

Standards Help Protect Children From Electrical Shock

Background

An analysis of U.S. Consumer Product Safety Commission (CPSC) data over a ten-year period (1991-2001) found 24,000 children younger than 10 years old were treated in hospital emergency rooms for accidents related to electrical receptacles. That works out to seven injured and emotionally traumatized children and their parents rushing to receive emergency treatment for injuries caused by contact with electrical outlets every day.

Typically, these types of injuries occur at home and are caused by small children inserting common objects such as hairpins, keys, and paper clips into electrical outlets. Most victims experience first-degree or second-degree burns, but much more serious injuries also occur. Toddlers between age two and three accounted for half of the injuries with boys being most at risk, regardless of age.

Young children are prone to putting objects into slots, hence the large number of educational toys that challenge their dexterity in just this way. Unfortunately, children also attempt to slip objects and their small fingers into electrical outlets in the same manner.

Members of the National Electrical Manufacturers Association (NEMA) addressed this safety hazard by turning to codes, standards, and conformity assessment initiatives designed to essentially eliminate the cause of the problem.

Problem

Electrical injuries can occur when a child inserts a metallic object into an outlet and it becomes electrified. When this happens, the child holding or touching the object can receive a powerful shock. Because children have less resistance to electric shock than adults, the results can be serious, even deadly.

Nearly all of the electrical outlet protectors on the market have shortcomings that put children at risk. The popular plastic outlet cap offers an inexpensive “child-proofing” method for protecting children under two years old, but children over two can remove these caps. In addition, adults often forget to reinsert receptacle caps after using an electrical outlet, and children can gain access to exposed receptacles by pulling out plugs.

Child-resistant wall plates offer more protection but add material, so they can also reduce contact between plug blades and contacts, creating the potential for heat rise or arcing. Ground fault circuit interrupters could offer protection when the contact points are the hot and the ground, but not if they are the hot and the neutral contact points.

The industry had already devised a better solution years ago for children’s wards in hospitals. These tamper-resistant receptacles use a system of shutters that prevents the insertion of most objects but allows the insertion of electrical plugs intended to work with that type of receptacle. These outlets were tested thoroughly in the hospital environment and they were a resounding success. Unfortunately, the hospital-grade receptacles were substantially more expensive than commercial receptacles.

To make this solution commercially acceptable, the industry realized that tamper-resistant receptacles needed to be substantially less expensive. They also needed to be supported by a solid standardization and certification effort because electrical outlets are a key component of the electrical infrastructure in North America and other countries.

Approach

The tamper-resistant receptacles used in hospitals proved that protecting children from inserting objects into electrical outlets can be accomplished. Lowering costs and gaining acceptance across the industry was now the key to solving the problem.

Developing codes and standards for the product was an integral part of the launching strategy. When created in an open consensus-based process, codes and standards are widely adopted. Members identified the NFPA 70®, National Electrical Code (NEC) 2008 edition as a major driver for gaining implementation in the U.S.

The National Electric Code (NEC), or NFPA 70, is a United States standard for the safe installation of electrical wiring and equipment. It is part of the National Fire Codes series published by the National Fire Protection Association (NFPA). The NEC codifies the requirements for safe electrical installations into a single, standardized source. The NEC is approved as an American national standard by the American National Standards Institute (ANSI). While the NEC is not itself a U.S. law, it becomes law when adopted by states and large municipalities. NEC use is also mandated by many jurisdictions outside of the U.S.

Supporters of tamper-resistant receptacles convinced voting members of the NEC to include tamper-resistant receptacle requirements in the NEC 2008 edition. In parallel, they offered proposals to include specific requirements for the new product in the Underwriters Laboratories (UL) related safety standard. This in turn allowed for a reliable certification of the product functionality. All major receptacle manufacturers now offer tamper-resistant receptacles at a cost only slightly higher than comparable standard receptacles. NEMA estimates the additional cost for an average home to be less than \$50.

An additional effort concerned the code adoption in various states and major municipalities. NEMA sent representatives to the public sessions that were debating the merits of adopting the 2008 NEC. They delivered the message that the new requirement provides a significant safety improvement and that the cost would not represent a major burden for the builder and future owner. Documented arguments and data supported the message.

A similar approach was undertaken in Canada which has a similar infrastructure to the U.S. The Canadian Electrical Code (CEC) was targeted first and then followed by proposals for the proper Canadian Standards Association (CSA) standard.

Outcome

Tamper-resistant receptacles provide real safety. At this time in 2010, as a result of the industry's activities, more than 50 percent of the U.S. states have adopted the 2008 NEC standard requiring tamper-resistant receptacles in new residential construction and other locations easily accessible to young children. The process continues at the state and large municipalities' level. The products are now on the shelves of practically every store and distributor. Other facilities with similar exposure such as mobile homes, which are not subjected to the NEC, are now considering adopting tamper-resistant receptacles. Military childcare facilities, also not regulated by NEC, have also adopted this safety enhancing technology.

The main lesson learned was that a change related to infrastructure should be supported by all the proper codes, standards, and certifications in order to succeed. A unified effort by trade associations and organizations representing the industry is needed for establishing the credibility of the proposal and for supporting it through the entire codes and standards adoption process.

One company alone, regardless of how large it might be, would not be able to implement industry-wide changes to the infrastructure. The standardization process also by-and-large removes proprietary technology issues, which in turn, provides the market with the assurance it can start building or rebuilding the infrastructure with the new product.

Saving children from physical and emotional trauma by ensuring and promoting standards is one of the great rewards of NEMA's efforts for the standardization and adoption of tamper-resistant receptacles. NEMA encourages electrical inspectors, contractors, and distributors to support this important safety enhancement. NEMA recommends contacting electrical associations and local state legislators to push for Code adoption.

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