

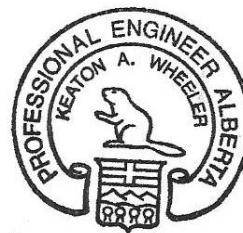
FortisAlberta ICAP Process Requirements for DER 500 kVA and Greater

DER-02E

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This document is not intended or provided as a design specification or as an instruction manual.

The DER owner, employees or agents recognize that they are, at all times, solely responsible for the generator plant design, construction and operation.

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Revision History

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1. Scope and Overview

This document provides a description of the process requirements for evaluation of a generator in conformity with FortisAlberta DER-02 and its companion standards together with normative adopted standards from the Institute of Electrical and Electronics Engineers (IEEE), including IEEE 1547, IEEE 1547a, and IEEE 1547.1. Together with its companion process document, this document addresses adoption of the IEEE Conformity Assessment Program's (ICAP) Commissioning Conformity Evaluation process for evaluation of large generators interconnecting with the FortisAlberta distribution system by certified Commissioning Conformity Evaluators (CCEs).

The companion document, DER-02D FortisAlberta ICAP Technical Requirements for DER 500 kVA and Greater, provides an overview of the ICAP process technical requirements for generators interconnecting with FortisAlberta's system, including FortisAlberta specific requirements and variations.

This document describes the ICAP process, including requirements for participant qualifications. This document is not intended to supersede any technical requirements expressed in FortisAlberta DER-02, DER-02A, DER-02B, or DER-02C, nor does it supersede any contents of IEEE 1547, 1547a, or 1547.1 or the Alberta amendments to IEEE 1547.

Some informative annexes provide further information to support generator owners and IEEE ICAP CCEs.

2. Normative References

All normative references must be fully understood and are applicable to this DER and application of this practice standard. It is expected that the DER owner's representatives and ICAP CCE are fully familiar with these documents in detail.

FortisAlberta:

- FortisAlberta Terms and Conditions
- DER-02

Institute of Electrical and Electronics Engineers (IEEE)

- IEEE 1547-2018
- IEEE 1547a-2020
- IEEE 1547.1-2020

Note that where "the IEEE 1547 series" is referred to in this standard, it means IEEE 1547 and IEEE 1547.1, together with any applicable amendments (e.g. IEEE 1547a).

Alberta Municipal Affairs

- Electrical STANDATA

CSA Group

- CSA C22.1
- CSA SPE-1000

APEGA

- APEGA Professional Practice Standard: "Authenticating Professional Work Products"
- APEGA Professional Practice Standard: "Relying on the Work of Others and Outsourcing"

3. Informative References

Informative references are included to support DER owners and ICAP CCEs. It is strongly recommended that the DER owner's representative and ICAP CCE are familiar with these documents.

Institute of Electrical and Electronics Engineers

- IEEE 1547.2-2023
- IEEE 1547.3-2023
- IEEE 1547.9-2022

4. Glossary and Acronyms

This section describes the definitions and acronyms used within this document. In addition, normative and non-normative technical standards referred to by this document.

The ICAP CCE is responsible to have read and fully understood the reference standards.

4.1. Definitions

All definitions adopted in FortisAlberta DER-02 apply in this document.

In addition, the following definitions are applicable:

electrically remote: an impedance greater than 0.5% on the service power base¹ between the points under consideration.

4.2. Acronyms

The following definitions apply in this document:

AESO	Alberta Electric System Operator
APEGA	Association of Professional Engineers and Geoscientists Alberta
ASET	Association of Science and Engineering Technology Professionals of Alberta
CCE	commissioning conformity evaluator
CSA	CSA Group (formerly Canadian Standards Association)
CT	current transformer
DER	distributed energy resource
EGP Act	Engineering and Geoscience Professions Act
EMI	electromagnetic immunity
EMT	electromagnetic transient
FAI	FortisAlberta Inc.
ICAP	IEEE Conformity Assessment Program
IEEE	Institute of Electrical and Electronics Engineers
IPSC	interconnection protection settings and commissioning form
NDA	non-disclosure agreement
PCC	point of common coupling
SCADA	supervisory control and data acquisition

¹ Any transformer between a DER unit's terminals and the PCC is likely to cause the DER unit to be electrically remote from the PCC. In addition, voltage drop along cabling can cause DER unit measurements to be electrically remote from the PCC.

5. Overview of the FortisAlberta ICAP Process and Technical Reporting

The standard IEEE ICAP DER conformity evaluation process follows a two-phase protocol:

- a pre-site evaluation, and
- an on-site evaluation.

The IEEE ICAP process is intended to address verification according to IEEE 1547.1 installation evaluation and commissioning evaluation. Design evaluation still needs to be performed; see below.

DERs of significant size connect to FortisAlberta's distribution system. To ensure large DERs cannot cause damage to FortisAlberta's distribution system, the transmission system, and FortisAlberta's other customers, FortisAlberta mandates an additional step not directly considered in the ICAP process: on-site protection evaluation. The resulting minimum process is:

- Stage 1: Pre-site evaluation,
- Stage 2: On-site protection evaluation, and
- Stage 3: On-site performance evaluation.

At each stage, FortisAlberta requires a report from an ICAP CCE meeting the minimum technical requirements outlined in DER-02D.

6. DER Owner Support Personnel

The DER owner may not be qualified for design, manufacturing, construction, or commissioning of DER systems. As a result, the DER owner may retain additional support via equipment vendors, consultants, and contractors.

All such personnel, except the ICAP CCE, are considered part of the DER owner for the purposes of this document. The DER owner is responsible to ensure that all supporting parties uphold the DER owner's obligations under this standard.

7. Qualifications Requirements for ICAP CCEs

This section describes the qualification requirements for ICAP CCEs submitting evaluations to FortisAlberta for consideration on FortisAlberta's distribution system.

7.1. *Professional Involvement*

7.1.1. The ICAP CCE shall hold one of the following qualifications:

- APEGA licensed professional engineering (P.Eng.),
- APEGA professional licensee, engineering (P.L.(Eng.)), or,
- ASET professional technologist (P.Tech.)

Where the term "licensed professional" is used in this document, it refers to someone holding one of the above licenses.

7.1.2. For ICAP CCEs holding P.L.(Eng.) and P.Tech. qualifications, all ICAP reports submitted by the ICAP CCE shall include evidence of the limited Scope of Practice approved by the appropriate professional regulator.

- 7.1.3. The ICAP CCE may employ other personnel in executing the evaluation. Supporting personnel shall meet all requirements of the ICAP CCE; however, supporting personnel need not be licensed professionals.
- 7.1.4. Unlicensed supporting personnel shall be under the direct supervision and control of the ICAP CCE who is a licensed professional, as defined in APEGA's practice standards on "Authenticating Professional Work Products" and "Relying on the Work of Others and Outsourcing".
- 7.1.4.1. Reports from ICAP CCEs that are not licensed professionals will not be accepted; all reports shall be authenticated by a licensed professional meeting the requirements of this section.

7.2. ICAP CCE Master Level Certification

- 7.2.1. The ICAP CCE shall hold a certificate for the IEEE 1547-2018 Commissioning Conformance Evaluator (CCE) Master Level Course and Written Examination, awarded by IEEE or an IEEE-approved training provider.

7.3. ICAP CCE Lead and Supporting Personnel

- 7.3.1. For complex projects, work may be undertaken by an ICAP CCE meeting all the requirements of this section as a lead individual, the ICAP CCE Lead. The ICAP CCE Lead may employ other personnel in executing the evaluation.
- 7.3.2. Supporting personnel need not be licensed professionals; however, they shall be supervised as per 7.1.4.
- 7.3.3. Supporting personnel shall still meet the ICAP Master Level certification requirements of the ICAP CCE described above, to ensure they fully understand the requirements of the interconnection standards and can correctly identify non-compliances during evaluation.

7.4. Multiple ICAP CCEs

Some situations may require that the ICAP CCE role is not continuous; that a different individual or different organization undertake different portions of the ICAP process as defined in this standard and its companion standard.

Where such a situation occurs, the final ICAP report(s) submitted during Stage 3 shall provide evidence of review of all previous ICAP report(s), including previous reports by other ICAP CCEs, to ensure that one party has provided a comprehensive assessment of conformity.²

² ICAP CCEs have discretion on whether they will rely on the work of others as defined in APEGA's practice standard.

8. Conflict of Interest and Duty of ICAP CCE

The role of the ICAP CCE is to independently evaluate the detailed conformity of the as-installed DER system to the interconnection standards³. While the ICAP CCE may be retained by the DER owner, the ICAP CCE is expected to provide an independent, unbiased, comprehensive view of conformity to FortisAlberta.

- 8.1. The ICAP CCE shall be an independent contractor and may not be directly employed by any party directly involved in or responsible for the design, manufacturing, construction, or commissioning of the DER system, including subsidiaries of directly involved parties.
- 8.2. An ICAP CCE shall not evaluate any DER system for which the ICAP CCE was involved in the design, manufacturing, construction, or commissioning.
- 8.3. The ICAP CCE shall advise the DER owner on the requirements but shall not give direction on any matter involving design, manufacturing, construction, or commissioning of the DER system⁴.

9. Use of Remote Witness Methods

- 9.1. The ICAP CCE may use remote presence methods such as camera teleconferences to complete the witness requirements.
 - 9.1.1. Where remote presence methods are utilized, the ICAP CCE must document the method used to verify that the DER equipment or test process being witnessed was the DER equipment or test process indicated by the on-site party.
- 9.2. The ICAP CCE shall attend the site at least once to perform the DER as-built installation evaluation.

10. IEEE 1547.1 Design Evaluation

This section describes the design evaluation process.

10.1. Overview of Design Evaluation

IEEE 1547.1 specifies a detailed DER verification process⁵ that includes:

1. DER design evaluation (desk study)
2. DER as-built installation evaluation (on-site)
3. Basic / detailed DER evaluation
4. Commissioning tests and verifications

Within IEEE 1547.1, the requirements for some commissioning tests are noted as “test dependent on

³ This role is similar to that of a Safety Codes Officer in Alberta, where the SCO fees may be paid by a builder, but ultimately the role of the SCO is to evaluate conformity of the builder’s work result to the installation codes for the public safety. Similarly, the ICAP CCE is evaluating conformity of the DER system to the interconnection standards for the safety of the grid and the public that relies upon it. DER misoperation has unique capabilities to cause harm beyond the DER owner’s property.

⁴ The ICAP CCE may indicate comparable solutions used by others.

⁵ See clause 8.1.3 of IEEE 1547.1-2020.

design evaluation". The need to perform tests in the field depends largely on whether type or production testing already accurately demonstrates the results for the system under consideration⁶. In the standard IEEE ICAP process, the ICAP CCE relies on others to perform the design evaluation to determine which installation evaluations and commissioning tests are applicable and must be witnessed.

Refer to DER-02D for information on the technical requirements for design evaluation.

10.2. Design Evaluation Professional Involvement

- 10.2.1. FortisAlberta requires that a licensed professional perform a design evaluation to determine which installation evaluations and commissioning tests are applicable to the given system. The licensed professional need not be the ICAP CCE and may be involved in or responsible for the design, manufacturing, construction, or commissioning of the DER system.
- 10.2.2. If the design evaluation is performed by the DER owner or another party, the ICAP CCE shall still validate its results to confirm that the test results demonstrate conformity to the requirements for the system under consideration. The design evaluation may be performed by the ICAP CCE as part of the pre-site evaluation described in section 11, Stage 1: Pre-Site Evaluation.

11. Stage 1: Pre-Site Evaluation

During the pre-site evaluation, the DER owner and ICAP CCE work together to collect data on the DER system necessary to demonstrate conformity to the requirements. This stage is when the DER design evaluation will be performed.

The ICAP CCE reviews the documentation and prepares a report assessing the conformity of the DER system as planned, documenting any non-conformities with the requirements, and submits it directly to FortisAlberta.

- 11.1. The DER owner shall address any non-conformities.
- 11.2. In addition, the DER owner shall submit the FortisAlberta IPSC Section 1.
- 11.3. The ICAP report(s) addressing pre-site evaluation shall be submitted with the 110 day package⁷.

⁶ In general, field testing will be required unless it can be demonstrated that type testing or production testing adequately demonstrated performance in the field. Generally this is only possible where the entire system as a whole has been subjected to type testing as a system.

⁷ It is strongly recommended that the ICAP report(s) be submitted as early as possible if there are any non-conformities identified. FortisAlberta reserves the right to reject any DER connection that does not conform to the interconnection standards. Early approval of any variances required is recommended to avoid delays.

12. Stage 2: On-Site Protection Evaluation

During the on-site protection evaluation, the DER owner performs any applicable testing of the protective systems prior to energizing the DER units. The tested settings must conform to the requirements of DER-02 and the IEEE series, except as amended by the FortisAlberta's response to the IPSC Section 1.

- 12.1. The ICAP CCE shall witness the testing of the protection systems.
- 12.2. The ICAP CCE shall prepare a report confirming the protection systems function as designed, documenting any non-conformities with the requirements, and submit it directly to FortisAlberta.
- 12.3. The DER owner shall address any non-conformities.
- 12.4. The DER owner shall not energize the DER units prior to acceptance of the IPSC Section 2 and the ICAP report(s) by FortisAlberta.
- 12.5. In addition, the DER owner shall submit the FortisAlberta IPSC Section 2.
- 12.6. The ICAP report(s) addressing on-site protection evaluation shall be submitted with the 30 day package.

13. Stage 3: On-Site Performance Evaluation

During the on-site performance evaluation, the DER units are operated for the first time under controlled conditions. The DER owner prepares a commissioning plan, detailing all testing prescribed by the DER-02, the IEEE 1547 series, and the DER design evaluation.

- 13.1. The ICAP CCE shall witness performance testing of the DER system, including any control system testing and power quality evaluation.
- 13.2. The ICAP CCE shall prepare a report confirming the DER functions as designed, documenting any non-conformities with the requirements, and submits it directly to FortisAlberta.
- 13.3. The DER owner shall address any non-conformities.
- 13.4. FortisAlberta may direct the DER owner to shut down the DER system if non-conformities are not remedied in a timely fashion.
- 13.5. In addition, the DER owner shall submit the FortisAlberta IPSC Section 3.
- 13.6. The ICAP report(s) showing final conformance to the interconnection requirements shall be submitted with the Commissioning Package, prior to commercial operation.
- 13.7. Where post-energization power quality monitoring is intended for use as evidence of conformity to the interconnection requirements, it shall be submitted with the ICAP report(s).⁸

⁸ This may cause the post-energization power quality assessment to be completed at the Commissioning Package stage.

14. Management of Non-conformities

- 14.1. If any non-conformities with the requirements are discovered during the ICAP process, they shall be documented in the ICAP report(s).
- 14.2. Each non-conformity shall be assigned a unique identifier, to enable its closure to be tracked. The identifier must not be re-used in any other ICAP report(s) during the ICAP process.⁹
- 14.3. The DER owner shall provide an action plan to mitigate each non-conformity with the requirements.
- 14.4. Where changes are made to the DER system, re-testing of any affected subsystems shall occur.
- 14.5. Following completion of the mitigations, the ICAP CCE shall verify that the mitigation is completed and witness any re-testing.
- 14.6. The ICAP CCE may accept photographic evidence of mitigation for deficiencies that do not require re-testing, provided it is clear that the evidence provided is of the remediated item.
- 14.7. The ICAP CCE shall amend the affected report(s) or issue a new report to indicate closure of the non-conformity. Record of the non-conformity and its resolution must be retained; the non-conformity cannot simply be removed from the report.
- 14.8. Amended or new report(s) prepared by the ICAP CCE shall be submitted directly to FortisAlberta.

⁹ The identifier will be used in correspondence between FortisAlberta, the DER owner, the ICAP CCE, and other parties. As a result, overlap can create confusion about which issue is being addressed. For this reason, use of unique identifiers is mandatory.

Annex A (Informative)

Management of Non-Conformity

This informative annex provides some guidance on management of non-conformities identified during the ICAP process.

A1. Non-conformity Register

It is recommended that the DER owner maintain a non-conformity register, identifying each non-conformity from the ICAP report(s) by its unique identifier, and documenting the action plans for closure. This approach is similar to the common construction practice of deficiency or “punch list” management.

Utilizing a register will simplify communication of progress with FortisAlberta and other parties involved in the DER system connection.

A2. Re-Witness

Following initial identification of a non-conformity, the ICAP CCE must witness its mitigation and update report(s) or issue a new report documenting the closure.