



IECRE OPERATIONAL DOCUMENT

**IEC System for Certification to Standards Relating to Equipment for Use in
Renewable Energy Applications (IECRE System)**

Proficiency testing in the wind energy sector of IECRE





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IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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1 Introduction

This operational document (OD) describes the requirements and the procedure to conduct proficiency tests (PT) for RETLs, applicant RETLs, RECTFs and IECRE member organizations or organizations with a liaison to IECRE. It applies to the wind energy sector of IECRE (WE-SWG) only.

This OD refers to ISO 17043 [1] as far as appropriate. Some definitions and procedures may vary slightly as the PTs are relevant for a very limited and known group of participants only.

The OD is based on the assumption that proficiency testing is mainly based on the analysis of data sets, however comparing measurements are not excluded and may be carried out e.g. for anemometer calibration. The procedure detailed in this OD is a result of the experiences from the first PTs, which have been carried out in the very beginning of the scheme by SG 551.

2 Purpose

The purpose of proficiency testing within the IECRE-Scheme is

- to assess the specified competence of RETLs and RECTFs by comparing the PT results,
- to clarify the interpretation of the IEC standard including corrigenda and amendments, which are relevant for the respective competence area,
- to give feedback on detected flaws, errors or sources of misinterpretation of IEC standards to SG 551 and TC 88 and/or initiate the production of corrigenda, amendments and clarification sheets and
- to demonstrate inter-comparability to the industry.

3 Validity

The OD applies to conducting proficiency tests for competence areas as defined by WE-SWG.

4 Definitions

The following definitions are based on ISO/IEC 17043:2010 [1] as far as possible and have been adapted to the purpose of proficiency testing under IECRE.

4.1 Proficiency Testing

Proficiency testing in General is the evaluation of the performance of an entity with specific focus on compliance with the underlying IEC standard by interlaboratory comparison. The scope of a proficiency test may cover all aspects of its underlying standard or certain parameters of a standard (such as methods, procedures etc.) only.

4.2 Proficiency Testing Scheme

A proficiency testing scheme is a set of one or more proficiency testing rounds. It may be useful to split up proficiency testing schemes into rounds in order to clarify questions, solve technical issues such as data formats, align the interpretation of IEC standards among the participants and define the operational procedure for this PT, first. Preliminary test rounds are useful to detect data inconsistencies or format problems, detect possible multiple interpretations of the standards and multiple methods that can be used to perform the same task, leading to different valid results that could lead to misinterpretations of the results.

4.3 Proficiency Testing Round

One proficiency testing round is a single complete proficiency test consisting of distribution of the proficiency testing task, test specimen (if applicable), evaluation and reporting of results. One or more rounds build a proficiency testing scheme.

4.4 Operational Procedure

The operational procedure is the document which serves as the basis for the proficiency test scheme or round. It contains the task formulation and may refer to a certain test specimen or test data set. Besides the technical instructions it needs to include accuracy requirements, information and/or assumptions for uncertainty estimations, assessment methodologies for results and pass/fail-criteria. Within the scope of IECRE Proficiency Tests it may also include indications on which one of the several methodologies or options available in the standard (line choice as defined in 4.10) has to be used by the participants.

4.5 Test Specimen

A test specimen is an item which is sent to the participants of a proficiency testing scheme or round and whose parameters shall be tested.

4.6 Test Data Set

A test data set is a data set which is typically sent around along with the operational procedure and to which the tasks refer. The data set shall be in such a format that can be read by all the participants. Test data may be composed of

1. Artificial data, which can be mathematically cross-checked,
2. data with specific aspects in order to identify issues which have previously been discussed
3. and/or anonymized real test data.

Participants will generally be required to be able to inject data in certain steps of the calculation process, in order to be able to use the chunk data approach. In the final round of a PT the participants can use the chain data approach if they desire, being aware of the possible consequences.

4.6.1 Chunk data

Simple data set oriented to test one evaluation step within the chain of the evaluation.

4.6.2 Chain data

Comprehensive data set oriented to test a whole process, from the first input to the final results.

4.7 Participant's Results

The participant's results are the results provided by individual participants. Participant's results may be complete results or partial results as defined in the operational procedure. The results are sent to the Organizational Provider [5.1.2] who handles them to the Technical Coordinator [5.1.3] once the anonymity requirements are met.

4.8 Final Results of PT

The final results of a proficiency test are the summary of all participant's results including its statistical analysis and evaluation. The final results of a PT are prepared by the coordinator. The final results of IECRE Proficiency tests are reflected in an Internal Report, an External Report, the participants' reports and certificates and, for the member Testing Laboratories, the published list of participants that have passed the PT.

4.9 Clarification Sheet

Clarification sheets are documents that explain ambiguities present in the normative or correct deficiencies found. They are created by the participants and formatted by the Technical coordinator and circulated to TC88 through the IECRE secretariat according to IECRE OD-002. This process is done before the start of the last round of the PT.

4.10 Line Choice

The line choice is a set of instructions handled to the participants explaining which options, among those valid and present in the standard, have to be taken in order to improve the intercomparability of the results.

5 Roles

5.1.1 SG 551 Proficiency Testing Representative (Person or Group)

The SG 551 Proficiency Testing Representative is a person or group of persons who coordinate all proficiency testing activities for all competence areas on behalf of SG 551. The PT Representative makes sure that sufficient proficiency tests for all competence areas are being carried out in a timely manner. A schedule for all proficiency tests covering all competence areas and aligned with future RETL assessments and the creation of new competence areas as approved by WE-SWG shall be provided by the PT Representative.

The PT representative will be elected by and reports to SG 551. The PT representative advises SG 551 in matters of proficiency testing providers, proposes those providers to SG 551 and leads the communication on behalf of SG 551.

The PT Representative shall present budgets for the conducting of individual proficiency testing schemes to SG 551 based on general guidance from SG 551, including:

1. fees which have to be paid by the participants,
2. fees which will be paid to the coordinators,
3. fees which will be paid to the proficiency testing providers and
4. any external costs.

Minimum numbers of participants shall be determined with the PT Organizational Provider in order to make sure that there is no budget shortfall.

The budgets will be approved by SG 551 on a yearly basis as a minimum.

5.1.2 Proficiency Testing Provider

The proficiency testing provider (also referred to as “Organizational Provider” or “Provider”) takes responsibility for all organizational, logistic and financial tasks in the development and operation of the proficiency testing scheme. A PT scheme may include a number of PT rounds.

It shall be an organization whose commercial interests are not affected by the PT’s outcome nor could affect such outcome, sufficiently technically qualified and impartial. It is preferable that an organization with previous experience in the organization of Proficiency Tests in the Competence Area and ISO/IEC 17043 accredited is selected. The proficiency testing provider shall be proposed and selected by SG 551 per competence area for a period of time of three years. The WE-SWG chair has the right of veto over an organization selected by SG551 presenting well-founded reasons.

The proficiency testing provider:

1. Informs possible participants from group A and B (see 5.1.4) about the upcoming PTs,
2. provides technical facilities such as data servers,
3. administers the finances of the PT,
4. coordinates the applications for participation of the participants (e.g. registration, contractual issues, confidentiality issues etc.),
5. sets the time schedule for the PT (deadlines etc.) in coordination with the technical coordinator,
6. handles all results handed in by participants and hands them over to the coordinator for further evaluation,
7. makes sure that results are anonymized (this includes the coordinator),

8. supervises the production of the Clarification Sheets by the coordinator, and its correct distribution,
9. publishes the results according to the rules for publication defined in this document,
10. liaises with the IECRE Scheme Lead Assessor,
11. and provides input for changes in this document based on the lessons learned during the Proficiency Tests.

Subcontracting of proficiency testing provider responsibilities is not permitted without written approval of the PT Representative. In this case the subcontracting PT provider remains responsible for the full scope of work.

The proficiency testing provider may be recalled and released from its duties by SG 551 if there are doubts to the technical competency, the independence, the impartiality or in the case of severe failure to fulfil its duties. The financial consequences of such an event shall be agreed between IECRE and the PT provider before the Proficiency Test is initiated.

The proficiency testing provider is responsible that all data related to the PT, including, but without being limited to all test data, instructions, result tables along with their hand-in dates, time schedules, discussion outcome, reports, certificates and communication, are archived for a period of 10 years after the final publication of the PT.

Any physical test specimen (such as anemometers) are explicitly excluded from this obligation. If necessary, individual regulations for the storage of test specimen will need to be given by the PT provider.

5.1.3 Technical Coordinator.

The Technical Coordinator (also referred as “Coordinator”) takes technical responsibility for organizing and managing all the activities involved in the operation of the proficiency test.

The coordinator shall be elected by a vote held by all the type A participants, and its designation approved by the WE-SWG Convener. If no agreement can be achieved between both parties the WE-SWG shall take a decision.

Although the typical situation is that the coordinator is one of the type A participants, other individuals and organizations that do not qualify as type A participants can be elected provided that:

- The organization is content wise qualified for the job.
- There is a specific added value for the IECRE system to choose such an organization.
- The organization participates in the PT as a paying participant.
- The organization is a non-profit organization.
- The organization does not place orders to RETLs in the specific competence area.
- The organization is approved for the role as a possible non group A coordinator by SG551.

In General, coordinator RETLs should be ISO 17025 accredited for the respective competence area for at least 5 years or have technical staff which has been working in the competence area for the same period of time. For well-established competence areas, the person designated as coordinator should have at least participated in previous PTs in that competence area. For new competence areas without track record, coordinators without experience in the role may still be approved and shall be closely monitored, e.g. by frequent reporting.

The coordinator:

1. Governs the operational procedures (technical instructions and additional information) necessary to participate in the proficiency test and provides input to the PT provider for the calendar organization,
2. produces and provides the data sets needed by the participants,

3. analyzes the results received from the provider and writes preliminary and final reports,
4. leads the discussion on clarification sheets and line choices and takes responsibility that discussion results are being summarized in a clarification sheet and/or line choice definition for the next round of the PT. The clarification sheets are to be treated, with the supervision of the PT provider, according to OD-002 and
5. reports to SG 551 Proficiency Testing Representative as appropriate, in coordination with the PT Provider.

Participants are normally expected to choose themselves appropriate methods; however, the coordinator may require the participants to use a specific method (e.g. in case alternatives are given in the standard). This is called “line choice”. In the case that certain alternatives are allowed, these alternatives shall be reflected in the pass/fail criteria.

The coordinator may be recalled and released from its duties by the provider in agreement with SG 551 in case of doubts referring to the technical competency, the independence, the impartiality or in case of severe failure to fulfil its duties. The financial consequences of such an event shall be agreed between the coordinator and the PT provider before the Proficiency test is initiated.

5.1.4 Participants

Participants are laboratories, organizations or individuals that take part in proficiency testing and deliver results for review by the coordinator. For the purpose of IECRE SG 551 proficiency testing the following organizations may participate:

A-Participants: RETLs and applicant RETLs in the respective competence area and other TLs approved by SG551.

B-Participants: RECTFs, IECRE member organizations (including OEMs, end users, RECBs, other TLs) and other organizations approved by SG551.

A-participants members of IECRE have a right to participate. A-participants not belonging to IECRE can participate after approval from SG551 PT representatives. B-participants not belonging to IECRE do not have an automatic right of participation which is at the discretion of SG 551 PT representatives. The final decision on participation will be taken by SG551 in case of conflict.

Participants may be excluded from the proficiency testing by the proficiency testing provider in case of breach of confidentiality, failure to pay fees or other justifiable reasons. The participant may appeal to IECRE secretariat, which will take a decision in collaboration with SG551.

6 Proficiency test

6.1 General

ISO/IEC 17043 [1] and ISO 13528 [2] should be followed as far as possible and appropriate. ISO 13528 [2] may be used in order to formulate requirements for results to be handed in by participants and/or to formulate how the final results are to be determined.

6.1.1 Participants

6.1.1.1 Round 1

Round 1 shall be open for A-participants only and mandatory for RETLs and RETL candidates

The main aim of round 1 is to identify the root causes of the differences between the laboratories. These root causes can be classified in:

- Standards unclear.
- Proficiency Test guidance documents unclear.
- Mistakes or misinterpretations from the participants.

Therefore, the Round 1 should be used:

To confirm validity of pass/fail criteria for subsequent PT rounds. Changes in the pass/fail criteria shall be considered exceptional and only applied after their approval as defined in [6.1.3].

1. To produce clarification documents for the purposes of the PT.
2. To specify which options of standards (named Line Choice) shall be used in subsequent PT rounds, in case the standards allow the choice of methods. This line choice may have been already defined in the scope of the proficiency test.
3. To discuss unclear, false or not appropriate issues in the standard or procedure which may result in the publication of a clarification sheet.
4. To propose technical changes of standards to SG551 (including standards outside IEC). This stakeholder Group will direct the proposals to the appropriated organizations, involving WE-SWG if it is considered adequate.

As far as possible subsequent tasks in the instructions shall be independent of each other and not based on the outcome of previous tasks in order to ensure that participants may solve tasks correctly even if previous tasks have been failed.

6.1.1.2 Round 2

Round 2 is open to A and B participants. Round 2 shall follow the procedure as stated below. Test data shall be identical in structure but significantly different from test data used in round 1. Pass/Fail criteria identified in round 1 shall apply, except for extreme cases.

Round 2 is the final round of the PT which relates to the final outcome of the PT. It concludes with the publication of final reports.

6.1.2 Requirements to Test Data

If a proficiency test is mainly based on test data which will be distributed, participants shall make sure that test data can be injected into their respective software tools. Test data shall be in a general, common and suitable format. The coordinator shall make sure that the test data may be read by all the participants, e.g. by sending around a preliminary data set prior to the test. The test instructions shall contain a description of the test data. Test data shall have a reasonable resolution. All units shall be SI-units.

6.1.3 Pass/Fail criteria

The pass/fail criteria shall be approved by SG 551 and published in a –INF document prior to the PT round starting.

The Pass/Fail criteria shall be reflected and kept updated in a specific IECRE Informative Document that openly communicates the current states of such criteria and its evolution over the time. If there is previous experience, formerly used values will become the basis of the criteria. In the case that there is no relevant previous experience the criteria chosen must take into account the needs of the industry and be reasonably achievable. In general it is a goal of the Proficiency Testing that the results of the participants improve their uniformity and quality, and Pass/Fail criteria should contribute to this goal.

If the determination of agreed values is not possible, a first round of a PT shall be conducted in order to determine reasonable pass/fail criteria. Pass/fail criteria shall be part of the instruction document and hence, available to all participants prior to the PT.

When pass/fail criteria are derived, it has to be made sure that the criteria and instructions are designed in such a way that they are unequivocal and clear. During the final round it must be prevented that outliers which are based on correct results occur. This is achieved by the use of Clarification Sheets and Line Choice instructions. If in the first round correct outliers occur due to different interpretation of instructions, this needs to be clarified among all participants, and in case of disagreement, external experts may be consulted. If a participant with an outlier can prove with sufficient technical evidence that the result is correct and that all others are wrong the PT round shall be repeated, either partially or in its full extent.

In general Pass/Fail criteria shall not be changed from the initial to the final rounds. If such change is necessary, it shall be approved by SG551, after a well-founded report on the cause approved by the majority of the participants. Other Stakeholder groups shall be informed and a consensus has to be reached over the changes.

6.1.4 Determination of Final Results

Statistical guidance on how to evaluate the participant's results and how to determine the final results of the PT may be taken from ISO 13528 [2].

Statistical methods shall be developed to meet the objectives of the PT based on the nature of the data (quantitative or qualitative, including ordinal and categorical), statistical assumptions, the nature of errors, and the expected number of results.

6.1.5 Correction plan phase

If a participant fails in the Proficiency Test, it can present a correction plan detailing the causes of the incorrect results, a new version of the calculations, a cause and extent analysis in order to prove that the cause and the extent of the problem has been determined and information on the measures taken in order to avoid the same problems from happening again.

This information will be analyzed by the IECRE-Wind RETL Lead Assessor. If the result of such analysis is satisfactory the participation in the Proficiency Test will be considered as successful.

The Lead assessor may communicate with the coordinator if further information about the fail values is needed, and also may provide feedback to the PT provider and/or SG551 if considered necessary, always maintaining the confidentiality with the participant.

The participation in the correction plan phase has an extra fee associated based on the Lead Assessor assessment fee.

6.1.6 Presentation of final Results / Final Reports

The results of a proficiency test shall be presented in the form of the following reports.

- Internal report, confidential and to be kept by IECRE secretariat and Organizational Provider.
- Participant reports, confidential and to be distributed to each participant.
- External report, public and to be distributed freely by IECRE.

In the external reports and in the participant reports all information which is related to participants shall be confidential and all results shall only be presented in an anonymized way (e.g. by coding or labeling). Participant reports will reveal only the name of the corresponding laboratory.

The reports shall be distributed into parts for A-participants and B-participants, if applicable.

Any statistical evaluation used to determine a pass or fail result shall only relate to A-participants (e.g. calculation of average values). Additional statistical evaluation will be presented for B-participants and a joint set of participants.

The internal report shall contain all the data relevant to the Proficiency Test, to a detail level that allows to reproduce all the calculations made and justify every pass/non-pass decision:

1. Original Scope of the Proficiency Test:
 - a. Standards used, versions and extent of such standard to be applied.
 - b. Preliminary line choice.
 - c. Pass/Fail Criteria.
2. Complete participants list, including those participants that did not complete the full process.

3. Complete data set and instructions as sent to the participants and all the further information distributed related to it.
4. Reports issued by all the participants in all the rounds.
5. Minutes of the meetings held with the participants.
6. Clarification sheets issued.
7. Line choice applied in each round.
8. If the Pass/Fail criteria are modified from those in the original scope, values taken and documentation of the reasons and the approval of the new values.
9. Calculations that lead to the Pass/Fail decisions.
10. Pass/Fail values for each participant and final results.

The participant reports shall inform each participant of its own results, without providing information about other participants'. Since the participant has already received most of the information contained in the internal report, the participant report is intended to be shorter. It shall at least consist of:

1. Scope of the Proficiency test.
2. List of participants in the last round.
3. Anonymized numerical results of the other participants.
4. Numerical results of the participant.
5. Statistical evaluation of the results of the participants for each individual task
6. Statistical evaluation of the results of the participants which passed for each individual task
7. Results of the participant in terms of Pass/Fail.

The external report shall at least consist of:

1. Scope of the Proficiency Test.
2. Summary of the instructions and description of the process.
3. Pass/Fail criteria used.
4. List of all participants that have passed the Proficiency Test:
 - a. Participants that withdrew with an explanation before the first data submission, will not be mentioned
 - b. Participants that did not submit any data without explanation in round 1 or round 2, will be listed as participant and retired
5. Statistical evaluation of the results of the participants for each individual task. In the statistics outliers shall be excluded.
6. Statistical evaluation of the results of the participants which passed for each individual task, consisting at least of a mean value and standard deviation calculations.
7. Description of the issues found in round 1, with special attention to those aspects where the standard was considered unclear or incorrect.

An external report template is given as a separate document under IECRE.

6.2 Procedure

6.2.1 General

As a guide, the following procedure should be followed:

6.2.1.1 Proficiency test Preparation

1. SG 551 initiates a proficiency testing scheme and selects a proficiency testing provider through the SG 551 PT representative. A MoU shall be signed between the proficiency testing provider and a representative of IECRE (WE-SWG convener and/or the secretariat)
2. SG 551 defines if the PT scheme shall be divided into several PT rounds. By default, PT schemes should consist of 2 PT rounds. They may deviate from default for instance in case of repeating PTs, when new versions of the standards have been released or when there is information that suggests that issues will arise during the PT. Also SG551 defines the scope of the Proficiency Test:
 - a. Standards to be used, version of such standards and extent within them to be covered by the PT.
 - b. Preliminary Line Choice to be used during the PT, if desired by SG551.
 - c. Chunk Data definition, i.e. the steps in the procedure in which the data are to be injected, if desired by SG551.
 - d. Pass/Fail criteria to be used.
 - e. Draft calendar of the Proficiency Test.
3. The proficiency testing provider plans and announces the availability of a PT at least 3 months before it starts. This includes the general announcement along with the scope of the Proficiency Test, participation fees, registration deadline and contractual requirements. Where there is a more immediate need for a PT the timeline can be shortened in exceptional circumstances.
4. Participants may register with the proficiency testing provider
5. The proficiency testing provider approves the participation based on the criteria defined in this OD. Participants may appeal to IECRE secretariat, which will take a decision in consultation with SG551 in case of rejection.
6. Participants pay fees prior to commencement of PT. Fees are not refundable in case of withdrawal of a participant. Refund is possible in case the tasks of the conductor or provider have not been fulfilled.
7. The proficiency testing provider queries all RETLs in the competence area for a coordinator and proposes a coordinator WE-SWG convener for approval.
8. The provider, in close collaboration with the coordinator, sets the time lines for delivery of results, issuing of reports and discussion rounds.

6.2.1.2 Round 1

1. The coordinator provides the instructions for the round:
 - a. Database or test specimen and the technical instructions about it (format definition, units, explanation of files or manuals of equipment).
 - b. Definition of the Preliminary Line Choice.
 - c. Chunk Data definition.
 - d. Pass/Fail criteria.
 - e. Reference to the Standards and Clarification sheets involved.

- f. Template for submitting results and/or reports.
2. Participants carry out the proficiency test and hand in their results to the Provider.
3. Provider anonymizes the results and sends them to the Coordinator.
4. Coordinator evaluates the results and prepares them to be discussed among the participants.
5. The participants meet and discuss the results. The Coordinator shall manage the meeting that will produce the following results:
 - a. Line choice to be used in round 2
 - b. Pass/Fail criteria to be used in round 2. These shall be the same ones as in the PT Scope except in exceptional circumstances.
 - c. If necessary, Clarification Sheets to be used in round 2.
 - d. Modifications to the technical instructions or the Chunk Data definition, if necessary.

6.2.1.3 Round 2

1. The coordinator provides the instructions for the round:
 - a. Database or test specimen and the technical instructions about it (format definition, units, explanation of files or manuals of equipment).
 - b. Definition of the Line Choice.
 - c. Chunk Data definition.
 - d. Pass/Fail criteria.
 - e. Reference to the Standards and Clarification sheets involved, including those drafted in round 1.
 - f. Template for submitting results and/or reports.
2. Participants carry out the proficiency test and hand in their results to the Organizational Provider.
3. Organizational Provider sends the anonymized results to the Coordinator.
4. Coordinator prepares and sends an anonymized draft of the internal report according to 6.1.5. Also communicates to each participant which its results are. Participants may communicate typing / editorial mistakes, but no technical corrections are allowed.

Round 2 should be completed within 6 months from the delivery of the dataset of round 1 to the participants. This period can be extended, if Clarification Sheets are issued, in the same amount of time as taken by IECRE to approve the Clarification Sheets.

6.2.1.4 Announcement / Correction Phase

After the Proficiency Test results have been communicated to the participants, a final phase is dedicated to the announcement of the results and to the correction of deviations from the participants.

1. The Coordinator handles the final Participant Reports to the Provider, which circulates them to the participants.
2. The RETLs that have not passed the Proficiency Test can Present a Correction Plan to the IECRE Lead Assessor to be evaluated in order to keep their status within the system, according to 6.1.4.

3. The coordinator handles the final versions of the Internal Report and the External Report to the Organizational Provider, which circulates them to IECRE through the SG551 representative.

Final versions of the reports shall be issued within two months from the finalization of round 2. At that moment IECRE web page will list those RETLs that have passed the Proficiency Test and also those that have presented a Correction Plan considered adequate by the IECRE Lead Assessor.

WE-SWG Chair checks that the internal and the external reports have been issued according to this procedure.

RETLs that complete a correction plan evaluation at later stages will be added to the list in the IECRE web page after such completion.

6.2.1.5 Participation Certificate

Upon closure of the PT the proficiency testing provider hands over participation certificates to the individual participants which have passed the PT with the following minimum information:

1. Basic data on the PT (competence area, standard(s), parameters)
2. Name of proficiency testing provider and coordinator
3. Name of participant along with a statement that the PT was passed
4. Signature of responsible person at the proficiency testing provider and of the coordinator

A template for a participation certificate is provided as a separate document under IECRE.

7 Conflict resolution

During the Proficiency Tests development, the PT provider shall arbitrate any discrepancies between the participants and the coordinator.

In case of conflict between an RETL and the Organizational Provider, IECRE-Wind Chair will arbitrate a solution through the SG551 representative.

8 Specific requirements for proficiency tests related to IEC standards

The specific requirements for each type of Proficiency test, as well as the current Pass and Fail criteria shall be published as separated documents referencing to this Operational Document.

References

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**INTERNATIONAL
ELECTROTECHNICAL
COMMISSION**

3 rue de Varembé
PO Box 131
CH-1211 Geneva 20
Switzerland

T +41 22 919 0211
info@iec.ch
www.iec.ch

**IEC SYSTEM FOR CERTIFICATION TO STANDARDS
RELATING TO EQUIPMENT FOR USE IN RENEWABLE
ENERGY APPLICATIONS (IECRE SYSTEM)**

IECRE Secretariat c/o IEC
3 rue de Varembé
PO Box 131
CH-1211 Geneva 20
Switzerland

T +41 22 919 0211
secretariat@iecre.org
www.iecre.org