21 | Inspection & verification of d.c. power sources overall operations | YES | YES | YES |
| 22 | Inspection & maintenance of d.c. power sources output terminations and check polarity | YES | YES | YES |
| 23 | Inspection & maintenance of d.c. power sources components (extent depending on regulations) | YES | YES | YES |
| 24 | Verification of d.c. power sources voltage and current outputs with portable calibrated meter | YES | YES | YES |
| 25 | Interpretation of data | NO | YES | YES |
| 26 | Analysis of data and anomalies detected | NO | NO | YES |
| 27 | Inspection & maintenance of d.c. power sources components including replacement of failed components (extent depending on regulations) | YES (T) | YES | YES |
| 28 | Supervision of visual inspection by diving or remote operated vehicle: Physical damage to surface and cathodic protection system, coating damage, corrosion damage | YES | YES | YES |
| 29 | Estimation of anode dimensions by diving (diving operation and certification excluded) or remote operated vehicle (vehicle operation excluded) | YES | YES | YES |
| 30 | Supervision of measurement of pit depth with underwater mastic replica by divers | YES | YES | YES |
| 31 | Supervision of measurement of wall thickness with underwater ultrasonic meter by divers | YES | YES | YES |
| 32 | Supervision of measurement of extent of underwater corroded area | YES | YES | YES |
| 33 | Supervision of diver or remote operated vehicle cathodic protection survey of pipeline, riser or structure | NO | YES (T) | YES |
| 34 | Measurement of resistivity of seawater or mud with soil box | YES | YES | YES |
| 35 | Measurement of resistivity of seawater by conductivity meter or salinity or chlorinity | YES (T) | YES | YES |

## B.4 Specific tasks for reinforced concrete structures application sector

Level 1 certificated personnel shall have general knowledge of: EN 12696, CEN/TS 14038-1 and EN 13509.

Level 2 certificated personnel shall have a good understanding of: EN 12696, CEN/TS 14038-1 and EN 13509.

Level 3 certificated personnel shall have a good understanding and full theoretical knowledge of EN 12696, EN 13509, EN 12473, EN 12954 and CEN/TS 14038-1.

Table B.4 indicates which specific tasks can be fulfilled by each competence level in the reinforced concrete structures application sector.

**Table B.4 - Specific tasks to be fulfilled by the various competence levels in the reinforced concrete structures application sector**

| Task number | Description of task | Level 1 | Level 2 | Level 3 |
|---|---|---|---|---|
| 1 | Electrical continuity testing of reinforcement to allow accurate potential measurements | YES (I) | YES (I) | YES |
| 2 | Measurement of steel to concrete natural potential in concrete | YES | YES | YES |
| 3 | Measurement of “Half Cell Potential Survey” (close interval survey natural potential) | YES | YES | YES |
| 4 | Processing of potential data for mapping | NO | YES (T) | YES (T) |
| 5 | Location of reinforcement with cover meter | YES | YES | YES |
| 6 | Measurement of cover to reinforcement with cover meter | YES | YES | YES |
| 7 | Supervision or undertaking of the collection of concrete drilling dust or core samples for chloride testing | YES | YES | YES |
| 8 | Interpretation of chloride analysis results | NO | NO | YES |
| 9 | Carbonation testing to broken or cored concrete | YES | YES | YES |
| 10 | Measurement of concrete resistivity (two pins or four pins) | NO | YES | YES |
| 11 | Inspection of surface of reinforcement when exposed for corrosion or physical damage | NO | YES (O) | YES |
| 12 | Measurement of pit depth with suitable gauge | NO | YES | YES |
| 13 | Inspection of surface of pre-stressing steel when exposed for corrosion or physical damage | NO | YES (M) | YES |
| 14 | Design of cathodic protection system and other electrochemical treatments | NO | YES (M) | YES |
| 15 | Measurement of reinforcement electrical continuity (resistance and potential techniques) | YES | YES | YES |
| 16 | Supervision of reinforcement electrical continuity bonding and retest | YES | YES | YES |
| 17 | Supervision of installation of cable connection to reinforcement or embedded/surface mounted metallic items: mechanical | YES | YES | YES |
| 18 | Supervision of installation of cable connection to reinforcement or embedded/surface mounted metallic items: exothermic/welded/pin brazed | YES (T) | YES (T) | YES (T) |
| 19 | Supervision of installation of cable connection to pre-stressing steel | NO | YES (M) | YES (T) |
| 20 | Supervision of installation of anode systems: galvanic and impressed current | YES (M) | YES (I) | YES (T) |
| 21 | Supervision of installation of reference electrodes, sensors and coupons | YES | YES | YES |
| 22 | Supervision of installation of d.c. power supplies and monitoring system (electrical input a.c. excluded due to regulations/safety) | YES (M) | YES | YES |
| 23 | Measurement of anode to reinforcement isolation (resistance and potential techniques) | YES | YES | YES |
| 24 | Measurement of anode circuit continuity or resistance | YES | YES | YES |
| 25 | Measurement of cathode and test circuit continuity or resistance | YES | YES | YES |
| 26 | Checking calibration of reference electrodes prior to installation or survey | YES | YES | YES |
| 27 | Correction or removal of anode to reinforcement short circuit | NO | YES (M) | YES |
| 28 | Inspection and measurement of power supply output current and voltage and polarity checks | YES | YES | YES |
| 29 | Verification of d.c. power supply voltage and current outputs with portable calibrated meter and comparison with output meters or data logged values | YES | YES | YES |
| 30 | Inspection & maintenance of d.c. power supply components (extent depending on regulations) | YES | YES | YES |
| 31 | Setting up of synchronised current interruptions for instant OFF potential measurements | NO | YES | YES |
| 32 | Measurement of ON and Instant OFF potential and current at permanently installed electrodes | YES | YES | YES |
| 33 | Measurement of ON and Instant OFF potential and potential decay from instant OFF at permanently installed reference electrodes | YES | YES | YES |
| 34 | Survey / measurement of potential decay from instant OFF over concrete surface using portable reference electrodes | YES (M) | YES | YES |
| 35 | Interference testing | YES (M) | YES (I) | YES |

## B.5 Specific tasks for inner surfaces of metallic structures application sector

Level 1 certificated personnel shall have general knowledge of: EN 12499 and EN 13509.

Level 2 certificated personnel shall have a good understanding of: EN 12499 and EN 13509.

Level 3 certificated personnel shall have a good understanding and full theoretical knowledge of EN 12499, EN 13509, EN 12473 and EN 12954.

Table B.5 indicates which specific tasks can be fulfilled by each competence level in the inner surfaces of metallic structures application sector.

**Table B.5 - Specific tasks to be fulfilled by the various competence levels in the inner surfaces of metallic structures application sector**

| Task number | Description of task | Level 1 | Level 2 | Level 3 |
|---|---|---|---|---|
| 1 | Measurement of resistivity of electrolyte: Soil box | YES | YES | YES |
| 2 | Measurement of resistivity of electrolyte: Conductivity meter | YES (T) | YES | YES |
| 3 | CP design for simple conditions (as in B.1.3) | NO | YES | YES |
| 4 | CP design for any conditions | NO | NO | YES |
| 5 | Supervision of installation of galvanic or impressed current anodes and reference electrodes | YES | YES | YES |
| 6 | Supervision of installation of d.c. power supply (electrical a.c. supply excluded, depending on regulations) | YES | YES | YES |
| 7 | Supervision of installation of isolation devices | YES | YES | YES |
| 8 | Verification of the operation of the automatic gas blow-off system | YES | YES | YES |
| 9 | Verification of the electrical continuity of all parts of the structure to be protected | YES | YES | YES |
| 10 | Supervision and verification of cable connections | YES | YES | YES |
| 11 | Inspection and measurement of isolation devices | YES | YES | YES |
| 12 | Measurement of current and voltage in the cathodic protection circuit | YES | YES | YES |
| 13 | Inspection & measurement of d.c. power supply output current and voltage | YES | YES | YES |
| 14 | Inspection & verification of d.c. power supply overall operations | YES | YES | YES |
| 15 | Inspection & maintenance of d.c. power supply output terminations and polarity check | YES | YES | YES |
| 16 | Inspection & maintenance of d.c. power supply components (extent depending on regulations) | YES | YES | YES |
| 17 | Measurement of metal to electrolyte natural potential | YES | YES | YES |
| 18 | Measurement of metal to electrolyte ON potential | YES | YES | YES |
| 19 | Measurement of metal to electrolyte instant OFF potential | YES | YES | YES |
| 20 | Setting up and confirmation of synchronised current interruptions for instant OFF measurements | YES (T) | YES | YES |
| 21 | Measurement of ON and IR free potential and current on coupons | YES | YES | YES |
| 22 | Interference testing | NO | YES | YES |
| 23 | Verification of d.c. power supply voltage and current outputs with portable calibrated meter | YES | YES | YES |
| 24 | Interpretation of data and analysis of anomalies detected | NO | YES | YES |
| 25 | Visual inspection inside the vessels: Physical damage to vessel and cathodic protection system, coating damage, corrosion damage | YES | YES | YES |

# BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

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