Quazite®

HUBBELL®

Underground Enclosures

Performance Standards Update
ANSI/SCTE 77-2013

HUBBELL®
Power Systems, Inc.

Performance Standards Update ANSI/SCTE 77-2013

In 2002, a national performance standard was needed to help engineers specify underground enclosures that would reliably fulfill their performance needs. ANSI/SCTE 77-2002 was established as a performance based standard, rather than a product material standard. This new standard aided engineers in specifying underground enclosures that correctly fulfilled a need in the field, rather than simply specifying a construction material. This performance based specification minimizes enclosure maintenance issues, ensures a long service life, and reduces liability concerns. Because enclosures are made using various materials, designs, and technologies, prior to ANSI/SCTE 77, it was easy for manufacturers to inadvertently make misleading or false claims about the performance and appropriate applications for their enclosures.

Millions of underground enclosures are installed each year and silently and invisibly perform their duties. Many enclosures specified might not perform as expected unless they meet the newly released ANSI/SCTE 77-2013 performance standards.

Established over 10 years ago, ANSI/SCTE 77 has continued to evolve over the years. It was most recently updated in 2013, and subtle improvements have been made over the prior 2010 version to enhance the already robust performance standard. Other associations have taken note of this underground standard, and have understood its importance. Most notably, the National Fire Protection Association (NFPA) has pro actively worked to increase the safety and reliability of underground enclosures. NFPA recognized that the equipment and wires in underground enclosures had to meet their Code, but the enclosures themselves had not been addressed. As a result, NFPA took steps to incorporate underground enclosures into their Code. The result of this action was the 2011 National Electric Code (NEC) Section 314.30.

Specifiers and end users relying on the new ANSI Standard (ANSI/SCTE 77-2013) to specify enclosures, can have confidence that they are selecting enclosures that will withstand "all loads likely to be imposed." For example, Quazite® underground enclosures were among the first to meet or exceed all the performance requirements listed in ANSI/SCTE 77-2013. Although all underground systems will reference this standard, it is especially relevant for the electrical industry because the 2011 National Electric Code, Section 314.30 requires that, "Handhole enclosures shall be designed and installed to with stand all loads likely to be imposed."

The new ANSI/SCTE 77-2013 standard remains the same as the 2010 standard for all provisions but more clearly defines and extends the testing procedures with the following enhancements:

- Magnesium chloride was added to the list of chemical reagents used to evaluate the chemical resistance of enclosure materials.
- Magnesium chloride is typically used as a de-icing solution, so its inclusion will insure resistance to corrosion.
- The number of cycles required in the simulated light exposure test was clarified to provide testing guidance.
- The pass/fail criterion was changed to state that the environmentally exposed flexural test specimens must retain at least 75% of the control values for stress and deflection. Earlier versions of the specification stated that the test specimens must retain at least 75% of the control values for load and deflection, which did not account for slight differences in specimen dimensions.
- The lateral sidewall pressure test was changed to state that enclosures greater than 60" in length should be loaded with two loading plates 24" deep x 18" wide. The previous version stated that enclosures greater than 48" in length are tested with the two plates. The change to the larger box length eliminates plate overlap which occurs when testing enclosures 48" to 54" in length.

All the existing provisions of the original 2002 standard are included in ANSI/SCTE 77-2013. A copy of the new specification can be downloaded at: http://www.scte.org/documents/pdf/Standards/ANSI_SCTE%2077%202013.pdf.

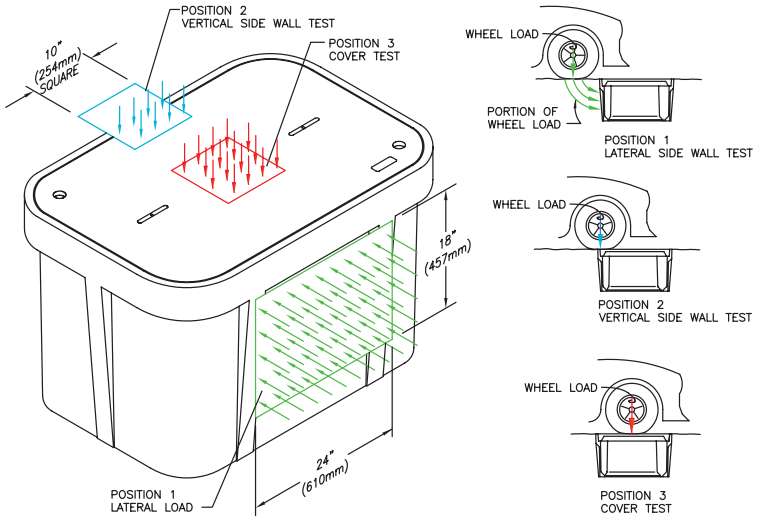
Since the ANSI/SCTE 77-2013 is an appropriate performance specification rather than a construction specification, any properly designed and constructed enclosure could potentially meet the ANSI standard regardless of the construction materials. To meet the ANSI standard, enclosures must pass a battery of physical, and environmental equipment protection tests to ensure a long service life with minimal maintenance.

While all the tests are important to ensure long-term performance, the heart of the standard and the best indicators of an enclosure's strength are the three position structural tests. The first position tests how an enclosure's lateral sidewall withstands soil surcharges as a vehicle approaches the enclosure. The second position tests how an enclosure withstands vehicular loading applied directly onto a vertical sidewall, and the third position tests vehicular loading applied to the center of the enclosure's cover.

Testing includes:

- Structural testing to simulate typical non-deliberate vehicular loading
- Accelerated service testing
- Chemical resistance testing
- Simulated sunlight exposure
- Impact resistance tests
- Water absorption testing
- Flammability resistance testing

In the past, some underground enclosure manufacturers used only the results from the center of the cover test to tout the strength of their enclosures. This practice was misleading because no mention was made of lateral or vertical forces. If an enclosure was weak in its vertical or lateral areas, end users would be unaware that their enclosures were not strong enough. This issue was one of the driving forces behind the development of the ANSI Standard.



Product Test Positions (from ANSI/SCTE 77-2002) properly test and simulate all loadings to be imposed upon an underground enclosure.

Application	Loading Requirements			
Light Duty Pedestrian Traffic Only	Vertical	Test Load	13.3 kN	3000 lbs
TIER 5 Sidewalk applications with a safety factor for occasional non-deliberate vehicular traffic	Vertical Lateral	Design Load Test Load Design Load Test Load	22.2 kN 33.3 kN 28.7 kPA 43.1 kPA	5000 lbs 7500 lbs 600 lbs/sq.ft. 900 lbs/sq.ft.
TIER 8 Sidewalk applications with a safety factor for non-deliberate vehicular traffic	Vertical Lateral	Design Load Test Load Design Load Test Load	35.6 kN 53.4 kN 28.7 kPa 43.1 kPa	8000 lbs 12000 lbs 600 lbs/sq.ft. 900 lbs/sq.ft.
TIER 15 Driveway, parking lot and off roadway applications subject to occasional non-deliberate heavy vehicular traffic	Vertical Lateral	Design Load Test Load Design Load Test Load	66.7 kN 100.1 kN 38.3 kPA 57.5 kPA	15000 lbs 22500 lbs 800 lbs/sq. ft. 1200 lbs/sq. ft.
TIER 22 Driveway, parking lot, and off roadway applications subject to occasional non-deliberate heavy vehicular traffic	Vertical Lateral	Design Load Test Load Design Load Test Load	100.1 kN 150.1 kN 38.3 kPA 57.5 kPA	22500 lbs 33750 lbs 800 lbs/sq. ft. 1200 lbs/sq. ft.
AASHTO H-20 Deliberate vehicular traffic applications	Certified precast concrete, cast iron, or AASHTO recognized materials			

Underground Enclosure Performance Specification

Enclosures, boxes and covers are required to conform to all test provisions of the most current ANSI/SCTE 77 "Specification For Underground Enclosure Integrity" for Tier_____ (specify Tier 5, 8, 15 and/or 22) applications. When multiple "Tiers" are specified the boxes must physically accommodate and structurally support compatible covers while possessing the highest Tier rating. In no assembly can the cover design load exceed the design load of the box. All components in an assembly (box & cover) are manufactured using matched surface tooling. Independent third party verification or test reports stamped by a registered Professional Engineer certifying that all test provisions of this specification have been met are required with each submittal.

The tiered load chart (above) helps eliminate the practice by some enclosure manufacturers of using test loads (the minimum ultimate failure load) rather than design loads (the expected load plus a safety factor of 1.5). This misleading practice can lead to catastrophic enclosure failures because test loads will not provide a factor of safety. ANSI compliant enclosures must meet design loads that have a 1.5 safety factor built in.

The ANSI/SCTE 77 standard defines specific loading requirements and defines Tier levels based on an enclosure's application. For example, in a sidewalk application, an enclosure that is Tier 5, Tier 8, or greater should be used, depending on the potential for a vehicle to run over the enclosure. To make it easier to determine the correct Tier level for an enclosure in the field, some manufacturers have taken the initiative to emboss the Tier designation on their enclosure covers. This visual aid helps eliminate confusion and possible misapplication in the field.

When choosing a Tier rating, the exact placement of the enclosure should be carefully considered. For example, if an enclosure is installed in a sidewalk, a Tier 8 enclosure might be appropriate. However, if the enclosure is placed in a sidewalk close to a curb where there is an increased likelihood of inadvertent vehicle contact, a Tier 15 rated enclosure is a better choice.

When specifying an enclosure to be installed in a grassy area, it is reasonable to assume that a Tier 5 rated enclosure would be strong enough. However, if the enclosure has the potential to come in contact with a lawn tractor, a Tier 8 enclosure should be specified.

Quazite®, an underground enclosure manufactured by Hubbell Power Systems, Inc., is an example of an underground enclosure that meets or exceeds all of the ANSI/SCTE 77-2013 standards and delivers superior performance. Quazite enclosures can reduce installation costs, reduce product liability claims, and provide years of trouble free service.

In conclusion, the ANSI/SCTE 77 is a reliable indicator of both performance and durability that has helped ensure that quality products are easily identified and specified in underground applications.

Hubbell has a policy of continuous product improvement.
Please visit hubbellpowersystems.com to confirm current design specifications.
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