

NEBS Level 3 testing goes well beyond what is required for UL listing and CSA certification. Using compression connectors which meet NEBS Level 3 requirements will help ensure a quality installation and dependable performance.

Wouldn't it be nice to know that the products you install won't cause headaches later from outages or failures? Agencies such as UL and CSA create standards and perform testing to help ensure that products are safe. However, demanding applications have forced some industries to go beyond UL and CSA safety test requirements and create their own performance and reliability tests.

Minimize Service Interruptions

with the Right Power & Grounding Connectors

The telecommunications industry, for instance, hosts mission-critical applications such as 911 emergency services. To help ensure that phone service is always available, the world's toughest performance and reliability product test standard was designed at Bell Laboratories, and is now maintained by Tercordia Technologies. This test criteria is known as Network Equipment-Building Systems (NEBS) Level 3.

While NEBS Level 3 was designed to qualify products used by phone companies, the high quality of products that pass this test makes them desirable for use in many industries. Products tested to NEBS requirements are used worldwide for a broad range of commercial, utility, and defense applications.

by **Tom Turner**



The Testing Agencies

- **Underwriters Laboratories (UL)** is an independent, not-for-profit product safety testing and certification organization. Its mission is to operate laboratories that examine and test devices, systems, and materials to determine if they are hazardous to life or property. In addition, UL develops and publishes standards for a variety of elements that could affect those hazards. UL serves the electrical industry, but also serves industries as diverse as meat and poultry, software, and public health.
- **The Canadian Standards Association (CSA)** is a not-for-profit membership-based organization serving business, industry, government, and consumers both in Canada and throughout the world. Its mission is to develop standards that address issues such as public safety and health, quality of life, preservation of the environment, and trade facilitation. Like UL, it also serves a wide range of industries.
- **Telcordia Technologies** develops specifications and performs testing on products related to the telecommunications market. With regards to standards, its mission is broad, encompassing both safety and operability of equipment. Its publications propose generic criteria for telecommunications equipment involving a variety of factors - including interoperability, network integrity, and needs expressed by industry. It also develops software, performs research, and provides consulting.



Wide variety of Pan-Lug™ compression connectors meet NEBS Level 3.

NEBS Level 3 testing as it applies to the qualification of copper compression connectors and splices for power and grounding applications:

Level	Description	Typical Applications
1	People hazards, equipment hazards, and network degradation is minimized. Does not assure equipment operability or service continuity.	Mostly prototype and other equipment used for vital services.
2	Provides limited assurance of equipment within controlled environments.	Typically used in highly controlled environments, such as data centers or in places where equipment failures under extreme environmental conditions can be tolerated.
3	Assures equipment operability in extreme environments.	Suited for applications demanding minimal service interruptions over the equipment's life.

UL & CSA Test Requirements

Power

The UL standard that applies to copper compression lugs and splices for power is UL 486A. The relevant CSA document is C22.2 NO. 65-93. These two documents are similar, though not identical. Generally, these agencies certify lugs and splices for power by conducting tests on the strength of the crimp and through observation as to whether unsafe heat build-up takes place in the connector during operation. Furthermore, UL and CSA impose a set of general requirements on the conductors-including material specifications and product design.

Grounding & Bonding

UL 467 applies to connectors used for grounding and bonding. To pass this test, a connector must first meet the qualifications of UL 486A and then pass a short time current test to simulate fault

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conditions. Similarly, C22.2 NO. 41-M1987 dictates CSA certification for grounding and bonding connectors. CSA requires that a connector must pass qualifications for C22.2 NO. 65-93 and then pass a short time current test.

Going Beyond UL and CSA

The NEBS concept was first introduced within the Bell System in the 1970s to standardize phone company equipment. Telcordia, formerly known



Before and after rigorous NEBS Level 3 testing.

as Bellcore, maintains the NEBS documents. NEBS is the most common set of safety, spatial, and environmental design guidelines applied to telecommunications equipment in the United States.

Before NEBS Level 3 testing starts, Telcordia requires that the connector or splice be listed to UL486A and/or UL467 with manufacturer-recommended tooling. From there, the products are put through a number of demanding tests. For example: When NEBS Level 3 testing is performed on telephone company products, calamities such as lightning strikes and Zone 4 earthquakes are simulated. To pass NEBS Level 3, all of the parts must continue working properly after these tests have been performed.

But NEBS Level 3 goes further than that. It must be proven that power connectors and splices can operate in frigid temperatures and blistering heat as well as high and low humidity. Furthermore, NEBS Level 3 requires that copper compression lugs and splices continue working in corrosive environments.

What makes these tests especially difficult is that each connector or splice is put through all of these tests consecutively, and Telcordia expects very little change in how well the parts work when testing is done. When the earthquake test, temperature test, humidity test, and corrosive chemical exposure tests are complete, the test samples are not

allowed to have a resistance greater than 30 milliohms.

To date, NEBS Level 3 has the most stringent test requirements in the connector industry, going well beyond what is required for UL listing and CSA certification.

Though it was developed for the telecommunications industry, the rigor of NEBS Level 3 ensures that connectors passing the test are ideal for a wide variety of applications in many indus-

tries. Therefore, using copper compression lugs and splices that meet NEBS Level 3 requirements will help ensure a quality installation and dependable performance.

Look for “Meets NEBS Level 3” and “Tested by Telcordia” on product labeling for the most reliable compression connectors and splices. ■

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