The Product Safety Newsletter

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What's Inside

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A Message from the Editor

The recent world of regulatory compliance is certainly becoming the "Mother of all Information Overloads", to overwork a phrase. If you're not up on the latest on EC 92, EN 60 950, UL 1950, CSA 950, preEN 41003, and the NEC, you're quickly left wondering what century you made the wrong turn. And nothing makes matters worse than meeting with a group of colleagues who discuss paragraph numbers like an IRS agent in an audit. "Para. 2.9.4 isn't superseded by 34.3 until 2001 at which time D3 may be dropped in favor of the more ergonomically sound requirements of 51.4. Don't you agree?" Enough to make you wish you'd chosen Greek Philosophy for a major.

The Product Safety Newsletter exists to help you meet the information demands of our profession. We are well into our fourth year of publication, and thankfully, more than a few of you still want to sign up for another year of insightful developments. Great efforts are being made to keep you up to date on product safety information. Would you mind if I bragged about our staff and contributors? Rich Nute's technical insights and challenges to make us think are unequalled in product safety publications. Dave Edmunds and Dave Lorusso have faithfully sought to keep our readers informed for well over two years. And John McBain does an incredible amount of work keeping the bills paid, the mailing list current and me on time (well...). New to our staff is Ken Warwick. He has ideas that will make you want to resubscribe on time (novel thought!), so that you will not miss a single issue. Of course I must mention his tremendous talent in formatting the last several issues to perfection.

As before, we could use your help. Even one article sent to Dave Lorusso for "PS Abstracts" or a hot safety news item to Dave Edmunds would be appreciated by our hundreds of readers. Won't you take a minute to consider how you could help? You'll help us all deal with an information overload that would scare even an IRS agent.

Roger Volgstadt, Editor

The Product Safety Newsletter

The Product Safety Newsletter is published bimonthly by the Product Safety Technical Committee of the IEEE EMC Society.

Opinions expressed in this newsletter are those of the authors and do not necessarily represent the opinions of the Technical Committee or its members. Indeed, there may be and often are substantial disagreements with some of the opinions expressed by the authors.

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Product Safety Abstracts

Product Safety Abstracts Needed!

Please send your product safety abstracts to:

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"The Harmonization Struggle" was published in the February, 1991, issue of Appliance. The author, Tim Somheil, discusses how international standards are harmonizing steadily but still have the potential to act as trade barriers. Developing standards internationally, including U.S. input into IEC and ISO standards, is described. The need for ISO 9000 Certification and the process is described. The article concludes with a brief description of approvals for the Far East and how Canada and the United States published a harmonized safety standard for air-conditioning equipment.

"Safe Product Management" was published in the February, 1991, issue of Appliance. The author, Lanny R. Terke, explains how a manufacturer can minimize losses in court and explains that an injury doesn't always mean a plaintiff victory. The need for testing and evaluation programs to identify reliability / safety problems is discussed including meeting government and "voluntary" standards. Information is given on the use of safety labels and instructions, records, successful defenses, and post-accident investigations.

"Using UL Specifications to Select Transient Voltage Surge Suppressors" was published in the Premier VI, 1990, issue of Power Quality. The author, Jeff Wright, discusses UL Standard 1449, Transient Voltage Surge Suppressors, requirements and how the UL suppressed voltage rating and surge current rating provide a common standards of comparison.

"Underwriters Laboratories, Safer Products Through Tough Testing" was published in the January, 1991, issue of Mechanical Engineering. The author, Steven Ashley, describes UL services in the area of evaluating electrical and mechanical products for possible hazards and identification on those products that have been safety tested.

"Video Display Terminal and Occupational Health" was published in the December, 1990, issue of Professional Safety. The author, Phil Shield, presents a synopsis on the current body of information as it relates to occupational health and suggested control measures to reduce adverse health effects.

"Power-factor-corrected Switching Power Supplies" was published in the April 11, 1991, issue of EDN. The author, Dan Strassberg, describes the problem, some solutions and reasons for change. Goaded by the IEC and encouraged by IC vendors, firms that make switching power supplies are starting to correct a long-standing problem: their products' propensity to draw nonsinusoidal line currents.

"Selecting Fuses for Electrical Applications" was published in the

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Technically Speaking

TESTING PURPOSES
Every product is subjected to a suite of tests. What are the purposes of these tests?

Often, we just perform the tests as prescribed in a standard, and with whatever conditions are specified by the certification house we are currently dealing with.

I have found that it is worth while to consider not what the standard or certification house requests, but rather what is the "thing" that is being tested, and what is its relevance to the safety of the product.

Let's look at a few of the popular and universal tests that are commonly applied to products.

INPUT TEST:
This test is to measure the input current and input power as a function of input voltage. The product is adjusted or stimulated to consume maximum current or power.

Note that the test has no pass/fail criteria as do most of the other tests. The input current and input power for specified input voltages are recorded.

What do we use the test data for?

Some standards imply the purpose of the test is related to proper sizing and loading of the supply to which the product is connected. Indeed, this is true for permanently connected equipment where the building wiring is specifically installed for the equipment. For plug-and-socket connected equipment, the building wiring is already installed; the issue is whether the building wiring has sufficient capacity to carry the additional load imposed by the product.

However, what is the safety issue? Whether permanently installed or plug-and-socket connected, the building wiring up to the point of product connection, is required by building codes to be adequately protected by circuit breakers or fuses. No matter what load is connected to building permanent wiring for either permanently connected products or plug-and-socket connected products, the installation remains safe.

The usual use of the test data is to evaluate the product rating markings. However, such data is not related to the safety of the product. If the rating markings are incorrect, there is no safety issue. The worst that can happen is nuisance tripping of building overcurrent devices. This, in itself is not a hazard, although remedies to nuisance tripping may result in hazardous situations.

The major safety issue for which we use input test data is to determine the adequacy of the current rating of the various primary circuit components. To prevent overheating, the current ratings of various primary components must be equal to or greater than the primary current. Components that must be considered include the power plug current rating, the power cord wire ampacity rating, the appliance coupler current rating, the fuseholder current rating, the power switch current rating, internal wire ampacity rating, internal connector rating, etc.

Another safety issue related to the input test is the temperature of various insulating materials within the product and the temperature of heated accessible parts on the product. As a general rule, maximum heating occurs when the product consumes maximum power. Thus, the "normal temperature" test should be conducted at the input voltage for maximum power.

However, the power difference as a function of input voltage is usually a low percentage of total power. Unless internal temperatures are

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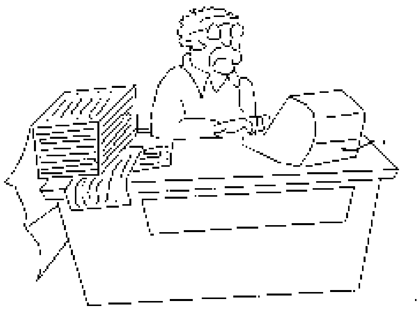
News and Notes



[Our readers are our greatest source of information. We thank you and remind you if you see a news item or an article that may be of interest to the product safety community, please send it to the Product Safety Newsletter, attention: Editor. We will gladly recognize the contribution as yours. -Ed]

Election Results:

The ballots have been counted and the election/nomination results for the officers of TC-8 forwarded to the EMC Society Board of Directors for consideration. At its May meeting in Texas the BOD confirmed: Brian Claes - Chair; Rich Pescatore - Vice Chair; John McBain - Secretary/ Treasurer. Tony Nikolassy who ran for Vice Chair, the only contested position, lost his bid to Rich Pescatore, the former Chairman. Only members of the EMC Society were eligible to run or to vote, since the Product Safety Technical Committee is sponsored by the IEEE EMC Society as one of their Technical Committees (TC-8).

PSTC at the EMC Symposium 1991:

If you attend the Symposium in Cherry Hill, New Jersey, the week of August 12, be ready to get up early on Wednesday, August 14. The Product Safety Technical Committee (TC-8) will be holding its annual meeting from 7:00 a.m. to 8:30 a.m. to review the past year and plan for the next. Comments, questions and especially offers to help are welcome from all attendees. If product safety is part of your responsibility, then you should be part of this meeting!

Call for Papers:

The IEEE International Symposium on EMC will be held at the Anaheim Marriott Hotel in Anaheim, CA, August 18-20, 1992. The IEEE EMC Society seeks original, unpublished papers on all aspects of EMC, which include, but are not limited to, the following categories and topics: Accreditation/Certification, EM Product Safety, Radiation Hazards, Grounding.

Authors' Schedule:
Abstract and Summary (3 copies):
10/15/91
Notification of Acceptance:
12/15/91
Camera-Ready Copy:
3/1/91

Prospective authors should submit a 50 to 75 word abstract and a 500 to 700 word summary with up to five illustrations explaining the contribution, its originality, and relevance to EMC. Upon acceptance, authors will receive manuscript preparation kits.

Abstract and summary should be sent directly to:
George M. Kunkel
Spira Mfg. Corp.
12721 Saticoy Street South
North Hollywood, CA 91605

UL Seminars:

Underwriters Laboratories will conduct a seminar on "Information Technology and UL 1950" September 24-25 in New York and November 19-20 in Tampa, Florida. "Plastics in Electronic and Electrical Products" is scheduled for October 23-24 in Chicago and November 21-22 in Tampa. For more information on either seminar contact Denise Roberts (UL Northbrook, IL) at 708-272-8800 X3444.

New UL Dallas Facility:

The new UL regional "Supercenter", located at 14675 Midway Road, Suite 104, Dallas, TX, combines the staffs of UL's Dallas and Fort Worth inspection centers and will provide engineering services locally. UL engineer Gary Schrempp will be transferred

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The Physiological Effects of Electromagnetic Fields

by Melinda Marks

Recently there has been a great deal of publicity regarding 60 Hz electric and magnetic emissions from high power utility lines and household electrical appliances. To date, there have been three types of studies done to determine the physiological effects of electromagnetic fields (EMF). First, epidemiological studies have been conducted. These studies look for statistical associations between known illnesses and possible causes. Second, there are exposure studies that examine how much a person is exposed to EMF, as well as determine the strength of the fields. Last, there are laboratory studies that expose whole animals as well as single cells and tissues to EMF and observe the results.

All three techniques of research on EMF have been unsuccessful in providing conclusive results regarding whether EMF is hazardous to a person's health. In epidemiological studies, it is impossible to control such variables as genetic and environmental influences. For example, epidemiologists seldom check to determine if their subjects smoke, drink or participate in other activities that could be hazardous to their health. Exposure studies only show statistical information on sources of EMF and contain no information on health outcomes. Laboratory studies frequently expose their subjects to stronger electromagnetic fields than a person would normally encounter. Also, laboratory studies often have no relevance to higher life forms such as human beings.

The above research techniques intend to show adverse effects of EMF. It would be much more useful to devise an experiment or series of experiments that could find that there are no adverse effects of EMF up to a certain level. For my study, there were two basic lines of reasoning. First, to identify a high level of dosage that would be more severe than an ordinary environment. Second, to identify a simple life form that could be monitored to identify the potential physiological damage from EMF. This organism could then be exposed to the high level of EMF, and the detrimental results observed. This would represent EMF's potential for detrimental effects on humans. The goal would be to ultimately understand the mechanism of change, if any, caused by the exposure, and, if a mechanism were not found, to be able to conclude that such radiation is not harmful.

The first step of my study was to visit Sun Micro-systems to observe how EMF is measured. Under the supervision of Mr. Tony Fredriksson, PE, I used a magnetic field-measuring instrument (the Cambinova MFM 10) to compare the fields of two VDT's. Mr. Fredriksson suggested that a degaussing coil might be a convenient source of 60 Hz EMF. We measured in excess of 1500 microTeslas adjacent to the degaussing coil. This compares to the Swedish specifications of .250 microTeslas 50 cm away from the face of a monitor.

Dr. John Zupan of Berkeley's Genetics Department suggested that Escherichia coli would be a suitable organism that would illustrate an alteration of the DNA structure that would be an indication of EMF's potential for causing cancer. If bacteria exposed to an electromagnetic field reproduced at the same rate as a control group, this would indicate that the bacteria's DNA was not damaged.

Thus, to determine the physiological effects of EMF, two experiments were conducted. The first illustrated the effects of bacteria exposed to the field at different distances from the degaussing coil. Because the radiation decreased rapidly farther away from the source, I wanted to see if adverse effects on the bacteria would diminish as a function of distance from the coil. The second experiment was done to determine the effects on different samples of bacteria exposed to the coil for different lengths of time. The control groups for both of these experiments were in a different room with no nearby sources of EMF, and at the same temperature as the test environment. The bacteria were exposed to the field while in lubriobroth. After exposure, the bacteria were transferred to petri dishes, and the colonies that grew

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A Call for More Scientific Truth in Product Warning Labels

by Susan Hewitt
and Edward Subitzky

As scientists and concerned citizens, we applaud the recent trend towards legislation that requires the prominent placing of warnings on products that present hazards to the general public. Yet we must also offer the cautionary thought that such warnings, however well- intentioned, merely scratch the surface of what is really necessary in this important area. This is especially true in light of the findings of 20th century physics.

We are therefore proposing that, as responsible scientists, we join together in an intensive push for new laws that will mandate the conspicuous placement of suitably informative warnings on the packaging of every product offered for sale in the United States of America. Our suggested list of warnings appears below.

WARNING: This Product Warps Space and Time in Its Vicinity.

WARNING: This Product Attracts Every Other Piece of Matter in the Universe, Including the Products of Other Manufacturers, with a Force Proportional to the Product of the Masses and Inversely Proportional to the Distance Between Them.

CAUTION: The Mass of This Product Contains the Energy Equivalent of 85 Million Tons of TNT per Net Ounce of Weight.

HANDLE WITH EXTREME CARE: This Product Contains Minute Electrically Charged Particles Moving at Velocities in Excess of Five Hundred Million Miles Per Hour.

CONSUMER NOTICE: Because of the "Uncertainty Principle," It Is Impossible for the Consumer to Find Out at the Same Time Both Precisely Where This Product Is and How Fast It Is Moving.

ADVISORY: There is an Extremely Small but Nonzero Chance That, Through a Process Know as "Tunneling," This Product May Spontaneously Disappear from Its Present Location and Reappear at Any Random Place in the Universe, Including Your Neighbor's Domicile. The Manufacturer Will Not Be Responsible for Any Damages or Inconvenience That May Result.

READ THIS BEFORE OPENING PACKAGE: According to Certain Suggested Versions of the Grand Unified Theory, the Primary Particles Constituting this Product May Decay to Nothingness Within the Next Four Hundred Million Years.

THIS IS A 100% MATTER PRODUCT: In the Unlikely Event That This Merchandise Should Contact Antimatter in Any Form, a Catastrophic Explosion Will Result.

PUBLIC NOTICE AS REQUIRED BY LAW: Any Use of This Product, in Any Manner Whatsoever, Will Increase the Amount of Disorder in the Universe. Although No Liability Is Implied Herein, the Consumer Is Warned That This Process Will Ultimately Lead to the Heat Death of the Universe.

NOTE: The Most Fundamental Particles in This Product Are Held Together by a "Gluing" Force About Which Little is Currently Known and Whose Adhesive Power Can Therefore Not Be Permanently Guaranteed.

ATTENTION: Despite Any Other Listing of Product Contents Found Hereon, the Consumer is Advised That, in Actuality, This Product Consists Of 99.9999999999% Empty Space.

NEW GRAND UNIFIED THEORY DISCLAIMER: The Manufacturer May Technically Be Entitled to Claim That This Product Is Ten- Dimensional. However, the Consumer Is Reminded That This Confers No Legal Rights Above and Beyond Those Applicable to Three-Dimensional Objects, Since the Seven New Dimensions Are "Rolled Up" into Such a Small "Area" That They Cannot Be Detected.

PLEASE NOTE: Some Quantum Physics Theories Suggest That When the Consumer Is Not Di-

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Hazardous Materials: Not Exactly a Transport of Delight

by Paul Quickert
Hewlett Packard

This article is devoted to the following U.S. regulatory action:

HM 181, PERFORMANCE ORIENTED PACKAGING STANDARDS; CHANGES TO CLASSIFICATION, HAZARD COMMUNICATION, PACKAGING AND HANDLING REQUIREMENTS BASED ON UN STANDARDS AND AGENCY INITIATIVE; FINAL RULE

EFFECTIVE DATE: October 1, 1991 (Federal Register date: December 21, 1990).

Background:
The U.S. Department of Transportation has amended the Hazardous Materials Regulations (HMR, Title 49, Code of Federal Regulations) to bring them in line with United Nations Recommendations for the Safe Transport of Dangerous Goods. This will affect all U.S. surface shipments of Hazardous Materials (including Hazardous Wastes and Hazardous Substances).

The overriding reason for this action is that, as the HMR evolved, no systematic plan was employed in its development. This dates back to the late 1800's when dynamite was a necessary commodity in the push westward, and as you can guess, the related transportation needs of such explosives were a prime concern for the railroads. They had enough to worry about dealing with bandits who blew up trains, and didn't need the added burden of exploding freight. The regulatory process was initiated, and has remained in a reactive, rather than proactive mode.

In 1974, DOT's first formal charter was expressed by Congress in the Hazardous Materials Transportation Act: "To protect life, property and the environment by establishing a system which would ensure the safe transport of hazardous materials". Unfortunately, old habits die hard, and the HMR continued to be caught up in the bureaucratic mire of piecemeal "knee-jerk" rule making. Time to start over...

The goal stemming from DOT's initial discussions regarding the adoption of the UN Recommendations was to simplify the HMR, reduce the volume of regulations, provide greater flexibility in the design and construction of hazardous materials packaging (based on advances in packaging technology), reduce the need for DOT exemptions, and facilitate international commerce.

Major New Provisions:

* Consolidation of Hazardous Material Tables 171.101 and 171.102 into one table. The new table is shown in the final rule as 172.102, however, this reference is inconsistent with other references made to the new table, and will most likely be amended to read 171.102.

* Elimination of 100 packaging specifications.

* Changes the authorized Units of Measure to the Metric System, however standard U.S. measurements will be allowed on an interim basis (171.6).

* Hazard Class definitions aligned with the UN Recommendations and use the same numerical Hazard Classes. Certain DOT Hazard Classes such as Combustible Liquid and ORM-D will be retained (172.101).

* Hazardous Materials descriptions (Proper Shipping Names) aligned with UN Recommendations, except in certain instances where shipping description is unique to U.S. transportation are retained (172.101).

* Hazard Communication standards are included for the identification of gases with a poison inhalation hazard (in addition to current regulations for liquids) (172.203).

* Packaging requirements for material based on Packing Group, vapor pressure and compatibility of packaging and hazardous materials.

* Materials packaged under the International Maritime Dangerous Goods Code (IMDG) are

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Designing Ventilation Grills for Electronic Equipment

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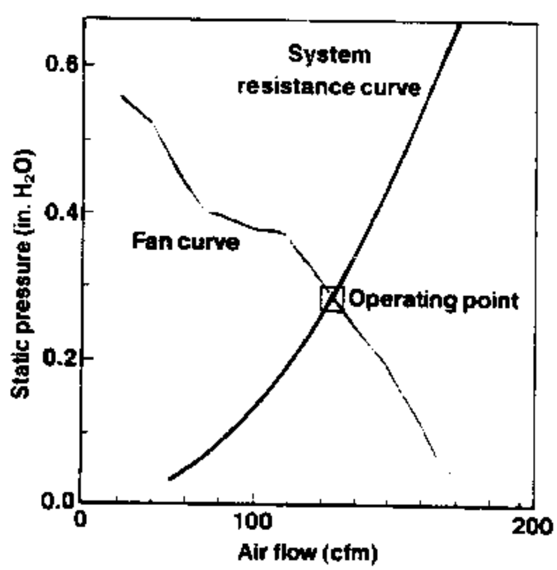
Grille design is often a compromise of conflicting requirements for cooling capacity, safety and EMI.

Everyone knows that high temperature is the major nemesis of electronic equipment. Every 15°C rise in junction temperature of a typical semiconductor approximately doubles the failure rate of that component. It's no wonder, then, that thermal analysis and cooling system design should be a major part of electronic equipment design.

However, designers of this equipment are faced with a dilemma. Free, unrestricted air flow is the best and least expensive way to remove heat from electronic components. But parts must be encased in enclosures to protect them from the environment, guard personnel from shocks, and prevent electromagnetic interference with surrounding equipment. This interferes with the free flow of air over components, and temperatures inside enclosures can rise to levels that endanger the electronics.

As a compromise, enclosures normally include some type of ventilation openings that permit some flow of air over components. Openings come in many variations such as louvers, slots, holes, and screens. But opening selection and design is not just a matter of styling. Serious concerns about cooling capacity, safety, and electromagnetic interference come into play when designing a ventilation grille. These considerations often conflict, and the final selection is often a balance of all three requirements.



Cooling

In a typical enclosure, heat is transferred by convection to a cooling fluid moving across a surface. In natural convection, the driving force moving the fluid is the buoyancy caused by thermal expansion; that is, hot air rises. The fluid most commonly used in electronic cooling is air because it is abundant, nontoxic, and clean. Other fluids such as water and freon are used occasionally if extremely high power dissipation or localized hot spots must be handled.

Both sealed and ventilated enclosures can be cooled by natural convection. However, heat removal from a sealed enclosure is limited by the lack of effective heat transfer paths from hot internal components to exterior surfaces in a sealed enclosure, internal temperature rise is inversely proportional to the external surface area available for convection.

If enclosure surface area is limited, ventilation holes can be used to improve heat transfer. Ventilated enclosures can be cooled by natural convection if heat concentration in the enclosure is below about 0.15 W/in^3. Additionally, circuit boards should have power dissipation below about 0.12 W/in^2 to maintain acceptable temperatures. Forced-air cooling generally is required if these values are exceeded.

Grille area is critical in an enclosure

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very close to their ratings, the actual input voltage at which the temperature test is conducted is not usually significant.

(Some certification houses assert that maximum temperature of some devices within products is not related to maximum input power; in such cases, only the certification house can specify the input voltage at which temperatures should be determined.)

(Other certification houses specify the input voltage at which the temperature test is to be conducted regardless of power.)

The purposes of the input test are:

1. Determine whether the rating markings are acceptable.
2. Determine whether the primary components are suitably rated.
3. Determine the input voltage at which the temperature test should be conducted.

LEAKAGE CURRENT TEST:
For grounded products, this test is to measure the current in the protective grounding conductor. For two-wire products, the test is to measure the current between accessible conductive parts and ground.

In some cases, leakage current is measured following humidity treatment. Why should humidity affect leakage current?

This test has pass/fail criteria which are specified in the standard to which the product is evaluated. The measured value is recorded and compared with the standard.

Often, the purpose of the test is purported to be that of determining whether an electric shock is possible in the event of an open ground, or from accessible conductive parts of a two-wire product.

To identify the purpose of this test, let's look at what one would do to address a problem of excessive leakage current. Or, putting the question another way, what does one do in the design of a product to control or minimize leakage current (ignoring EMI suppression capacitors)?

To control leakage current, we must first know the source of the leakage current. Since there are no electrical components connected to the ground circuit (or to accessible conductive parts), where does the current come from? The current comes from the stray capacitance between the primary circuit and the ground circuit (or to accessible conductive parts). The dielectric of this stray capacitance is the insulation between the primary circuit and the ground circuit (or accessible conductive parts).

Therefore, to control leakage current, one must minimize the stray capacitance of the primary circuit. This is done by increasing the distance between the two plates of the capacitor (increasing the distance between the primary circuit conductors and grounded or accessible parts).

Some insulations may be hygroscopic (i.e., may absorb moisture). The presence of moisture within an insulator will alter the overall dielectric constant, thus increasing the value of capacitance. If the value of capacitance increases, so will the value of leakage current. Therefore, some standards specify humidity treatment prior to the measurement of leakage current.

The purpose of the leakage current test is:

1. Determine whether the insulation from the primary circuit to grounded or accessible parts is adequate to prevent electric shock.

DIELECTRIC WITHSTAND (HI-POT) TEST:
This test applies a relatively high voltage between the primary circuits and the protective grounding conductor. For two-wire products, the high voltage is applied between the primary circuits and accessible conductive parts (or foil wrapped around accessible non-conductive parts).

In some cases, the test follows humidity treatment. Why should humidity affect this test?

This test has pass/fail criteria which are specified in the standard to which the product is evaluated. Note that this is not a measurement in that no value of any parameter is recorded.

What is the safety purpose of this test?

To answer this question, we need to identify what part fails when the product fails the test and we need to identify the consequences of that part failure.

Since we are applying a voltage between the primary circuits and the grounding circuit (or accessible conductive parts), the part we are testing is insulation. The insulation between any point of the primary circuit and the grounding circuit is either solid or air, or both solid and air in series.

In the event of a hi-pot failure, there is a failure of either the solid insulation or the air insulation. If the failure is solid insulation, then a conducting path is impressed upon the surface or through the solid insulation, and the insulation is destroyed catastrophically, becoming a resistor of indeterminate value. The resistance may be sufficiently low value to allow an electric shock to occur.

If the failure is air insulation, then a conducting path exists for the duration of the test. When the high voltage is turned off, the system returns to normal because air is a renewable insulation. A shock could exist for the duration of a primary circuit overvoltage.

So, the failure of the primary-circuit-to-ground insulation could result in an electric shock.

But, why test with a voltage often more than 10 times the rated input voltage?

Inductors have the property of storing energy in magnetic fields. Usually, energy in magnetic fields is converted to some other energy form such as the kinetic energy of a rotating shaft (of an electric motor). Occasionally, magnetic energy is released as a high-voltage impulse into the power distribution system. Such releases are normal (e.g. - during the starting process of an electric motor).

Because high-voltage impulses are impressed upon the power line, all insulations on a power distribution system (including product internal insulations) must have sufficient electric strength to withstand not only the normal system operating voltage, but also the normal system overvoltages. Consequently, product mains-to-ground insulations must be tested with a high voltage to confirm that the insulations will not break down when subjected to high-voltage impulses, which normally occur on power distribution systems.

For type-testing, there is merit in converting this test from a pass/fail test to a measurement of the breakdown voltage of the weakest insulation in the product. This is done by increasing the voltage until breakdown occurs, recording the voltage, and examining the unit to identify the failed insulation. This tells you the margin between the required electric strength and the actual electric strength. It also tells you what the weakest insulation is. This is valuable information in the event of a failure of the production line hi-pot test.

Some authorities now advocate that the weakest insulation should be a specific air insulation especially installed in the product, where the breakdown voltage of that air insulation is less than that of the weakest solid insulation. This construction has the advantage of protecting the solid insulation from catastrophic breakdown in the event of ANY overvoltage. The breakdown voltage of the air insulation can be set at any convenient value.

However, safety standards authorities and certification house authorities commonly do not permit breakdown of either air or solid insulation at any value less than that specified in the standards.

The purposes of the dielectric withstand (hi-pot) test are:

1. Determine whether the insulation from the primary circuit to grounded or accessible parts has sufficient electric strength to withstand the worst-case overvoltage which could occur in service.
2. Determine the insulation with the least value of electric strength.

TEMPERATURE TEST:

This test is to measure the normal operating temperatures of various components and materials. (For the moment, we will ignore the fact that some standards specify measurement of temperatures under fault conditions.)

The measured temperatures are compared with maximum temperatures specified in the standard.

Why do we measure temperatures? What is the safety consequence of a component or material exceeding the temperature specified in the standard? How do we choose what components and materials to measure? Why does the standard specify some components and materials and not other components and materials?

Probably the most obvious reason to measure temperatures is to prove that accessible parts are not hot enough to cause a burn injury.

But what is the purpose of measuring internal product temperatures?

All components and materials will fail as a function of temperature. Products commonly use metals for conductors and for structure. For metals, the temperature for failure of either the conductor function or the structural function is sufficiently high that it can be ignored.

However, products also commonly use thermoplastic for insulation and for structure. For thermoplastics, the temperature for softening can be of the same order as the normal temperature for power dissipating components such as power resistors and power semiconductors. If the structural function of a thermoplastic is weakened, so, too, may be its insulating function. Failure of an insulator may result in electric shock or electrically caused fire.

Therefore, we need to measure temperatures of thermoplastic insulations and thermoplastic structural parts (assuming the failure of the structural parts will result in a hazard — which usually will be the case).

Examples of thermoplastic insulations are wire insulations, connector bodies, transformer bobbins (including EMI filter coil forms), and sheet insulations.

Other materials may exhibit chemical change as a function of temperature. If such materials are used as insulators, then we must ascertain that the material operating temperature is less than that at which the chemical change occurs. (The chemical change may also alter the material's insulating characteristics.)

An example of a material which incurs a chemical change as a result of being subject to a high temperature is the epoxy of a glass-epoxy circuit board.

Some components, when heated, can evolve a gas. If the component is sealed, the pressure due to the evolved gas can cause a catastrophic rupture of the container. Some containers will release such pressure in the form of an explosion, while others will release the pressure gradually. An explosion could result in an injury.

Examples of sealed components which can evolve a gas when heated include electrolytic capacitors and sealed batteries. Today, most electrolytic capacitors incorporate pressure relief mechanism which prevent explosion. Nevertheless, we still measure and control the temperatures of electrolytic capacitors and batteries.

Often, rather than measure the temperature of the material, we measure the temperature of the heating device, such as a transistor or diode. In this case, we get a worst-case measurement, where the insulation associated with that component can never achieve the temperature of the heating device.

Such a measurement accounts for misrouting of wires in case they should bear against the heating device.

The purpose of the temperature test is:

1. Determine whether materials are subject to a temperature at which they are likely to fail, where such failure would result in a hazardous condition.

CONCLUSION:
Obviously, we could continue this discussion to cover a large number of tests. But, I believe these four tests are sufficient to illustrate the point.

Too often, we just test the product, and record the data.

I believe it is useful, for each test, to consider the consequences of failure of that test, and what one would do to the equipment to make it pass the test. This exercise forces one to consider what is being tested, and how it fits into the "big picture," the overall set of components that make the product safe.❁

News Items Needed!

If you see a new item that would be of interest to the product safety community, won't you take a minute to send it to:

Dave Edmunds
c/o Xerox Corp.
(MS 843 1GS)
800 Phillips Road
Webster, NY 14580
(fax 716-422-7841)

—or—

Roger Volgstadt
c/o Tandem Computers Inc
10300 North Tantau Ave
Loc 55-53
Cupertino, CA 95014
(fax 408 285 2553)

Scientific Truth
Continued from page 7

rectly Observing This Product, It May Cease to Exist or Will Exist Only in a Vague and Undetermined State.

COMPONENT EQUIVALENCY NOTICE: The Subatomic Particles (Electrons, Protons, etc.) Comprising This Product Are Exactly the Same in Every Measurable Respect as Those Used in the Products of Other Manufacturers, and No Claim to the Contrary May Legitimately Be Expressed or Implied.

HEALTH WARNING: Care Should Be Taken When Lifting This Product, Since Its Mass, and Thus Its Weight, Is Dependent on Its Velocity Relative to the User.

IMPORTANT NOTICE TO PURCHASERS: The Entire Physical Universe, Including This Product, May One Day Collapse Back into an Infinitesimally Small Space. Should Another Universe Subsequently Re-emerge, the Existence of This Product in That Universe Cannot Be Guaranteed.

Hazardous Materials
Continued from page 8

acceptable for Inland Transport away from the immediate port area (171.12).

* Non-bulk packaging must be capable of withstanding a vibration test in addition to other performance tests to address transportation conditions not taken into account by the UN tests (173.24a).

* Reuse of plastic and metal drums linked to minimum thickness requirements to insure that reused packages are capable of withstanding rigors of transportation. Minimum thickness requirements would substitute for lack of performance test in UN standards for puncture resistance, abrasion resistance, and metal fatigue (173.28).

* For materials with a poison inhalation hazard packaging is enhanced and in some cases made more restrictive.

* To correct shortcomings in the UN System, specific criteria are included for defining categories which are poison inhalation hazards under Division 2.3 (173.115).

* Packaging Manufacturers are required to notify in writing of any packaging shortfalls or steps the user must take to conform with the applicable specifications (178.2).

* A transition period has been established to phase in the new packaging requirements. Packaging authorized as of September 30, 1991, may continue to be used until October 1, 1996. Packaging made obsolete by the new regulations may continue to be manufactured until October 1, 1994. There is no transition period for packaging containing materials classified as poison inhalation hazard.

Use Of The Regulations:
During the transition period the shipper may continue to use the same packaging authorized in the 1990, 49- CFR. The shipper also has the option of classifying and describing materials with the exception of new explosives, infectious substances and poison inhalation hazards by using either the criteria in the 1990, 49- CFR or the 1991, 49-CFR. New explosives, infectious substances and poison inhalation hazards would be classified and described by using the new regulations. To maintain consistency, if the material is described on the shipping papers in accordance with the new requirements (1991, 49-CFR), the markings, labels and placards must conform to the new requirements.

Impact on the use of Exemptions:
Packaging exemptions will be gradually phased out due to the new performance based standards. The Federal Register contains a list of exemption numbers expected to be affected by the New Standards.

Changes In Hazard Class Worth Noting:
Class 2, Gases: This hazard class is divided into three categories, 2.1 Flammable gas, 2.2 Non-Flammable gas, and 2.3 gases poisonous by inhalation.

Div 2.1, A Material which is a Gas A 20°C (68°F) or less and is ignitible at 101.3 kPa (14.7 psi) when in a mixture of 13 percent or less by volume with air, or has a flammable range at 101.3 kPa (14.7 psi) with air of at least 12 percent regardless of lower limit.

Div 2.2, Exerts in the packaging an absolute pressure of 280 kPa (41 psi) at 20°C (68°F) and does not meet the definition of 2.1 or 2.3.

Div 2.3, poison by inhalation.

Class 3, Flammable Liquid: A liquid with a flash point of not more than 60°C (140°F). This is higher than the current DOT definition of less than 100°F, and lower than the UN definition of 60.5°C (141°F) (this is inconsistent with DOT's intent and will most likely be amended to match the UN definition). The new definition of a Combustible Liquid is a material with a flash point above 60°C (140°F) and below 93°C (200°F). Except when offered for transportation by air or vessel a Flammable Liquid with a flash point at or above 38°C (100°F) that does not meet the definition of another hazard class may be reclassified as a Combustible Liquid.

Class 8, Corrosive Material: Same as the ICAO/IATA regulations.

Limited Quantity Exceptions:
Specific amounts of certain hazardous materials are excepted from the specification packaging requirements. Note that these limits are larger than the IATA/ICAO Excepted Quantity and Limited Quantity provisions.

Hazardous Material Table:

Several changes have been made to the Hazardous Material Table listed are the new columns.

Column 1, Symbols: In addition to the current symbols of "A", "+", and "W" two new symbols have been added to column 1. These symbols are "D" and "I", the letter "D" identifies proper shipping names which are appropriate for domestic but may be inappropriate for International Shipments. An alternate proper shipping name may be selected when only domestic transportation is included.

Column 2, Proper Shipping Names: While some proper shipping names will change, the use of this column remains the same. Only names in Roman type are to be used.

Column 3, Hazard Class: Instead of words to describe the hazard class a number will be used. Example Corrosive Material will be "8". The only hazard class not to use a number will be Combustible Liquids.

Column 4, Identification Number: No changes.

Column 5, Packing Group: Use of the IATA Packing Groups for all material except for Class 1, 2, and 7, Combustible Liquid, and ORM-D.

Column 6, Labels: Specifies the label to be placed on the package.

Column 7, Special Provisions: Contains specific codes applicable to hazardous materials. The meanings of these provisions are contained in the regulations following the Hazardous Material Table.

Column 8, Packaging Authorizations: This column is divided into three separate columns, 8A is for exceptions, 8B is for non-bulk packagings, and 8C is for bulk packagings.

Column 9, Quantity Limitations: This column contains the maximum amount per package for shipment by passenger and cargo aircraft.

Column 10, Vessel Storage Requirements: This column is only used if the shipment is being sent by boat.

New Documentation Requirements:
Because of the changes being made to the regulations the way shipping papers are prepared have also changed. The following is the new requirement for the basic description:

1. Proper Shipping Name
2. Hazard Class or Division Number (class names may be added in parentheses after the hazard class number)
3. Identification Number
4. Packing Group number preceded by the letters "PG"
5. Total quantity by weight or volume.

Technical Names may be included in parenthesis between the proper shipping name and hazard class number.

Example of Basic Description: Corrosive Liquid, N.O.S. (Nitric Acid), 8 (Corrosive Material), UN1760, PG II, 1L

These are just some of the changes in the new regulations. We expect that numerous amendments will be made to the final rule.

Training Requirements:
Regulatory training requirements cover all persons who are responsible for making compliance related decisions, or who write compliance related procedures which others will follow.

Each individual required to receive training must establish and maintain a working knowledge of the regulations. Recurrent training specific to each area of regulation is required every two years.

Vents
Continued from page 9

cooled by natural convection. Even in well-designed enclosures, inlet and exhaust grilles each typically contribute about one-third of the pressure drop created by the air movement through the enclosure.

A rough estimate of inlet and outlet grille area, in^2, can be made from

$$A_i = 0.3 \frac{Q}{P_A + P_i} \sqrt{\frac{T_i + 460}{h \Delta T_3}}$$

Where Q = heat dissipation inside the enclosure; W; PA = ambient air density, lb/ft^3; pi = air density inside the enclosure, lb/ft^3; h = height difference between inlet and outlet grilles, ft; DT = required air temperature rise, °F. Ambient temperature TA, and the preferred temperature inside the enclosure Ti must be known. Outlet area is larger than inlet because air expands as it warms; therefore, a larger outlet grille is required to maintain air flow while limiting velocity. For high-altitude operation, open area must be increased to compensate for the reduced air density.

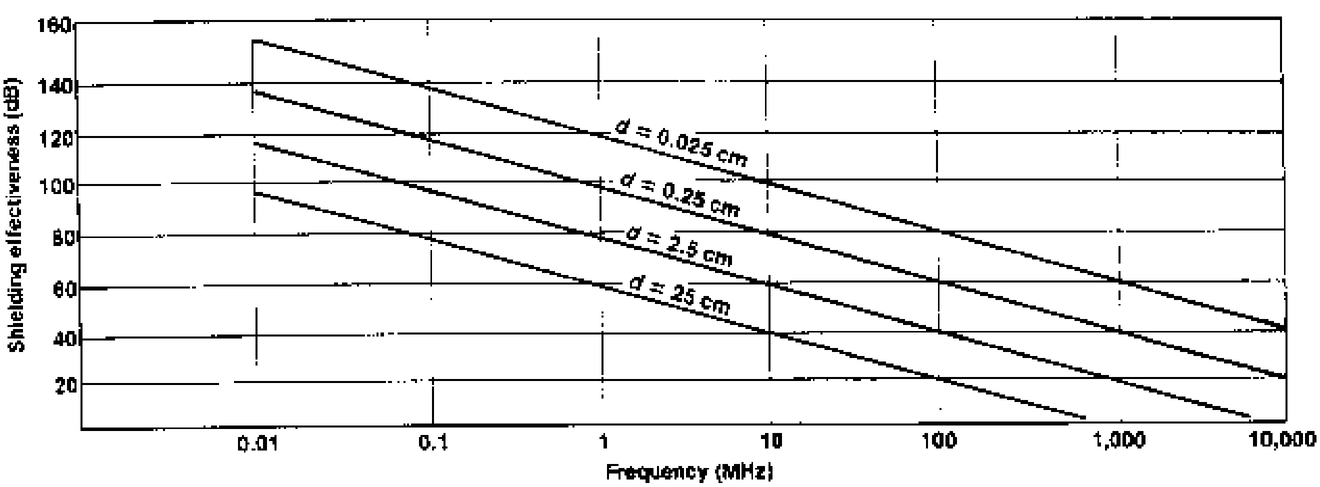
The air flow path should be designed to minimize sharp turns and restrictions. Also, hot components should be placed near the outlets. The flow path must have a clear route, and trapping air in horizontal chambers should be avoided.

The equations are approximate, are valid only for air temperature of 0 to 150°F, and should be used only for guidance to design an enclosure using natural convection cooling. Prototypes should always be tested to verify that the design temperature rise is not exceeded. Computer programs and consulting services are available to help design and test natural convection cooled enclosures.

In forced convection, a fan or blower creates a pressure gradient causing air flow. The air flow F to cool an enclosure at standard conditions is

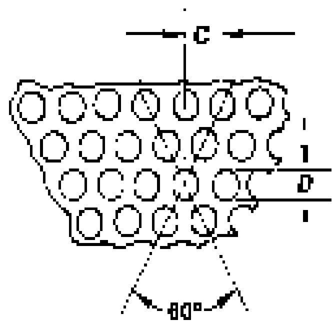
For lower density air, flow must be increased proportionally. Typical electronic equipment specifications limit air temperature rise to 18 or 20°F (10 or 11°C).

Airmover performance is described by a fan curve, which plots static pressure vs. air flow. At high flows, little pressure is available; at high



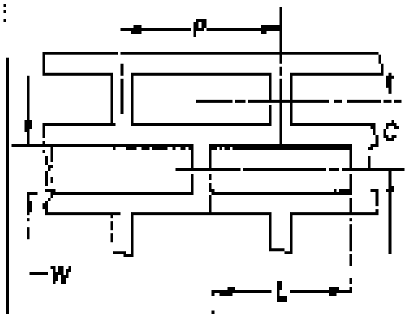
Longer slots in cooling grilles (length d) are less effective at all frequencies of EMI shielding. *A suitable slot length normally can be found for any required shielding of a particular frequency.*

PERFORATED METAL AND METAL SCREEN FOR VENTILATION GRILLES



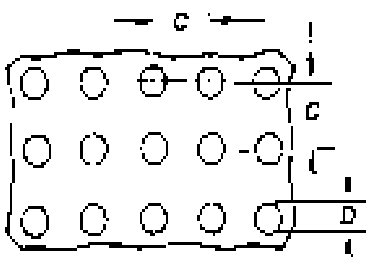
Staggered round holes

$90.69\, D^2/C^2$



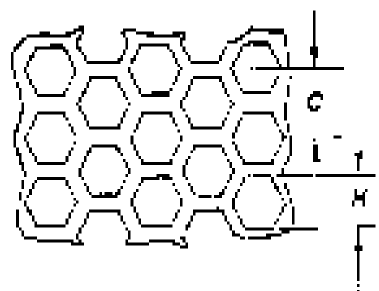
Slotted holes (staggered or straight)

$100\, LW/PC$



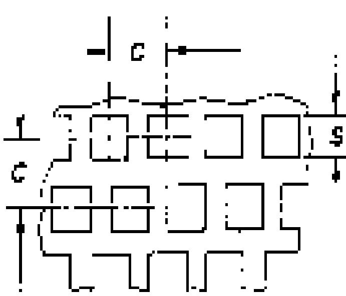
Straight round holes

$78.54\, D^2/C^2$



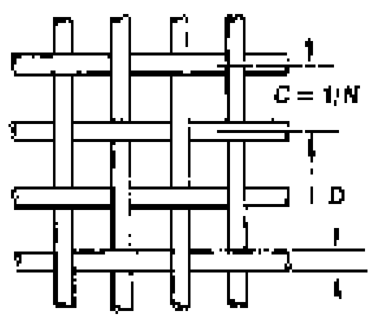
Hexagonal holes

$100\, H^2/C^2$



Square holes (staggered or straight)

$100\, S^2/C^2$



Square mesh wire screen

$100\,(1 - ND)^2$

N = meshes per inch
D = wire diameter

Perforated metal is available in round, square, and hexagonal holes as well as rectangular slots. Holes may be on straight centers or staggered to allow closer packing of holes and greater open area. The Industrial Perforators Association (Milwaukee, WI) has standardized a number of hole patterns.

Perforated metal thickness is limited by the punched hole size. In carbon steel and aluminum, sheet thickness cannot exceed the minimum hole diameter. In harder materials, such as stainless steel, thickness should be at least one gage thinner than the minimum hole diameter. Open area, as percentage of total area, can range from 2 to 80%, although 60% is the practical maximum.

Metal screen materials range from copper and brass to stainless steel with open areas from 10 to 70%. Mesh sizes with openings down to 0.001 in. are available.

Dimensions and open area of IPA standard perforations

IPA Number	Hole Size (in.)	Center Distance (in.)	Open Area (%)
	60 degree staggered round holes		
106	1/16	1/8	23
107	5/64	7/64	46
108	5/64	1/8	[illegible]
109	3/32	5/32	33
110	3/32	3/16	23
111	3/32	1/4	13
112	1/10	5/32	[illegible]
113	1/8	3/16	40
114	1/8	7/32	30
115	1/8	1/4	23
116	5/32	7/32	46
117	5/32	1/4	35
118	3/16	1/4	51
119	3/16	5/16	33
120	1/4	5/16	58
121	1/4	3/8	40
122	1/4	7/16	30
123	1/4	1/2	23
	Square holes		
200	2/10	1/4	64
201	1/4	3/8	44
	Slotted holes		
207	1/8 × 3/4		41
208	1/8 × 1		42

pressures, low flows are available. A system resistance curve shows the pressure drop required for a given air flow through a particular device. The system resistance curve takes the form

$$P = kF^n$$

where *P* = static pressure and *k* = constant. Exponent *n* ranges from 1.8 to 2 depending on equipment design.

Static pressure generated by a known air flow is measured to determine the resistance curve for a system. However, this measurement requires test equipment usually available only in specialized air flow laboratories.

The intersection of the fan curve and the system resistance curve is the system operating point. This indicates the flow and static pressure reached by a particular fan and enclosure.

$$V = F/A$$

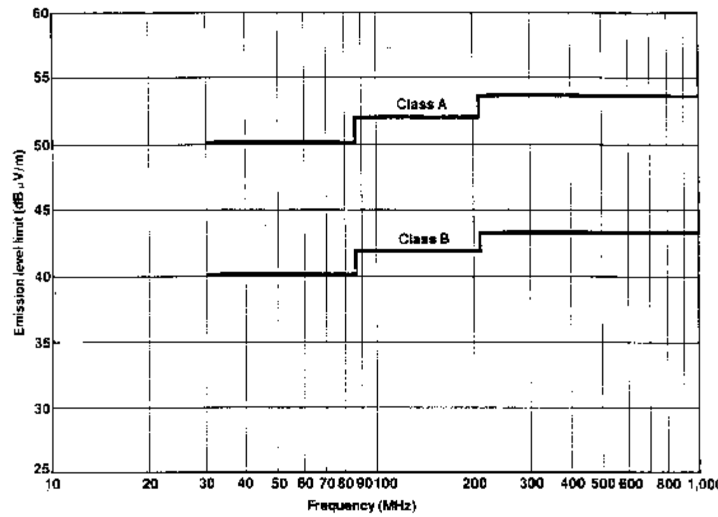
where *A* = duct cross-sectional area, ft^2; *F* = volume flow rate; and *V* = average air velocity, fpm. Pressure drop through a perforated grille or metal screen is

$$Ðp = K_t\,(1/2pV^2)$$

Pressure drop coefficient *Kt* varies with open area. Metal screens create a lower pressure drop for a given open area than perforated grilles because of their smoother edges. A simplified equation for air at standard conditions is

$$Ðp = 1.29\,(10^{-3})K_t\,(F/A^*)^2$$

where *A** = grille impact area, in^2, and *Dp* = pressure drop, in. H_2O. Impact area is total grille area, not just open area.



FCC limits electromagnetic interference at various frequency ranges according to residential (Class B) or nonresidential use. These limits must be considered in ventilation grille design.

Shielding effectiveness for various perforations

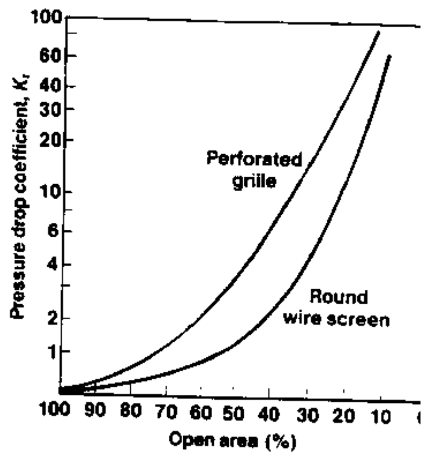
Hole diam (in.)	60° Center spacing (in.)	% Open area	Thick-ness (in.)	Mat'l	Shielding effectiveness (dB) 30MHz	100MHz	300MHz	1GHz
0.055	0.093	31	0.050	Al	68	79	78	75
0.065	0.109	32	0.050	Al	62	70	65	67
0.062	0.125	23	0.025	Al	61	71	59	61
0.068	0.250	6.7	0.060	Al	66	79	78	78
0.078	0.125	34.4	0.050	Stl	61	72	64	62
0.100	0.1875	25.9	0.040	Al	58	70	62	56
0.125	0.1875	40	0.032	Al	48	56	48	46
0.125	0.1875	40	0.060	Stl	53	64	49	53
0.125	0.1875	40	0.125	Al	66	68	64	66
0.125	0.250	22.5	0.040	Al	56	68	56	54
0.156	0.1875	63	0.036	Stl	42	46	39	38
0.156	0.218	46	0.050	SS	49	56	46	45
0.1875	0.250	50	0.060	SS	47	50	44	42
0.1875	0.375	22.5	0.040	Al	50	58	50	46
0.1875	0.500	12.8	0.040	Al	56	69	56	52
Dynamic range of test system					70	79	80	94

If the air flow contracts suddenly at the same point as the grille, an additional factor must be added to the *Kt* factor. For inlet grilles mounted on the enclosure surface, 0.50 should be added to the chart value for *Kt* .

Pressure drop through louvers can be roughly estimated based on open area, using the grille method. Pressure drop will always be greater for louvers than perforated material because of momentum lost in turning the air. Designs should be tested to verify expected pressure drops.

To reduce pressure drops through an enclosure, the open area percentage and total area of ventilation openings should be increased. Sharp turns, air flow restrictions, and the number of air flow direction changes should be minimized.

Initially, grille open area, in^2, is sized to limit maximum air velocity through the openings to 400 fpm,



using

$$A \bullet 0.36\ F.$$

Electromagnetic interference

EMI includes electromagnetic energy radiated from computers and other microprocessor-controlled equipment. The interference can cause problems with adjacent equipment by generating electrical noise and unwanted information signals. EMI may leave (or enter) equipment through power lines, system interconnect cables, or directly through openings in the enclosure.

EMI can cause more problems than simple radio interference. Operation of automated equipment or other sophisticated electronics may be affected.

Because of unwanted computing equipment interaction with broadcast equipment, the Federal Communications Commission (FCC) mandated frequency limits on such devices. Canada, Germany, Japan, and the European Standards Harmonization Organization (CENELEC) have similar but slightly different rules and regulations.

Conducted EMI can be reduced with line filters. Radiated EMI is diminished by using lower clock speeds. decoupling signal lines with capacitors, and using ground planes in printed circuit boards. Even with this source reduction, most designs will need some quieting of radiated EMI. Ventilation holes, while providing open cooling areas, must be designed carefully to reduce EMI.

FCC mandates quieting up to 1 GHz for commercial equipment. These usually do not have excessive radiation above 200 MHz. Generally, 30-dB quieting will allow a design to pass FCC Part 15 requirements. As a guideline, any opening's major axis should be less than one-twentieth of a wavelength of the assumed highest problem frequency *f*, in MHz. Too large an opening could act as a slot antenna. Wavelength λ is

$$\lambda = 29{,}972/f$$

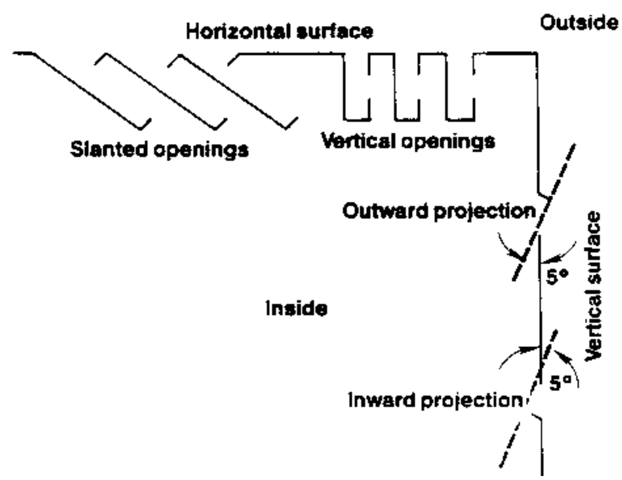
If wavelength is large relative to slot length *d*, and slot length is large relative to the metal enclosure thickness, signal attenuation *R* is

$$R = 20 \log (\lambda/2d)$$

The major axis should be no longer than about 2.5 cm for a theoretical 40 dB quieting at 200 MHz. Openings placed closer than one-half wavelength, 75 cm at 200 MHz, will cause a slight reduction in shielding effectiveness.

Ventilation openings should be as far from radiation sources as possible. If source to opening distance is shorter than the opening's major axis, shielding effectiveness will be further reduced.

Some designs may require slots larger than the suggested maximum. In these cases, metal screens can be used to break the area into smaller sections. However, screen material should be chosen carefully, because corrosion between dissimilar metals will deteriorate the ground connection of the screen, limiting its shielding. Good contact at screen wire intersections also is important.



Grille openings can take many forms. However, to meet safety requirements for electronic enclosures, slot openings must prevent accidental access but not block air flow.

Variations in wire size, hole opening, weave quality, and screen-to-enclosure bonding method make prototype shielding tests important. Perforated metal, with holes smaller than slots, can be used closer to radiation sources without degrading shielding effectiveness.

To shield frequencies higher than 200 MHz, slot size should be reduced using the λ/20 guideline. A waveguide construction can provide greater shielding. A honeycomb construction, with opening depth four times the width, yields almost 90 dB shielding at 5 GHz.

Safety

Ventilation openings are viewed as potential hazards by safety agencies worldwide. Openings allow unintended access to mechanical and shock hazards and can allow foreign objects to enter and bridge different voltage potentials. Therefore, opening dimensions are closely controlled.

Although each country's approval agency has differing requirements, most of the world follows one of two paths in determining what is safe. The U.S., Canada, and Japan use standards similar to Underwriters Laboratories (UL) standards; the Common Market and Nordic countries follow standards based on the standards of the International Electrotechnical Commission (IEC).

Ventilation openings that shield voltages over 30 V or greater than 240 VA are subject to agency scrutiny. Also, bottom holes generally are discouraged and subject to special requirements, and openings on horizontal surfaces must deflect a falling object away from exposed hazardous voltages. Alternatively, openings may be smaller than 5 mm in any dimension. UL accepts l-mm slots of any length.

Vertical surface ventilation openings must meet the same requirements. Louvers may be used instead of perforated holes, but EMl (longer major axis) and airflow resistance must be considered.

Plastic enclosures present additional safety problems, including impact and flammability requirements. Grilles are a specific impact test concern. Also, to comply with EMI requirements, a conductive coating sometimes is applied to a plastic enclosure's interior. These coatings may chip, flake, or peel, possibly bridging live parts and causing a safety hazard. These coating/plastic combinations have not received general approval from safety agencies.

MACHINE DESIGN/August 9, 1990 ❁

Physiological Effects

Continued from page 6

were counted. The number of colonies represented the viability of the DNA. Any change to the DNA would most likely reduce its viability.

For the first experiment, some samples exposed to fields at closer distances did not reproduce as much as the control group. However, some of the bacteria exposed to the field reproduced even more than the control group. For the second experiment, the reproduction of the bacteria varied with no correlation to the length of exposure. In conclusion, there was no pattern of reproduction problems with increased electromagnetic fields in this study.

I am now preparing for my next series of experiments. I hope to examine the effects on cell surfaces analytically, and to use higher levels of EMF. I would like to do more extensive measurements. I would appreciate suggestions and ideas from readers of the Product Safety Newsletter.

[Melinda Marks is a sophomore at Leland High School in San Jose. Her project, "The Physiological Effects of Electromagnetic Fields", won awards from IEEE, The Society of Women Engineers, The Society of Microbiology, the US Army, the US Marine Corps, and Underwriters Laboratories at the Santa Clara Valley Science and Engineering Fair. She is also a member of Leland Speech and Debate, active in Oxford Debate and expository speaking, a member of the California Youth Symphony, and a volunteer in the auxiliary of Good Samaritan Hospital. She hopes to pursue a career in medical engineering. - Ed.] ❁

Area Activity Reports

San Diego:

The product safety group here has been organizing some very successful technical presentations. The April meeting saw Bob Schmidt of UL discussing the UL Recognition testing program for plastics. He covered flammability, hot wire ignition and thermal characteristics. He also explained proper interpretation of the entries and descriptions of plastic properties in the UL Recognized Component Directory, as well as mentioning UL's upcoming CTI rating program for printed circuit boards.

The May meeting featured Rick Schneider, a partner in the law firm of Daley & Heft, speaking on the topic of Product Liability Law. He addressed general topics such as defects, negligence and warranty, as well as more specific items such as the usefulness of labelling and good record keeping. The June meeting managed to reach a new level by presenting a "Two-For-One Night". First, Ed Spooner, of the local TÜV Rheinland office, talked about "EN 60950 Frequent Deviations", then Manning Rose, from MIRA Corp. in Dayton, Ohio, discussed the "Cost of Product Safety". Mr. Rose pointed out that product safety is closely related to both the quality and functionality of a product and argued that the money spent on product safety is returned many times over in lower insurance premiums, fewer liability suits and increased customer satisfaction.

The September meeting will be the first after the July/August summer break. It will be at the Hewlett-Packard Company location in Rancho Bernardo from 6:00 to 8:00 p.m., planned for September 4 (the first Wednesday of the month, as usual) — but be sure to call Gene Biggs at 619-592-8236 for any last minute changes!

Santa Clara Valley:

Attendees at the May meeting were given some insights into the present and future status of the IEC 801-2, -4, and -5 Standards by Leo Makowski, from Haefely Test Systems in Woodbridge, Virginia. These standards deal with ESD and line transients and relate to the EN 50082 Standard of the European Community. Mr. Makowski was rushed directly from the airport to the PSTC meeting after an all-day transcontinental flight and still made an excellent presentation!

The May meeting also saw the election of local officers for next year:
Chair: Mike Campi
408-954-1800
Vice Chair: John McBain
408-447-0738
Treasurer: Mark Montrose
408-524-8129
Secretary: David McChesney
408-985-2400 X2771

The September meeting will be the first for the local product safety group after the long summer break of June/July/August. Instead of the usual technical presentation, plan to attend a dinner social with dinner provided by the PSTC! This will be the "kick-off" to the 1991/92 season and should be both informative and fun. The meeting date will be September 24 (the fourth Tuesday of the month, as usual). Details will be in the local meeting announcement mailer, or call David McChesney at 408-985-2400 X2771.

Orange County:

The April meeting speaker was Bob Schmidt of the UL materials group at Santa Clara with a presentation on plastics standards. He covered UL94 for flame ratings, UL746A/B/C for material specifications, and UL1446 for insulation systems. Of particular interest were the material specs Hot Wire Ignition (HWI), High Amp Ignition (HAI) and comparative Tracking Index (CTI). These are the parameters required for direct support of live parts. CTI is used in UL1950 to determine spacings on printed wiring boards and will be included in some future issue of the yellow book *[UL Recognized Component Directory - Ed.]*.

At the May meeting Ercell Bryant gave a review and discussion of the CBEMA ESC-2 meeting held March 12/13, 1991 in Austin, Texas. ESC-2 is the Safety committee of the Computer and Business Equipment Manufacturers Association.

Numerous topics were discussed covering safety and EMC activities in North America and Europe. Some of the topics included: very low frequency standards for videos, chemicals, batteries, symbols, acoustic noise, CE mark, EMC directive, metric rack and panel standard, software quality, power quality, cable flammability, CISPR 22, NRTL, plastic toxicity, joint meetings UL/CSA/ITAC/CBEMA, standards publication and harmonization and others.

The June meeting featured Manning Rose with a presentation on the Cost of Product Safety. He discussed the how's and why's of product safety and the costs of conformance versus the costs of nonconformance. A video tape of the presentation produced by NCR is available from Charlie Bayhi.

Meetings are held the first Tuesday of each month at File Net Corp.; however, the September meeting will be on the second Tuesday, September 10, because of the holiday. The topic planned is "ISO 9000 Registration Program" with Ed Spooner of TÜV Rheinland. For more information contact Paul Herrick at 714-770-1223.

Northwest (Portland/Seattle):

The May meetings featured Dick Troberg from John Fluke Mfg. Co. speaking about Power Quality. He discussed problems and solutions associated with power line harmonic currents generated by personal computers and other electrical equipment containing switching power supplies. The new specifications dealing with the problem (IEC 555 and IEEE 519) will be discussed. Art Henderson, the NW Sec/Treas, reports on the Portland area presentation: "It was unfortunate that his talk coincided with a Trailblazer playoff game because his presentation was one of the best I have heard during the last three years the Product Safety group has been meeting. He explained very clearly how power supplies cause harmonic currents that were not foreseen when our electrical systems were originally designed and how they are causing serious electrical failures and fire danger."

The speaker for June was Jim Pierce, Northwest Manager for ETL Testing Laboratories. His talk, "Plastics - a General Overview for Product Safety", discussed the electrical insulation and thermal characteristics of various plastic formulations. This meeting was the last one until September.

Generally, the Portland meeting is the third Tuesday of the month and the Seattle meeting is the third Wednesday of the month. Before the Portland meeting, come and visit informally with the speaker at a no-host dinner at the Cattle Company Restaurant at 5:30 p.m.. Everyone (including spouses) is welcome! For more details call Art Henderson at 503-777-8111. ❁

Abstracts

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July, 1991, issue of Electrical Manufacturing. The author, Wallace W. Menke, clarifies requirements in the National Electrical Code (NEC) and UL Standard 508 while discussing both primary and secondary fusing. Three-phase supply, grounding, and fuse types are other topics which are considered.

"Using UL Recognized Insulation Systems" was published in the July, 1991, issue of Electrical Manufacturing. The author, Michael Manegold, discusses the history and the advantages of using the UL Standard 1446 - Systems of Insulating Materials, General - and gives examples of testing.

"Specialized ICs Correct Power Factor in Switching Power Supplies" was published in the July 4, 1991, issue of EDN. The author, Dave Pryce, describes the main types of power factor correction, which will need to be used by power supplies to meet upcoming standards, such as IEC 555-2. Designers are using integrated circuits specifically dedicated to minimizing the percentage of harmonics in teh line current. Some specific examples are given. ❁

Please send your Product Safetgy Abstracts to Dave at his new address.

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Institutional Listings

We are grateful for the assistance given by these firms and invite application for Institutional Listings from other firms interested in the product safety field. An Institutional Listing recognizes contributions to support the publication of the *Product Safety Newsletter* of the IEEE EMC Society Product Safety Technical Committee. Inquiries should be send to: PSTC *Product Safety Newsletter*, C/O John McBain (M/S 42LS), Hewlett-Packard, 19447 Pruneridge Avenue, Cupertino, CA 95014.

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from corporate headquarters in Northbrook, IL, to provide the specialized engineering services. Schrempp will conduct on-site product evaluations at clients' facilities, evaluations of field installed products and other individualized services to Texas clients.

Foreign Standards Hotlines:

R&D Magazine reports that U.S. manufacturers and exporters can get the latest information on foreign technical standards and certification rules and regulations via two telephone hotlines from the National Institute of Standards and Technology (NIST). One hotline (301-921-4164) contains weekly updated information on draft European Community (EC) laws and standards that might create technical trade barriers for U.S. companies. The recording gives specific subject areas, products, deadlines, and sources for obtaining review copies of the standards and regulations. The second hotline (301-975-4041) gives a weekly update on proposed foreign regulations from the 83 member countries of the General Agreement on Tariffs and Trade (GATT).

[From the Electromagnetic News Report - Ed.]

California Product Safety Crime:

California has added criminal penalties to civil liability for failing to reveal "serious concealed danger". Assembly Bill No. 2249, adding Section 387 to the Penal Code, was approved on September 30, 1990.

Under previously existing law, a corporation may be civilly liable for damages caused by dangerous products or business practices. Also, various regulatory statutes required disclosures regarding safety hazards.

This bill provides that a corporation or person who is a manager with respect to a product, facility, equipment, process, place of employment, or business practice, is guilty of a misdemeanor or felony, if the corporation or manager has actual knowledge of a serious concealed danger that is subject to the regulatory authority of an appropriate agency and is associated with that product or a component of that product or business practice and knowingly fails to inform the Division of Occupational Safety and Health and warn its affected employees, as specified.

The maximum individual penalty is a fine of $25,000 and 3 years in jail and the maximum corporate penalty is $1,000,000. "Serious concealed danger" is defined to mean "that the normal or reasonably forseeable use of, or the exposure of an individual to, the product or business practice creates a substantial probability of death, great bodily harm, or serious exposure to an individual, and the danger is not readily apparent to an individual who is likely to be exposed." ❁

The
Product
Safety
Newsletter

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