

September 5, 2018

To: Michelle Rosier and the DGWG Technical Subgroup

Fresh Energy respectfully submits these comments and questions for technical subgroup consideration in advance of the September 14 workgroup.

What on-line commissioning tests, if any, will be required of Simplified systems under the new standard?

I bring this question to the group for two reasons: 1. I'm having a hard time working it out myself and am hoping that those closer to the development of 1547 and 1547.1 will be able to help answer the question, and 2. it seems there is opportunity with the transition to the new standard to eliminate the witness test step altogether for standard, simplified interconnections (this subset would need to be clearly defined) which would streamline the process for the majority of applicants.

The 2004 interconnection standard requires an Anti-Islanding Test "For Generation Systems that parallel with the utility for longer than 100msec."¹ It is my understanding that currently all utilities are coordinating with the installers and/or customers to schedule and witness this anti-islanding test for all interconnected systems prior to granting permission to operate the system. However, it seems from the tables in the new IEEE standard that this anti-islanding test is Not Required (NR) where type-tested, which would be all 1741 certified units.

Systems at PCC:

¹ 2004 MN state standard - Section (C) "Commissioning Testing", (ii) "On-Line Commissioning Test", (1) "Anti-Islanding Test".

Requirement	Compliance at PCC achieved by:	Type tests	DER evaluation	Commissioning tests
6.5.2.7 Frequency-droop (frequency-power) (This is a top-level heading and requirements are specified in the subclauses below.)				
6.5.2.7.1 Frequency-droop (frequency-power) capability	DER System	R	NR	NR
	Composite	L	R	D
6.5.2.7.2 Frequency-droop (frequency-power) operation	DER System	R	NR	NR
	Composite	L	R	D
6.6 Return to service after trip	DER System	R	NR	NR
	Composite	L	R	D
7 Power quality				
7.1 Limitation of dc injection	DER System	R	NR	NR
	Composite	NR	R	NR
7.2 Limitation of voltage fluctuations induced by the DER (This is a top-level heading and requirements are specified in the subclauses below.)				
7.2.2 Rapid voltage changes (RVC)	DER System	NR	Design: R Installation: NR	D
	Composite	NR	Design: R Installation: NR	D
7.2.3 Flicker	DER System	NR	Design: R Installation: NR	D
	Composite	NR	Design: R Installation: NR	D
7.3 Limitation of current distortion	DER System	R	NR	NR
	Composite	L	R	D
7.4 Limitation of overvoltage contribution	DER System	R	R	D
	Composite	L	R	D
8 Islanding				
8.1 Unintentional islanding	DER System	R	NR	NR
	Composite	L	R ^c	R ^d
8.1.2 Conditional extended clearing time	DER System	R	R	NR
	Composite	L	R	R ^d

Systems at PoC:

Requirement	Compliance at PoC achieved by:	Type tests	DER evaluation	Commissioning tests
7.2 Limitation of voltage fluctuations induced by the DER (This is a top-level heading and requirements are specified in the subclauses below.)				
7.2.2 Rapid voltage changes (RVC)	DER Unit	NR	Design: R Installation: NR	D
	Composite	NR	Design: R Installation: NR	D
7.2.3 Flicker	DER Unit	NR	Design: R Installation: NR	D
	Composite	NR	Design: R Installation: NR	D
7.3 Limitation of current distortion	DER Unit	R	NR	NR
	Composite	L	R	D
7.4 Limitation of overvoltage contribution	DER Unit	R	R	D
	Composite	L	R	D
8 Islanding				
8.1 Unintentional islanding	DER Unit	R	NR	NR
	Composite	L	R ^d	R ^e
8.1.2 Conditional extended clearing time	DER Unit	R	NR	NR
	Composite	L	R	R ^e
8.1.3 Area EPS with automatic reclosing	DER Unit	R	NR	NR
	Composite	L	R	R ^e
8.2 Intentional islanding (This is a top-level heading and requirements are specified in the subclauses below.)				
8.2.2 Scheduled intentional islands	DER Unit	NR	NR	NR
	Composite	L	R	R
8.2.3 Unscheduled intentional islands	DER Unit	NR	NR	NR
	Composite	L	R	R
8.2.4 Conditions for unscheduled transition to intentional island	DER Unit	NR	NR	NR
	Composite	L	R	R

Do others in the subgroup agree with that interpretation? If yes, what other testing requirements are applicable to standard systems, if any? If none, is there still a need for the utility to coordinate a scheduled site visit prior to PTO?

Additionally attached (in the pages following) are comments submitted on Witness Testing from October of 2017 by the Joint Movants.

I have included these comments again for subgroup consideration to the extent that they are still relevant to this discussion. As a reminder, one idea proposed in that set of comments is a worksheet for testing to be completed by the electrician on the project in lieu of a utility employee witnessing the test. Of note, testing by the installer followed by inspection by the utility, but without on-site coordination, would be a small but still significant step toward streamlining the steps to PTO.

Thank you for your consideration of this input. I apologize that my thoughts are a bit incomplete at this stage. I hope to have more solid footing by Friday's meeting. Looking forward to the discussion.

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**Minnesota Distributed Generation Workgroup
Docket 16-521**

**Supporting Material for Workgroup Consideration Recommending Waiving the Witness
Test for Applications that Qualify for the Simplified Process**

Submitted by Joint Movants

The purpose of this document is to further explain and support the recommendations made in the previous workgroup meeting (9/15) to expedite and simplify the post-installation steps of the Simplified Process by eliminating the requirement for the utility and applicant to coordinate a witness test. To be clear, utility inspection and/or meter replacement would remain part of the process, if applicable, but neither task requires the applicant to be on site.

As proposed, the MIP allows for witness tests to be waived at the discretion of the utility which is already an improvement over the existing Minnesota Interconnection Standards which requires utilities to witness an anti-islanding test performed for all systems prior to granting permission to operate (PTO). Going forward, there is no way to predict how often utilities will opt to waive the test, of course, but we anticipate some utilities may continue to operate as they have in the past rather than critically evaluating the necessity of a witness test for certified equipment. In other words, there is inertia here that will need to be overcome as we transition to the new process. To address that concern, we think it is appropriate for the Commission to draw a brighter line.

It is our recommendation that the Commission adopt one of the following:

- Option A: Determine that a witness test is not necessary for systems that qualify for the Simplified Process and remove the testing requirement
- Option B: Add a witness test section to the Certificate of Completion document to be completed and signed by the licensed electrician performing the test to satisfy the requirement assuredly and safely without the utility present

We recognize that there is an active conversation happening right now in the IEEE 1547 and 1547.1 working groups to put together a commissioning test table and associated tests. Squaring the timing and outcome of that discussion with the timing of this order is challenging. However, from what we understand, the IEEE working groups have determined that Simplified systems, as we have defined them, would be categorized as “type test only” for testing and verification, requiring no commissioning test. And while expectations are still being considered by the working group, anti-islanding requirements are not among the exceptions. The anti-islanding test is the test being performed today. As we move toward the grid support functions of IEEE 1547 and varying inverter settings by utility and/or installation the next iteration of the MIP will likely require us to revisit the post-installation process flow. Meanwhile, there is a real opportunity to streamline and reduce costs now.

It is our understanding from discussions with higher-volume installers in Minnesota that they need a full time, salaried employee, and a dedicated vehicle for that employee, whose entire job it is to schedule witness tests with the utility (and the homeowner where there is a need to access indoor equipment) and drive around performing these tests. This is a significant expense. Further, from the perspective of the utility, a meter tech able to create her own route of inspection and/or meter replacements without having to make scheduled appointments with the installer/homeowner would be much more efficient, resulting in reduced costs and timelines to PTO.

Option A

We recommend, with strong preference, that the Commission determine that a witness test is not necessary for systems that qualify for the Simplified Process. With this option, the Simplified Process (Attachment 5) will require modification as follows:

4.0 After installation, the Customer returns the Certificate of Completion to the Company. Prior to parallel operation, and consistent with the MIP, the Company may inspect the Generating Facility for compliance with standards, ~~which may include a witness test~~, and may schedule appropriate metering replacement, ~~if necessary~~. The Company is obligated to complete the ~~witness test~~ **inspection and metering replacement**, if required, within ten Business Days of the receipt of the Certificate of Completion. ~~If the Company does not inspect within ten Business Days, the witness test is deemed waived.~~

5.0 Within three days of inspection or waiver of inspection, the Company notifies the Customer in writing that interconnection of the Generating Facility is authorized. If the ~~inspection witness test~~ **inspection witness test** is not satisfactory, the Company has the right to disconnect the Generating Facility ~~until the necessary corrections have been made and the Generating Facility has been re-inspected, if required~~. The Customer has no right to operate in parallel until ~~a witness test~~ **an inspection** has been performed or waived ~~on the Application or~~ by the Company.

The Simplified Process Application form will require modification as follows:

Company waives inspection/~~witness test~~? Yes ___ No ___

The Terms and Conditions will require modification as follows:

2.3.2 Does not schedule an inspection of the Generating Facility within ten business days after receiving the Certificate of Completion, in which case the ~~inspection witness test~~ **inspection witness test** is deemed waived (unless the Parties agree otherwise).

Additionally, attached is a new Certificate of Completion form which is intended to replace the Certificate of Completion originally filed. The form has been simplified to one page for administrative efficiency. It is applicable to this Option A recommendation.

Option B

Should the Commission decide not to waive the witness test for small systems, it is our recommendation that we improve the process by eliminating the requirement for this test to be coordinated between the applicant and the utility, where both are present. Instead, the installing electrician shall perform the test, which they would undoubtedly do anyway, and complete the witness test portion of the Certificate of Completion.

With this option, the same modifications would be required as with Option A, with one additional recommended point of clarity to the Simplified Process (Attachment 5):

4.0 After installation, the Customer returns the Certificate of Completion to the Company, including the completed witness test portion. Prior to parallel operation, and consistent with the MIP, the Company may inspect the Generating Facility for compliance with standards, which may include a witness test, and may schedule appropriate metering replacement, if necessary. The Company is obligated to complete the ~~witness test~~ inspection and metering replacement, if required, within ten Business Days of the receipt of the Certificate of Completion. ~~If the Company does not inspect within ten Business Days, the witness test is deemed waived.~~

Additionally, attached is a new Certification of Completion document that includes a witness test table which is intended to replace the Certificate of Completion originally filed. The form is applicable to this Option B recommendation. Should this option be adopted by the Commission, we will create and provide the three phase table for Exhibit [i].

Generating Facility Certificate of Completion

Commented [LH1]: New Certificate of Completion (Option A)

Application ID number: _____

Customer Account Number: _____

Address of Generating Facility: _____

City: _____ State: MN Zip: _____

Is the Generating Facility owner-installed? Yes No

Contact Person / Company: _____

Phone: _____ Email: _____

Electrician Name / License: _____

The Generating Facility has been installed and inspected in compliance with the local permitting authority as verified by the signature below or the additionally attached document.

Inspector Signature: _____

Print Name: _____ Date: _____

Authority Having Jurisdiction (city/county): _____

As a condition of interconnection, email a completed copy of this form to (insert Company name) at (insert email).

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Approval to Energize the Generating Facility (For Company use only)

Energizing the Generating Facility is approved contingent upon the Terms and Conditions for Interconnecting an Inverter-Based Generating Facility No Larger than 40 kW (Simplified Process).

Company Signature: _____

Title: _____ Date: _____

Generating Facility Certificate of Completion

Commented [LH2]: New Certificate of Completion with Witness Test Table (Option B)

Application ID number: _____

Customer Account Number: _____

Address of Generating Facility: _____

City: _____ State: MN Zip: _____

Is the Generating Facility owner-installed? Yes No

Contact Person / Company: _____

Phone: _____ Email: _____

Witness Test:

A witness test has been successfully performed by simulating loss of utility source and verifying the Generating Facility ceased to energize, and verifying that the Generating Facility delays energization for at least 5 minutes upon reconnecting to the utility source as measured and recorded in the table below². Measurements taken on the AC side of the inverter.

	Voltage between line1 and line2	Voltage between line1 and ground	Voltage between line2 and ground
Disconnected (simulating outage)			
Reconnected within 5 minutes			
Reconnected after 5 minutes			

	Line1 Current	Line2 Current	Ground Current
Disconnected (simulating outage)			
Reconnected within 5 minutes			
Reconnected after 5 minutes			

Electrician's Signature: _____

Electrician Name / License Number: _____

² See Exhibit [i] for a three phase measurement table for completion when applicable.

Inspection:

The Generating Facility has been installed and inspected in compliance with the local permitting authority as verified by the signature below or the additionally attached document.

Inspector Signature: _____

Print Name: _____ Date: _____

Authority Having Jurisdiction (city/county): _____

As a condition of interconnection, email a completed copy of this form to (insert Company name) at (insert email).

.....

Approval to Energize the Generating Facility (For Company use only)

Energizing the Generating Facility is approved contingent upon the Terms and Conditions for Interconnecting an Inverter-Based Generating Facility No Larger than 40 kW (Simplified Process).

Company Signature: _____

Title: _____ Date: _____

Exhibit /i/ : Witness Test Table for Three Phase

[Insert]