



## TEST DATA ENVIRONMENTS

# UL Power Quality Assessment

For more than a century, UL has been one of the most recognized and trusted resources for product safety testing, certification and information. As such, it is essential that consistent and repeatable test data is generated and the testing environment, including the quality of the electrical power, be known.

Data Acceptance Program (DAP) customers and International Electrotechnical Commission for Conformity Testing and Certification of Electrical Equipment (IECEE — CB) Manufacturer Test Laboratories (MTL) are required by ISO/IEC 17025 Clause 5.3 to monitor and control the test environment, including power sources. A power quality study verifies that the source of power meets minimum voltage regulation, frequency regulation and harmonic distortion. MTL requirement OD-5010 and DAP Requirement 00-OP-C0036 outline the minimum power source requirements. Both DAP and MTL allow manufacturers to conduct their own testing or contract another testing service to complete the power quality testing. UL now offers an added Power Quality Study service to run a series of tests at a client's location to assess and document its power quality.

### Is this a required test?

Yes, for all DAP clients that connect their products to any of the following values:

- 120 VAC 60 Hz up to a load of 20 AMPS
- 240 VAC 60 Hz up to a load of 15 AMPS
- 230 VAC 50 Hz up to a load of 16 AMPS

A power quality analysis (PQA) is to be performed at the point of test connection(s) every three years. The schedule may be planned such that circuits are analyzed at specific times within the three-year cycle, providing that all test circuits are evaluated within the three-year period. Local power conditions may require more frequent monitoring to assure power quality parameters are maintained. When the test circuit(s) are modified or repaired, a power quality analysis shall be performed prior to use. Consideration shall be made for changes to the circuits external to the facility.

While using UL for this service is optional, it may be recommended based upon UL's knowledge (i.e. requirement applicability and scope of participation) of those customers who are participating within UL's DAP and MTL Program. Recent experience found that the cost and time spent for customers working with another provider or conducting the tests themselves may not be worth the added aggravation and effort, whereas UL can provide the service with calibrated equipment, and knowledgeable staff that are experienced in conducting these.

### Why conduct a power quality study?

Initial and ongoing testing of laboratory environments must be done to achieve results that are accurate and repeatable. Properly calibrated test and measurement equipment ensures the instruments used have a suitable accuracy range. Repeatability requires that the test arrangement and process is consistent each time the test is conducted. The laboratory power quality is part of this environment therefore it must be periodically assessed.

One major factor affecting reliable test results is having a proper testing environment within the parameters specified by the standard. Most manufacturers understand the environment to mean suitable ambient temperature, humidity and similar elements. Another important aspect is the power quality. Voltage fluctuations with loads that cycle or having significant distortion of the voltage waveform due to harmonics will affect consistency and repeatability of test results.

UL's power quality assessment will survey the power supply to the test area including the source transformer ratings, installation wiring, and measure voltage, current and total harmonic distortion

over a period of time and under specified load conditions. A report will be provided to the client for its records and to be used as evidence of the power quality at the client's location.

## Power quality analysis

Power quality analysis is to be performed on test power sources having nominal voltages and currents up to, and including:

- 120V 60Hz up to 20A;
- 230V 50Hz up to 16A;
- 240V 60Hz up to 15A.

## DAP and IEC Testing and Certification

**For IEC** — UL staff will review copies of the power quality assessment and will indicate compliance/non-compliance in the test data sheet package prior to accepting data under the CB Scheme's MTL.

**For other DAP programs (CTDP, TCP, TPTDP, WTDP, etc)** — Clients are to index and retain copies of power quality analysis and related documentation. The UL DAP engineer will review the output of the power quality assessment to make the final pass/fail determination.

## Power Quality Assessment Process

**Independence of test circuits** — Using the facility power wiring diagram provided by the client, all the loads connected along with the test circuits are observed. Loads that may cause disturbances, such as air conditioning, heating, machinery, are identified and the test circuits monitored to determine the effect of starting and stopping of these loads. The duration of this test is to be adjusted to allow high demand starting loads to cycle. The cycling may need to occur more than once to determine the effect both in magnitude and duration.

**L, N, G voltage measurement test** — Each and every representative test bench outlet receptacle/test power connection point is checked by measuring the open circuit voltage between Line to Neutral (L-N), Line to Ground (L-G), and Neutral to Ground (N-G).

**Voltage regulation/circuit capacity tests** — Includes details for use of manual variable transformers (variac/slidac) as a means of voltage regulation. For the voltage regulation/circuit capacity test, the open circuit voltage at the representative test bench receptacle/ test power connection point is to be adjusted to the nominal value and recorded. The circuit is then loaded to the design circuit load rating and the voltage is monitored and recorded. The result is an indication of the voltage regulation under both no load and loaded conditions.

**Frequency stability-loaded supply test** — While the voltage is being monitored, the frequency is also monitored to confirm the frequency stability under no load and rated load conditions is satisfactory.

**Total harmonic distortion test** — Using a total harmonic distortion analyzer, the harmonic distortion of the voltage at the representative test bench receptacle/power connection point is to be measured under open circuit conditions and loaded conditions.

## Get started now

For more information or to request a quote for a power quality assessment of your facility, contact a UL representative today or e-mail request to [DAP@ul.com](mailto:DAP@ul.com).

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