NQ Panelboards — Quality and Durability Testing
Class 1640

Retain for future use.

A Reputation for Quality and Durability

With a reputation for quality and durability, Square D® brand lighting and power panelboards are the preferred choice of electrical consultants, contractors, and end users. This reputation has helped Schneider Electric develop a broad base of loyal customers that install and use Square D brand panelboards daily, in various applications.

When Schneider Electric undertook redesigning the popular NQOD 240 Vac lighting panelboard, they committed to ensure it would meet the high quality expectations associated with the Square D brand name. This document describes the substantial testing regimen they used and how the new NQ panelboard will meet or exceed customer expectations.

Extensive Testing Regimen for the New NQ Panelboard

When a new product is developed, the developer makes a significant capital investment to ensure it complies with all relevant industry standards. The testing regimen used for the new NQ panelboard met and exceeded these rigorous standards. The new NQ panelboard was designed and tested to comply with the following industry standards to ensure reliable performance.

- Undewriters Laboratories Inc.
  - UL 50
  - UL 67
  - UL 98
  - UL 746C
  - UL 489
- National Electrical Manufacturers Association
  - NEMA AB1
  - NEMA KS1
  - NEMA PB1
  - NEMA 250
- Canadian Standards Association
  - CSA C22.2 No. 4
  - CSA C22.2 No. 5
  - CSA C22.2 No. 29
  - CSA C22.2 No. 94
- National Electrical Code
  - NEC Article 408
- National Fire Protection Association
  - NFPA 70, 5000
- International Building Code
  - 2006 IBC
- American Society of Civil Engineers
  - ASCE 7
Additionally, Schneider Electric designed and tested the new NQ panelboard, above and beyond required industry standards.

- Shipping and Packaging Testing
- Panelboard Interior Endurance Testing
  - Adapted from UL 857 standard
- Field Installation Testing with Electrical Contractors
- Bonding Resistance Testing
- Thermal Cycle Testing
- Seismic Qualification Testing

Overview of Underwriters Laboratories Inc. Panelboard Testing Procedures

A new panelboard undergoes many hours of design, development, and testing before it is submitted to industry standards organizations for compliance approval. Once submitted for review, certifying authorities, such as Underwriters Laboratories Inc. (UL), perform comprehensive and rigorous certification tests to confirm a panelboard complies with their standards.

The following is a list of UL mandated certification tests, passed by the NQ panelboard.

Temperature Testing

As specified in the UL 67 and CSA C22.2 No. 29 standards, a panelboard must not exceed a maximum temperature rise of 65° C above a 10–40° C ambient temperature when operated at maximum rated amperage for approximately four (4) hours, or until the thermals stabilize and readings are documented.

During the NQ panelboard development process, Schneider Electric conducted numerous thermal tests, at various amperages, and performed three (3) UL supervised thermal tests. These tests proved successful.

Rain Testing

Schneider Electric used the demanding water ingress standard, UL 50, to confirm the performance of the weatherproof NQOD panelboard enclosure.

Since NQ panelboard enclosures and trim fronts (Type 3R, 4, and 4X) are identical to those currently being used with NQOD panelboards, testing wasn't necessary. Schneider Electric provided UL with proper documentation and earned certification for the new NQ panelboard enclosure.

Strength of Insulating and Base Support Testing

When testing per standard UL 67, Schneider Electric torqued a short length of conductor to 110% of the torque value marked on the NQ panelboard label. For compliance, UL requires this procedure cause no considerable damage to the panelboard molded components.

The NQ panelboard passed this test with no damage noted.

Mold Stress Relief Distortion Testing

Schneider Electric performed the mold stress relief distortion test prescribed by UL by placing an NQ interior in a full-draft circulating air oven heated to at least 70° C for seven hours and then allowed to be cooled to room temperature.

NQ panelboards earned compliance with standard UL 746C by passing the test with no softening, shrinkage, warpage, or other distortion noted.
Short Circuit Current Testing

As specified in the UL 67 and CSA 22.2 No. 29 standards, a series of 3-cycle short circuit withstand and maximum voltage tests were conducted to confirm that the panelboard could withstand the fault current ratings claimed, without substantial damage.

During the NQ panelboard development process, Schneider Electric conducted numerous short circuit tests, at various AIC levels, and performed seven (7) UL supervised tests. These tests proved successful:

- At 100–225 A, 3-cycle test resulted in a 10 KA rating
- At 400–600 A, 3-cycle tests resulted in a 25 KA rating

The successful results of this testing enabled Schneider Electric to produce NQ panelboards for sale and to mark them with the cULus label.

Overview of Additional Schneider Electric Panelboard Testing Procedures

All panelboards bearing a cULus label undergo the same rigorous UL certification testing. However, Schneider Electric took additional steps and performed additional testing to improve the NQ panelboard and confirm that it would meet and exceed UL, CSA and customer quality and durability expectations.

The following is a summary of the other tests Schneider Electric conducted to ensure the NQ panelboard achieved the highest levels of quality and durability.

Shipping and Packaging Testing

Schneider Electric performed a number of shipping-related tests, focused primarily on receiving an installation of the new NQ panelboard, to confirm the quality of its packaging. The panel was subjected to rotational vibration tests (up to 14,200 vibratory impacts) to ensure the integrity of the panelboard, particularly its blank filler plates, was not compromised during shipping.

This testing resulted in improvements to the shipping cartons and internal packaging used. These improvements have eliminated/reduced shipping damage.

Panelboard Interior Endurance Testing

Branch breakers in the NQ panelboard can be attached to the mounting rail and/or the plug-in fingers. Schneider Electric redesigned these components for the NQ panelboard. The plug-in fingers for 100 A and 225 A NQ panelboard interiors were upgraded to have 30% more cross-sectional area and a 190 A current rating.

To test the new components for durability per standard UL 857 (Plug-in Units for Busway), Schneider Electric installed and removed a 150 A 3-pole QO®-VH plug-in circuit breaker 25 times at each of the various mounting locations on a 225 A NQ panelboard interior. This circuit breaker is the largest, highest amperage branch breaker that can be installed in the panelboard and the worst case for potential panelboard damage from repeated branch circuit breaker installation and removal. The testing revealed no damage to either the mounting rail or the plug-in fingers.

This testing confirmed that the new plug-in fingers and mounting rail provide a secure branch breaker mounting and a dependable electrical connection.
Field Installation Testing with Electrical Contractors

Schneider Electric tasked fifteen electricians in five U.S. and three Canadian locations with evaluating the new NQ panelboard and its installation instructions. These evaluations were also used to confirm the ease of assembly/installation of various ready-to-install (RTI) accessory kits and branch circuit breakers.

The feedback from these field evaluations resulted in two design changes to the NQ panelboard to address potential installation concerns. The electricians' feedback also led to enhanced installation instructions that simplify the installation process for the installer.

Bonding Resistance Testing

Schneider Electric followed the requirements of standard UL 67, including testing to ensure a reliable bond exists between the new NQ panelboard and its enclosure. This successful testing ensures proper bonding for service entrance applications.

Thermal-Cycle Testing

Schneider Electric subjected the new NQ panelboard bus bars and finger connections to rigorous thermal-cycle testing to ensure a consistent torque is maintained in electrical joints with bolt-on and plug-on breakers.

Seismic Qualification Testing

The seismic provisions of the 2006 International Building Code (IBC) requires strenuous shaker table testing for panelboards. The new NQ panelboard successfully completed this testing without any structural damage, while retaining electrical continuity.

Conclusion

The new NQ panelboard has been the most extensively tested and evaluated panelboard ever developed by Schneider Electric. These efforts will help ensure that the new NQ panelboard delivers the quality and durability expected of products bearing the Square D brand name.