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technical bulletin

Municipal Technical Advisory Service
Institute for Public Service, The University of Tennessee
In cooperation with the Tennessee Municipal League

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TRANSIENT VOLTAGE/POWER SURGE SUPPRESSORS

The following report is reprinted in its entirety from a Report by the Council of Better Business Bureaus, Inc., 1150 17th Street, N.W., Washington, DC 20036, dated May 1977.

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Introduction

With the energy crisis that has faced the nation in recent years, numerous products and devices have been marketed that promise to save energy and reduce the costs involved in energy consumption. Joining the growing list of "energy savers" are transient voltage or surge suppressors - devices for use in household and business electrical circuits that many sellers claim will save from 10% to 40% on electric bills.

According to professional electrical engineering organizations, tests by engineering schools and actions by some state attorneys general, there is no merit to the claim that transient voltage and power surge suppressors will reduce electricity costs. This report summarizes the data obtained by the Council of Better Business Bureaus on these devices.

What are they?

Typically, the device is an electrical apparatus consisting of simple electronic components - varistors, diodes and fuses - mounted in an encapsulating material (e.g. epoxy cement), and installed either at the electric service entrance (fuse or circuit breaker panel) to a home or business establishment, or on individual internal circuits.

A function of the devices, which range in price from $150 to $750, is to suppress or "clamp" transient voltage surges caused by such external and internal sources as lightning and the switching on or off of appliances, motors and other electrical equipment.

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It is the transient surges, or over-voltages, of electricity which some sellers claim will be suppressed and dissipated by their devices with a resultant reduction in the use of electrical energy and a corresponding savings in electric bills.

Do they suppress surges?

The electrically significant component in the several devices tested and examined by the sources providing data to the Council of BBBs was a varistor - an electronic resistor selling for as little as 75¢ in quantity lots - that is designed to "clamp" high voltage surges or pulses by absorbing the energy associated with them.

The presence of a varistor or functionally similar semiconductor device, according to our sources, can result in the suppression of transient voltages - but the duration of these transients is so short (generally 0.1 to 100 microseconds) and their energy content so small that the presence of transients would have no measurable effect on either appliance efficiency or energy dissipation.

Do they reduce electric bills?

Tests of various surge suppression devices by such highly regarded institutions and organizations as the Virginia Polytechnic Institute and State University (VPI), Lehigh University, University of Florida, and National Aeronautics and Space Administration (NASA) show that such devices reduce neither power consumption nor electric bills.

The Laboratory Support Services of VPI reported in a test of two devices that they "may well suppress transient voltages and may very well improve power factor, but these are not quantities measured by the residential watt-hour meter and thus could not reduce the watt-hour meter reading, which is the basis for billing by the power company."

A test by NASA's Langley Research Center of a device on circuit with a motor, fluorescent light and a fan revealed that the device "did not result in any power savings."

In tests of the ability of two models of surge suppressors to reduce energy consumption when applied to representative residential and commercial loads, a report by Dr. John G. Kassakian, consulting engineer and professor at the Massachusetts Institute of Technology, concludes for each device that "No measurable increase or decrease in energy consumption attributable to the presence or absence of the _____ device was observed." The report concludes with a "last point worth mentioning" that "if a service entrance is equipped with a (suppression device) and a watt-hour meter capable of responding to voltage transients, any externally generated transients will have already been metered before being dissipated by the (suppression device)."

State regulatory actions

At the time of this report three state attorneys general were known by the Council of Better Business Bureaus to have obtained either permanent injunctions (Virginia, Jan. 7, 1976; New Jersey, April 1, 1977) or a temporary injunction (Texas, April 27, 1977), restraining certain marketers of surge suppressors from representing in advertising and selling that their devices would, among other things, reduce electrical energy consumption and decrease electrical costs.

A significant provision in the New Jersey injunction requires the defendant companies to disclose conspiciously in all retail contracts and distributorship agreements that "THERE IS NO SCIENTIFIC PROOF THAT THE USE OF THIS PRODUCT WILL RESULT IN APPRECIABLE REDUCTION IN ELECTRICAL ENERGY CONSUMPTION." The court permitted the companies to seek modification of the warning "upon a proper showing of scientific evidence to support such modification" after October 11, 1977.

Recommendations

The Council of Better Business Bureaus recommends that any consumers and business establishments considering the purchase of devices for electrical systems, whether or not they are represented to be capable of reducing energy consumption and electric bills, should:

1. Find out from local and state housing and building authorities if the device meets electrical code requirements.

2. Determine whether the device has been tested for hazards to life and property (e.g. electrical, shock, fire) and found safe by a competent and recognized laboratory, such as Underwriters Laboratories Inc. (UL).

3. Consult the local power company for information and advice.

4. Make sure that installation will be made only by a licensed and registered electrician or electrical contractor.

Acknowledgements

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Industry Standards Department

J. K. Orr:csb
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Note - In separate tests, New Bedford Gas, and Edison Light Company tested TVS devices for distortion of watthour meter accuracy. Controlled tests on "HDA Power-Master" and "Power-Mate" were conducted to determine any effects on watthour billing meter accuracy. Results of eight tests showed that the meter recorded identically with and without a TVS device in circuit.