



National Performance Standard for Underground Enclosures

ANSI/SCTE 77-2007

ANSI/SCTE 77-2007 Specification for Underground Enclosure Integrity sets a national performance standard for underground enclosures. This ANSI standard supersedes ANSI/SCTE 77-2002 which was the first national performance standard that is not material specific to help ensure long service life, minimize maintenance and reduce liability issues related to underground enclosures. Previous to ANSI/SCTE 77-2002 the underground enclosure industry did not have a national performance standard to follow for the testing of products. Second, because enclosures are made using various materials, designs and technologies, it was easy for manufacturers to misunderstand and make misleading or false claims about the performance and appropriate applications for their enclosures.



The information is based upon an article previously published in the April 2005 edition of NEC Digest and authored by Phil Stephens, Director of Marketing and Customer Service, Quazite, Hubbell Lenoir City, Inc.

While the first ANSI standard was being formulated, the National Fire Protection Association (NFPA) was also pro actively working to increase the safety and reliability of handholes. NFPA recognized that while the equipment and wires that go into underground handhole enclosures had to meet the Code, the enclosures themselves had not been addressed. The NFPA then took steps to bring handhole enclosures into the Code. The result of this action is in the 2005 NEC section 314.30.

When specifiers and end users follow the ANSI Standard (ANSI/SCTE 77-2007) to choose enclosures, they have a dependable guide in selecting enclosures that withstand “all loads likely to be imposed.” Enclosures that will remain safe and reliable for the intended applications. Quazite underground enclosures meet or exceed ANSI/SCTE 77-2008. Although all underground systems will specify this standard, it is especially relevant for the electrical industry because the 2005 National Electric Code, Section 314.30 requires that, “Handhole enclosures shall be designed and installed to withstand all loads likely to be imposed.”

The new ANSI/SCTE 77 2007 standard remains the same as the 2002 standard for all provisions but more clearly defines and extends the loads and testing procedures with the following added enhancements:

- Tier 22: (22,500 pound Design Load, 33,750 pound test load) testing and performance criteria. The 2002 standard previously only included Tier 5 (5,000 pound Design Load, 7,500 pound Test Load), Tier 8 (8,000 pound Design Load, 12,000 pound Test Load), and Tier 15 (15,000 pound Design Load, 22,500 pound Test Load) for non-deliberate traffic applications. For deliberate traffic applications both standards direct the specifier to use AASHTO H20 certified pre-cast concrete, cast iron or AASHTO recognized materials.

• **Coefficient of Friction Test:**

Measures the slip resistance of the walking surface that is or may be exposed to pedestrian traffic. The static coefficient of friction of this surface shall be a minimum of 0.50 as determined using ASTM C1028-06 Section 8, or any equivalent test method.

- Reliable test procedures for testing underground enclosures with sidewalls greater in length than 48.”

All other existing provisions of the 2002 standard are included in ANSI/SCTE 77 2007.

ANSI/SCTE 77-2007 is an appro-

priate performance specification rather than a construction specification meaning that 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, environmental and internal equipment protection tests to ensure long, reliable service life with minimal maintenance. These tests include: structural testing to simulate typical non-deliberate vehicular loading; accelerated service; chemical resistance; simulated sunlight exposure; impact resistance; water absorption and flammability resistance. While all the tests are important to ensure long-term performance, the heart of the standard is the three position structural tests (See page 14). The three-position test is the best indicator of an enclosure’s overall strength. 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.

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 sidewall strength. If the enclosures were weak in those areas, end users were none the wiser and enclosures that were not strong enough for certain applications were installed anyway. This issue was one of the driving arguments for the development of the ANSI Standard, which now spells out that enclosures must be tested at all three positions in order to meet the standard.

The load chart (table below) 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) to promote the strength of their enclosures. This misleading practice can lead to dangerous

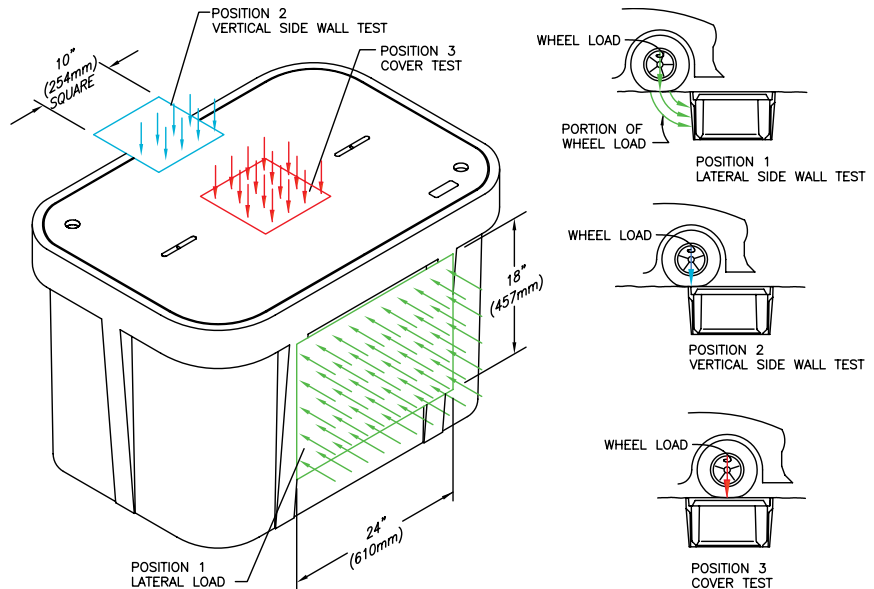
APPLICATION	LOADING REQUIREMENTS			
Light Duty Pedestrian Traffic Only	Vertical	Test Load	13.3 kN	3000 pounds
TIER 5 Sidewalk applications with a safety factor for occasional non-deliberate vehicular traffic	Vertical	Design Load	22.2 kN	5000 pounds
	Lateral	Test Load	33.3 kN	7500 pounds
TIER 8 Sidewalk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

failures because test loads do not provide a factor of safety. End users, therefore, might unknowingly use enclosures in applications that push loading ratings dangerously close to, or even past, the limits of the enclosures. Now, however, ANSI compliant enclosures must meet design loads that have a 1.5 safety factor built in.

The ANSI standard defines loading requirements for enclosures based upon anticipated loads and separates these requirements into Tier levels defined by the applications. As shown on the table, the end user now has straightforward instruction that if there is a sidewalk application, they should use an enclosure that meets, at a minimum, the loading requirements for Tier 5 or Tier 8, depending on the potential the enclosure will have of being run over by a vehicle. To make it easier for end users or contractors to determine the correct Tier level of enclosures, some of the leading manufacturers, including Quazite, have taken the initiative to emboss Tier designations directly onto the covers of their enclosures. This visual aid helps eliminate confusion and the possibility of misapplication when enclosures are pulled from pre-existing stock.

Careful consideration should go into determining the appropriate Tier level needed for a particular underground enclosure application. For example, if an enclosure is installed in the sidewalk away from the curb, a specifier would usually determine that a Tier 8 enclosure would be the most suitable choice. If that enclosure were located in the sidewalk next to a curb, though, where there is an increased likelihood of coming into contact with vehicles, it would be a better choice to specify a Tier 15 enclosure.

If an enclosure is being installed in a grassy area, the installer might first assume that a light-duty enclosure would be strong enough for the application. However, if that enclosure has the potential to come in contact with a lawn tractor, it would be wise to install a Tier 8 enclosure instead.



Product Test Positions (from ANSI/SCTE 77-2002 Specifications for Underground Enclosures Integrity) simulate all loadings likely to be imposed upon the enclosure.

At Quazite, we deliver superior underground enclosure performance with a life cycle that is longer than traditional materials for cost effective and trouble free service over the long term. We welcome ANSI/SCTE 77-2007 as a national performance code that includes rigorous testing to help ensure safe, reliable underground enclosures based upon application.

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. ■



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