

Webinar Q&A

PREPARING FOR UL 1741SB CERTIFICATION

On November 17th, 2021, QualityLogic held a webinar to provide the latest updates on timelines for UL 1741 SB certification and our guesstimates on actual regulatory requirements as well as the company's 1547.1 test tools. These are answers to the questions that came up during the presentation.

1. Are there any tests required to be done in the production line?

Section 11.2.3 in IEEE 1547-2018 addresses production testing. Presumably, the manufacturers have very good quality control processes that once a system is certified, then that's the system that gets built and has a security certificate with it, and is shipped to the customer.

Section 7 in IEEE 1547.1-2020 addressed production testing procedures. Before this can be done, the DER must first satisfy the requirements in Section 5 (Type) and 6 (Interoperability). Production tests include overvoltage/undervoltage trip tests and overfrequency/underfrequency trip tests.

The production testing requirements in 1547 are not detailed. The goal is to "verify the operability of every DER unit..." This can be done as part of a factory test or DER evaluation or commissioning process. "Manufacturers having certified production facilities..." are assumed to produce operable and conformant products.

2. You said 1547 will be required or is required for bi-directional inverters. Will this require both AC and DC bi-directional inverters to have grid support functionality? Is that only certified in 1741SC?

1547.1 tests include support for bi-directional inverters and our test tool supports such testing.

That's a really interesting question. V2G-DC means that the inverter is on the charging station. Interconnecting that charging station comes under California Rule 21 if it is intended to be used for V2G, and would be certified to UL 1741 SB.

V2G-AC is a little more complicated, because now you've got an inverter on the electric vehicle, and that inverter somehow has to be compliant with 1547. The actual testing of that is still being debated. UL is developing UL 1741 SC that only applies to an AC charging station. The new standard is really focused on ensuring that the charging station itself can communicate correctly with the inverter onboard the EV and act as the interface between the grid operator

and the DER. The required protocol is 2030.5, in the case of passenger cars, and for higher capacity electric vehicles, trucks, etc. it would be a SunSpec Modbus interface between the EVSE and the onboard control system. The new standard is based on SAE J3072 and is still in development by the UL working group.

3. Does the monitoring test also provide similar dialog boxes to management tests? Can we control the different aspects of the monitoring test?

The monitoring test is not the same dialog box. The monitoring test is essentially related to the DUT reporting meter data along with some aspects of device information, which is serial number, product model, etc. To request more information on these tests, email us at info@qualitylogic.com.

4. Can you comment on the most common protocol that inverter manufacturers use for UL 1741 SB certification?

We are seeing interest in both IEEE 2030.5 and SunSpec Modbus. There is a little bit of interest in DNP3, but small compared to the other two protocols so far.

5. Can this tool be used for AS/NZ 4777 grade compliance testing?

It likely could be used, but we would need to look at the particular standard you're talking about to see how compatible it is with 1547.1 test procedures. Fundamentally, you have the same type of grid support functions: a volt-var curve is a volt-var curve in any country, and inverters understand that. If the primary differences are in the default and test parameters, then it these can be adjusted on the fly using our test tool.

6. Do you have any information formal or informal regarding adoption timing, a 1547.1 by ERCOT.

The Texas PUC has a docket open for IEEE 1547-2018. We have little insight to ERCOT itself. So that's a good question. Some of the ISO and RTOs are adopting, or recommending adoption, of certain parts of 1547 to their member utilities.

7. If there is any grid, PV simulator, or PQ meter that is currently not supported by you, do you provide support to add that interface? And is there a charge for that?

We absolutely do support adding new models, as long as they support the SCPI interface. And we do that on a continuous basis as new customers come in and ask for a new model that we don't currently support. We support the major equipment that are common in the industry (please refer to the answer to a similar question in this Q&A for a more detailed list). If you have specific models you're interested in, please contact us and we can answer any questions you may have..

8. Are the CSIP certification requirements changing at all?

CSIP certification continues to be done according to the SunSpec CSIP Conformance test procedures V1.2, published in July 2019. There are some activities in the SunSpec Alliance, which we are a part of, that may redesign the test procedures, but that's months away at best, so I don't see that happening anytime soon.

Any big changes are probably going to happen sometime towards the end of 2022 after there's an update to 2030.5 that's in process at IEEE. Once that is voted on and approved, then that will have an impact on CSIP. We suspect that there are a number of things that will roll into a CSIP update, but it'll be probably the end of next year at the earliest.

9. Just to clarify the UL 1741 SC certification is only for the AC charging station. What is the communication protocol between the EV inverter and EVSE?

UL 1741 SC comes out of SAE (Society of Automotive Engineers) J3072, which defines V2G AC communications. The inverter is on the vehicle itself, and there is not an inverter on the charging station. Could the AC EVSE act as the front end for communications between the utility and the EV? The communications in SC between the charging station and the electric vehicle control system will be done in either 2030.5 or SunSpec Modbus, depending on the type of vehicle as defined in J3072.

10. How does your automated test system handle the unintentional islanding tests?

We currently don't automate the unintentional islanding test because those require equipment like resistor banks, capacitor banks, that are hard to automate and control through SCPI. Most of those are very basic logic commands on that equipment and a lot of them are manual, so we don't do any testing for unintentional islanding.

11. Can your tool connect with all major grid and PV simulators in the market without additional engineering work?

Yes. We do support the major ones, Ametek and NHR grid simulator product lines, For PV, we support Chroma, Magna, Keysight, TerraSAS, and Regatron. For Power Analyser/Oscilloscope, we support the Yokogawa product line and Chroma. Based on customer requests, we continue to add to this list. If you have other models, we'll be happy to discuss your needs. That list was actually collected from working with all the NRTLs and leading inverter customers to understand the most commonly used equipment used in the industry.

12. How can we join the working groups you have referenced?

For the 1547.1 and 1547.2, their work is done. 1547.1 is approved, so it's not doing anything, so joining it wouldn't be useful. 1547.2 is just going to ballot, so there's not much to do there. I suggest instead joining the IEEE 1547 workgroup and my guess is it's already working on an update because they're collecting a bunch of issues that need to be addressed.

ADDITIONAL Q&A FROM PAST 1547.1 WEBINARS

1. What's the required setup (HW) to employ this IEEE 1547 testing tool for prototype EVSE validation?

1547.1 evaluates the inverter functionality to ensure that it meets 1) the safety and functional requirements of IEEE 1547-2018 and 2) the Interoperability

requirements of IEEE 1547-2018. The test set-up using the QualityLogic 1547.1 test tools is the same as traditional inverter testbeds with the addition of a Windows-based system to host the 1547.1 test tool. The rest of the testbed is standard inverter testing equipment consisting of the inverter, a grid simulator, a DC simulator, and monitoring equipment.

2. Using a gateway to translate the commands from an IEEE2030.5 master (test tool) into SunSpec Modbus parameters, would it be possible to run the interop tests only once? What about sending only on IEEE2030.5 protocol but reading the IEEE2030.5 and the SunSpec Modbus?

You have two options. You can run the interop or type test using IEEE 2030.5 and have the (local) gateway convert them to SunSpec Modbus to your inverter. Or, if you will support the SunSpec Modbus 700 series model, you can use the QualityLogic test tool and run the interop (and type tests) thru SunSpec Modbus..

3. Do the NRTLs allow data from the Automated Test Equipment implementation to support certification?

That is up to the NRTLs. We would hope they would since they are planning to use our test tools. If an NRTL uses our test tools to manage the output data, then it will by default be accepting that data for their inverter evaluation.

4. After a DER is certified, to what authority does one submit the certification?

UL 1741 SB is recognized as part of the UL 1741 family of safety standards under the Occupational Safety and Health Administration Nationally Recognized Test Lab Program (NRTL). Labs that are qualified by OSHA to conduct the UL 1741 certification testing are the authorities that issue the certificate of compliance.

5. I understood that you can conduct the Rule 21 / CSIP Tests and the IEEE1547 conformant tests with the same tool, correct?

CSIP and 1547.1 FTS are separate test suites that can be executed from the same application interface that

you're used to. 1547.1 FTS can be programmed into the same license dongle you have, or on a new dongle if you wish to separate the two.

6. Your client tester tool was used to translate IEEE2030.5 to the inverter's protocol. Which protocol was used, and which are supported?

Our test tool supports use of 2030.5, SunSpec Modbus 700 and DNP3 (coming later this year) to communicate with the target inverter.

7. If data is compiled in Automated ops, can that data be used for certification?

See question 3 above. Note that our test tools do not attempt to evaluate the pass/fail of a specific test (at this time). Rather they produce test results that a qualified tester can use to make the determination.

8. How is the design of test tool licenses and what are the costs?

The 1547.1 test tools are licensed as single-user perpetual licenses secured by a USB Dongle that enables their use on a specific machine. Pricing is confidential and we are happy to provide a quotation to prospective customers.

9. Where does OpenADR play in reference to "Which Protocol to Use" while handling DER use cases?

OpenADR does not play in this domain today. It is not one of the named protocols in 1547.1. When the 1547 workgroup was putting together their list of protocols, OpenADR was seen as a demand response protocol and not as a protocol for dealing with the advanced inverter functions, so it was not included. There is some work going on in the OpenADR Alliance to address this, but at this point in time, it's not there.

10. For CA Rule 21 — 2030.5 interoperability IS required, correct? Even if the supported protocol is DNP3 or SunSpec MODBUS.

IEEE 2030.5 is not actually required at the local inverter interface unless that inverter is directly communicating with the utility. However, most of the inverters are expected to be communicating either through an aggregator or some other gateway, such as a cloud-based or local gateway, and California Rule

21 has not yet addressed how that communication happens. All that is stated is that you have to use 2030.5 to get to the first leg of the communication that the utility is communicating directly with. Now that's temporary (maybe). When 1547.1 / UL1741SB is mandated in California, there could be a requirement that one of the 3 protocols is used locally, unless California determines they want to specify 2030.5 has to be supported as part of the UL 1741 SB certification.

11. Have you seen aggregators adopting your tools or test environment for testing interoperability conformance?

Absolutely. Anyone who goes through certification ends up using our tools, and the labs use our tools to do the certification testing itself. They're very helpful for being able to do development testing as well as for pre-certification testing.

12. Why are aggregators not required to provide IEEE 20305 interface?

The aggregators are required to provide a 2030.5 interface in California if their system is communicating directly with the utility. Aggregators are not required, at this point anyway, to use 2030.5, SunSpec, or anything else to talk to the inverters.

13. So in California only, the aggregators need a 2030.5 interface to the utility?

Yes, but what we think you will see is that because California is requiring it, other states and countries will leverage the interface.

14. Is it mandatory if a utility and service provider have a mutual agreement, then can they use Aggregator?

I think it's going to be state to state, jurisdiction to jurisdiction, and utility to utility. In California it's not mandated that they use an aggregator. What is mandated is that if you are going to use an aggregator, there are a set of rules to explain how the aggregator is going to communicate to the utility DERMS. We think that's going to be an area still to be figured out in the industry. There's a business side to dealing with aggregation, and that hasn't been determined.

15. Can Section 6 interoperability of 1547.1 be applied to synchronous generator-based power plants control systems communication base, or just for smart inverters.

It's a question that the industry is also talking through to understand. The 1547 standard does reference rotating generators. . If the control system is 1547 compliant and gets certified, then it would need to support one of the interoperability profiles.

16. Is 1741SB an evolution of 1741SA?

Evolution can mean a lot of things, but it is an update to 1741SA to reflect the new requirements coming in from 1547-2018 and the 1547.1 spec that was just released. 1741 SB has been approved and is available from the UL website.

9. What are the requirements to connect to utilities?

It depends on the utility, the state, and the country. That's one of the complexities of this industry. Look at the inverter vendors - they have very complex systems that keep track of all of the nuances of the certification requirements, settings, and everything else. So if you're sending an inverter to Mississippi, then it probably has a basic set of requirements that are comparable, but it won't have anything like a CSIP 2030.5 requirement.

17. Is there an effort to standardize asset information exchange for synchronizing asset details between Utilities and Aggregators? An asset would be a DER, the location, ownership, etc.

Within 1547 there is a standardized reports format to report from the labs the exact results of the testing and certification test. It is specified in a standardized CSV file. Utilities are looking at using that same report format to specify what the settings need to be for installed systems, or even capturing the configuration of the installed system. But in terms of a larger database, there's some work going on in SunSpec with the Orange Button, which is more around standardizing this kind of asset. It also gets into the kind of details of the assets so that people making financial decisions can also evaluate it. They're focused on issues like how long ago it was installed, how many hours before maintenance, what's the maintenance history, etc.

18. We used to reference function 17 and 18 in SA 1741. Are those functions still part of the UL 1741 SB requirements? Or is the 19 and 20 now?

SA 17 & 18 have not changed. They are still part of the next revision. SB adds onto the SA* tests for 1547-2018/1547.1-2020 by referring to the 1547.1 sections.

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