

# NFPA Technical Committee Document Proposal Form

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Date Oct. 1, 2002 Name William King Telephone 301-504-0508, ext. 1296  
Company U.S. Consumer Product Safety Commission  
Address 4330 East West Highway City Bethesda State MD Zip 20814-4408  
Please indicate organization represented (if any) U.S. Consumer Product Safety Commission

1. a) NFPA Document Title National Electrical Code  
b) NFPA No. & Edition 70-2002 c) Section/Paragraph 422.XX in Part IV  
2. Proposal Recommends (check one):  new text  revised text  deleted text  
3. Proposal. (Include proposed new or revised wording, or identification of wording to be deleted.) Note: Proposed text should be in legislative format, that is, use underscore to denote wording to be inserted (inserted wording) and strike-through to denote wording to be deleted (~~deleted wording~~).  
(See attachment for Proposal)

4. Statement of Problem and Substantiation for Proposal. Note: State the problem that will be resolved by your recommendation. Give the specific reason for your proposal including copies of tests, research papers, fire experience, etc. If more than 200 words, it may be abstracted for publication.  
(See attachment for Statement of Problem and Substantiation for Proposal)

5.  This Proposal Is Original Material. Note: Original material is considered to be the submitter's own idea based on or as a result of his/her own experience, thought, or research and, to the best of his/her knowledge, is not copied from another source.  
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Signature (Required) William H King

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## **PROPOSAL.**

Section/Paragraph: Art. 422, Part IV. Construction, para. 422.XX

Add new paragraph to Part IV of Article 422 as follows:

**Vending Machines.** Cord-and-plug connected vending machines shall comply with one of the following conditions:

- (1) Ground-fault circuit-interrupter protection for personnel. The ground-fault circuit interrupter shall be factory-installed on new and re-manufactured machines, and be an integral part of the attachment plug or be located in the power supply cord within 300 mm (12 in.) of the attachment plug. As an alternative to factory-installed devices, cord-and-plug connected vending machines with plugs rated 125-volt, single-phase, and 20 amperes or less, manufactured prior to January 1, 2005 and not re-manufactured on or after that date, shall be connected to receptacles that provide ground-fault circuit-interrupter protection for personnel.
- (2) Protected by a system of double insulation, or its equivalent.

## **STATEMENT OF PROBLEM AND SUBSTANTIATION FOR PROPOSAL.**

The U.S. Consumer Product Safety Commission (CPSC) has investigated four electrocutions in four separate incidents (CPSC Investigation Nos. 881202CCC1072, 950823CCN2720, 970922CCC2427 & 980402CCC3732), three of which occurred since 1995. Two of the deaths were to children, ages 9 & 10, when they contacted the vending machine. CPSC also investigated three additional incidents with vending machines, cases that involved non-fatal, electric shocks (CPSC Investigation Nos. 940816CEP9009, 950907CWE7273, & 960605CEP9016). In all incidents a vending machine conductor intended to carry current apparently faulted to the exposed frame of the machine, and the ground-fault path was damaged or inadequate.

In addition to the incidents investigated by CPSC, the agency has collected additional reports. One is a death certificate for an individual electrocuted on May 18, 1999 “while working on vending machine.” Eight other reports are from a sample of hospital emergency rooms where patients reportedly received an electric shock while in contact with a vending machine.

Recent publications highlight two electric shock events involving electric vending machines. One article, entitled “Case of the Legal Candy Machine”, was published in the January 2002 edition of “Electrical Construction and Maintenance Magazine” (“EC&M”, published by Intertec, a Primedia Company, Overland Park, KS). An electro-forensic engineering consultant, who found that the candy vending machine had a broken grounding pin on the power cord, wrote this article. The other article, “Vending Machine Accident Underscores NEC Grounding Requirements”, was published in the January/February 2002 edition of “IAEI News”, a publication of the International Association of Electrical Inspectors, Richardson, TX. An attorney, citing evidence that

the vending machine caused severe injuries to a consumer because it was not properly grounded, wrote this article.

Some of the incidents of shock and electrocution are the result of product modification that defeated the grounding feature. However, the ground-fault circuit interrupter (GFCI) does not rely on the presence of a grounding conductor to provide electrocution protection. Vending machines with GFCI protection or a system of double insulation will address the increased risk introduced by tampering with the grounding of the machines and make them safer.

Electric vending machines are often located in damp and wet locations, in public places, and used by people standing on the ground. Under these circumstances, reliance on equipment grounding conductors alone for protection against electrocution is insufficient.

An alternative to a machine provided with GFCI protection is proposed. The alternative is a machine designed to be protected by a system of double insulation, as such systems are defined by nationally recognized standards. This alternative can address concerns about the loss of perishable food products (milk, yogurt, ice cream, ice, etc.) in the event of a GFCI trip.

An alternative to GFCI protection or double insulation may be a program of improved installation guidelines and safety programs for vending machine operators. Such a program should complement, and not replace design improvements for new machines. Installation guidelines could, for example, instruct installers of older machines built prior to the requirement and without GFCI protection or a system of double insulation to connect the machines to receptacle outlets protected by GFCIs.

The material cost for implementing the proposed requirement should not be an impediment to adopting the GFCI protection. The price of a weather resistant, rugged GFCI plug or GFCI in the cord is approximately \$40 (retail). This one time cost when compared with the unit cost of a vending machine and the anticipated service life of the machine (reportedly 10-20 years before obsolescence or re-manufacturing) should be viewed in light of the benefit of protecting consumers from electrocution. The estimated number of electrocutions when consumers come in contact with the 3-4 million machines in use is two per year.

This proposal is submitted to the *NEC* Committee for adoption because the committee membership broadly represents the electrical community that can affect a solution to prevent these deaths in a timely manner on a national scale. The need for improved electrocution protection for consumers from electric vending machines is broader than only upgrading construction requirements applicable to newly manufactured machines. Given the life expectancy of the machines at 10 or more years, and the likelihood that existing machines will be reconditioned or re-manufactured to extend their life, the proposal includes providing electrocution protection for machines built prior to incorporating electrocution protection as part of the machine itself. In accordance with

the proposal, older machines would be connected to receptacle outlets provided with GFCI protection.