

The Product Safety Engineering Newsletter

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Vol. 7, No. 4 December 2011

President's Message

Hard to believe my two year term as president is wrapping up. It has been an exciting, challenging time for me. I think I can say that our young IEEE society is more solidly established now than when I started as president, and has a clearer path for growth. We have over 900 members, and 15 established chapters with about 10 in various stages of creation. We have symposia planned through 2015. What's really exciting is the potential that Elya Joffe will oversee our society during the next two years. If our members are active IEEE volunteers, we can all work together to have active chapters around the globe, stimulating conferences and workshops, and even begin archival documentation of our product safety engineering and regulatory technical issues and trends.

For those of you who attended our San Diego conference this year, I'm sure you were impressed with the depth of topics discussed. We had attendees from twelve countries and had more than 20 full technical papers presented. This diversity presented in our field at a single conference is unique. It illustrates the significance of the foundation that our group of active volunteers has achieved. I'll

let Elya expound on the opportunities he sees for our society. I just want to take this last opportunity as president to encourage all our members to become active IEEE "volunteers." In the long run, that's really the best thing we can do for our profession.



Why is our IEEE society and our profession important? Product safety engineering is a specialized mindset that is uniquely successful when the limelight is avoided. Successful PSE means products and systems are designed, marketed, and used safely anywhere in the world with its diverse peoples and environments. PSE includes ethical and environmental issues in addition to the strictly safety concerns. PSE overlaps most technologies, ranging from the usual electrical products to products used in hazardous locations, to products used in medical procedures, to products used in the power distribution grid, to products providing

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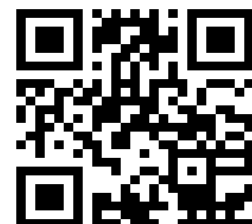
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President	Murlin Marks	(10-11)
Past President	Jim Bacher	(10-11)
President Elect	Elya Joffe	(11)
Secretary	Daniece Carpenter	(NA)
Treasurer	Jan Swart	(NA)
Vice President - Communications	Dan Roman	(11-13)
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Term Expires 12/11	Term Expires 12/12	Term Expires 12/13	Ex Officio (without vote)
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Ivan Vandewege	Rich Nute	Thomas Shefchick	IEEE TAB Division VI Director
	Douglas Kealey		Gold Member: Ashish Arora

IEEE PSES Web Sites

<http://www.ieee-pses.org/>
<http://psessymposium.org/>
<http://product-compliance.oc.ieee.org/>
<http://www.ieee-pses.org/emc-pstc.html>
<http://www.ieee-pses.org/newsletters.html>
<http://www.ieee-pses.org/pses.html>



safety functions. As technology and the rest of the world change, PSE is evolving as well. IEEE has agreed that our profession is worthy of a place in the hierarchy of technology. We are building a resource for the advancement of technology for humanity. You can become an active part of our IEEE society by being an active volunteer.

As an IEEE society president, I've seen many IEEE volunteers acting in leadership roles. It's amazing what IEEE accomplishes, mostly with active volunteers (see the video at solutionists.ieee.org). Most of these volunteers started at the chapter level, helping out with meetings, becoming chapter officers. They moved on to helping out with workshops and conferences, writing and editing papers, working with the regional IEEE section, etc. Many joined society Advisory Committees (AdComs) and became active in various committees in their respective societies, their sections and within IEEE. Most have grown personally and professionally over the years being exposed to more experienced IEEE volunteers, and learning from many achievements.

The neat thing is that it's just a matter of getting started. Going to chapter meetings, and conferences. Getting involved. It really doesn't take too much time, even with a job and a family, as most of us have or have had. In the latter parts of our careers, volunteering at IEEE is a way to give back professionally. To have a meaningful impact on our profession. To influence younger, less experienced engineers, administrators and managers. It's challenging and fun!

So I will move on to duties as a past president. I would like to take this opportunity to thank the members of my board of directors for their support. I would also like to thank the members of our conference committees, leadership of our chapters, members of our technical committees and our Newsletter editors for all their efforts. Let's continue to work together to build a great IEEE society!



Murlin Marks
President IEEE PSES

The PSEN is looking for articles on the product safety requirements for countries other than the USA and Canada. If you live outside of the USA and Canada and are familiar with the requirements, be it industrial or consumer, please write an article about your country requirements. It does not need to be well polished as we have volunteers who will help polish it for publication in the newsletter.

See Author Guide on Page 27.

Chapter Safety Probes

To see current chapter information please go to the chapter page at:

<http://www.ieee-pses.org/Chapters/index.html>

People Looking To Start Chapters

Dallas Texas

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Santa Clara Valley

New officers were elected on Nov 29, 2011:

Chair - Ken Kapur
Vice Chair - Kevin Ravo
Secretary - Trish Bass
Treasurer - Jon Derickson

Immediate Past Chair: Shirley Tarantino

Tentative schedule for 2012 begins with a presentation by Ken Kapur on International Product Regulations at the January meeting and a presentation on FDA compliance at the February meeting. See <http://www.ewh.ieee.org/r6/scv/pses/index.html>.

Orange County

The chapter will be starting workshops on UL 62368-1, Hazard Based Standard, in January. These sessions will be integrated throughout next year to supplement the normal monthly speakers.

Central Texas

The chapter held their November/December meeting on December 6. Election of new section officers for 2012 was held prior to the evening's

presentations. After the elections, Daniece Carpenter presented an outline and picture summary of the daily proceedings of this year's Product Safety Symposium in San Diego. Mark Edge followed with a more in depth look at some of the symposium sessions he attended, highlighting areas of interest to the group. Discussion followed over some of the observations brought up during both presentations.



Figure 1 - Central Texas showing off their new banner at the Nov/Dec meeting

News and Notes

News Shorts on Compliance

by Daniece Carpenter

European Union

Amendment A12:2011 to EN 60950-1 has been published, and will become mandatory in January 2013. The scope of the amendment is intended to limit exposure to sound pressure from personal music players by with requirements for user warnings and limits on maximum sound pressure delivered by the music player.

Serbia

Serbia has introduced a new certification scheme which includes both EMC and product safety standards. Under the new scheme, Certificates of Conformity will be issued for EMC and product safety by Serbian agencies such as Kvalitet, and will be based on established European standards.

The current scheme will be acceptable through 2011 and early 2012. A formal announcement of when the new scheme will become mandatory has not been made, although it is expected in early 2012.

A Mark is required on the product. The Mark requires the identification of the agency issuing the Certificate, and the year that the Certificate was issued.

The Mark as shown below indicates that Kvalitet, a Notified Body, issued the certificate in 2011.



More information on obtaining a Certificate of Conformity from Kvalitet can be found at <http://www.kvalitet.co.rs/english/KakoDoSertifikata-potvrda.html>

The Kingdom of Saudi Arabia

To more closely align the electrical system with that of the European Union, Saudi Arabia will be changing the electrical system used for both resi-

dential and commercial purposes from 127/220V to 230/400V. All products entering the country on or after May 21, 2012 must be rated for the new system. After this date, products rated to 127 V will not be allowed, and spare parts rated 127V will be banned from November 10, 2025.

Dual-rated products of 127/220 V will be not be allowed beginning February 28, 2016.

For more information on the new regulations, refer to <http://www.intertek.com/servicesdetail.aspx?id=20917>

China

AQSIQ, China has published a new regulation requiring the China Energy Label on printers. All new printers manufactured or imported into China as of January 1, 2012 will require the Energy Label. The standard sets the parameter values as well as the testing methods and inspection rules.

Also expected to be published in early 2012 is a new requirement for computers imported or manufactured after July 1, 2012 to comply with the CEL (China Energy Label) requirements.

Zambia

New Type Approval Guidelines for Radio and Telecommunication Terminal Equipment has been published by the Zambia Information Communication Technology Authority (ZICTA), effective at the beginning of September 2011. Two different type approval processes are defined: the Type Acceptance Process and the Standard Type Approval Process. Both local and foreign companies can apply directly to ZICTA.

Additional information is available at http://www.zicta.zm/index.php?option=com_content&view=article&id=59&Itemid=64

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President Elect's Message

“One generation passeth away, and another generation cometh; and the earth abideth forever.” So spoke the wisest man of all, King Solomon, also known as Koheleth, the son of David, king in Jerusalem (Ecclesiastes 1).

So is the nature of the leadership of our Society—Murlin Marks, our immediate past President has completed his two-year term as President of the PSES, and I, as your new President, will begin mine in January, 2012. But just as it is said in the Holy Book, “the earth abideth for ever,” the IEEE Product Safety Engineering Society will follow the path paved by its past leaders.

Indeed, Murlin has led the Society through exciting and turbulent years. Years following those of Mark Montrose, Henry Benitez and Jim Bacher, who worked to create the Society. Murlin entered a new era, that of stabilizing the Society, planning ahead; a term where strategies and long-term goals of the PSES are THE issue of concern. Most of all, from my perspective, Murlin's term was the term of transition, a term bonding our past, present and future. Indeed, “one generation passeth away, and another generation cometh; and the earth abideth forever.”

Soon to be installed as President of our Society, I humbly realize that I am following in the footsteps of a succession of excellent leaders we were fortunate to have had in our short past. Leaders, who brought this Society from its formation, less than a decade ago, to where it is now. I will to do my best to be worthy of being recognized as another link of this illustrious chain.

In this first message as the new President of the PSE Society, I would like to:

- Introduce myself to our members who have not had a chance to get to know me over the past few years;
- Outline some of the plans that have evolved out of last year's activities of the Strategic Planning, which will help guide the Society in the coming two years while I carry the responsibilities of President;
- Ask for your assistance in steering the PSES in the local, regional and international arenas, in order to make the Society what you'd like it to be.

My Personal Roadmap

Similar to many other members of our discipline, I started my way in the EMC Society. I am a member of IEEE for more than 27 years now, and assumed many positions in the EMCS, including President in the years 2008-2009.

When the PSES was about to be formed, I approached Mark, then to be the first and founding President of the PSES and offered my help in any which way I could, to make the PSES a successful society of the IEEE. I could offer little experience in PRODUCT safety, per se, but in my capacity in the field of EMC, I have been and still am strongly involved in FUNCTIONAL safety. It was my perception that on the one hand, my experience in the leadership of the EMCS, and on the other hand, my experience in some aspects relevant to safety engineering, would and could benefit the PSES. So, I joined as a “charter Member” and served as the first VP for Conferences. Then, continuously, I served on the PSES Administrative Committee (ADCom) as member at-large.

As time passed, I tried my best to contribute to PSES from my experience, take an active part in its conferences and other activities, and supported the formation of the Israel PSES Chapter. (I am proud that now, as I become President, a Second Israeli member was elected to our AdCom, Steli Loznen. Steli is also the Israel PSES Chapter Chair.) This leads me to where I am today, **at your service.**

Long Range Plans

“All the rivers run into the sea, yet the sea is not full” (Ecclesiastes 1). In the last two years momentous efforts were placed in the development of strategic plans for our Society. It was exciting to see that under the leadership of our previous presidents, many plans designed in the past have actually come into being, while new ideas kept on flowing. “The sea of ideas is not full.” Brainstorming sessions took place, and in recent months, the three-year planning matrix has been updated and filtered, forming a roadmap for implementation of short and long-range activities. One of my main goals during the next two years of my term as President is to find ways to put these plans into action, while extending our plans to a 5–10

year plan. After all, “My interest is in the future because I am going to spend the rest of my life there” (Charles F. Kettering).

Strategy

“Strategy” can be defined as “the evolution of a central idea through continuously changing circumstances.” Indeed, the PSES is an evolving society, going hand in hand with progress in technology. New technologies emerge while techniques used successfully in the past may become invalid. The evolution and relevance of a professional Society entails synergy and cooperation between practitioners and scientists working hand in hand. Our Society is blessed with such cooperation and our symposia as well as publications are a living proof of this.

However, the PSES is a large “machine,” and although great ideas continue streaming, the wheels of this machine cannot roll alone. The power required for moving it is the most valuable of all, the human power.

Member and Chapter Development

It is not possible to run a Society without a healthy membership that consists of active volunteers and dedicated leaders. Volunteerism, leadership, succession, membership development, new chapter development, and professional development go hand in hand.

I am a firm believer that “the chapter is where everything happens.” That is where technical and professional activities take place, and that is where networking among the Society members at the local scale occurs on a daily basis, and most of all that is where we recruit and engage our members. Several new chapters were formed in recent years, and it is my plan to support the dedicated efforts of our VP for Member Services and the Chapter Coordinator in their efforts to continue expanding our presence and through our chapters, offering better and more extensive services to our members.

The PSES will continue to spur the growth of new chapters worldwide and open up opportunities for leadership positions wherever and whenever possible. Chapter, membership, and member development come with new volunteers, fresh ideas, and some interesting paths to follow. That is the essence of our Society’s evolution. Note that I

mentioned membership and members. Parallel to our efforts to increase our visibility, presence and numbers (i.e., membership development) we will focus on increased value and services to the members (i.e., member development). More technical value, more knowledge, more networking—those are the key benefits of society membership.

“Volunteering is for everyone”

Even the greatest initiatives cannot materialize at their own will. Any society can only thrive just as much as its members support its goals. The PSES is led and run by volunteers and its success is reliant on the support and active assistance of interested members of the Society in the global and local arenas.

A boy asked once a wise man, “Is the butterfly I am holding in the palm of my hand alive or dead?” If the wise man said “alive,” the boy would crush the butterfly and show it dead, but if the wise man said “dead,” the boy would laugh and let the butterfly fly away. The wise man was clever enough to offer neither of the above replies, answering the boy “**as you will**, my lad, **as you will**.”

That is my message to you: The face of our Society, the course we take—they are at YOUR will. Following my personal experience I would like to encourage each and every one of you to consider stepping up to the challenge of getting actively involved in committees and the Society’s work in general, including running for open positions on the Administrative Committee (AdCom). This is your opportunity to influence and contribute to the evolution of the PSES. As a paraphrase on the famous statement by President Kennedy, “Ask not what the Society can do for you, but what you can do for the Society.”

“The reward of a mitzvah (good deed) is a mitzvah (the good deed itself).” (Pirke Avot 4:2)

So said the Jewish scholars in the ancient book of *Pirke Avot, the teachings of the patriarchs*, meaning that there is no greater reward than the delight you get out of doing a good deed happily. The delight of a happy good deed is so great that even if there was no other reward to come beyond it, this would be enough.

All professional activities of the PSES are per-

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formed by volunteers who are members like you, mostly in our committees. Meetings of its Technical Committees take place during our symposia in central locations, via teleconference calls, electronic communications and through e-mail discussions. Distance is no longer a barrier.

You can find information about each of the committees on our web site by clicking on the “Technical Committees” hyperlink in the left hand side bar and following the associated links. You are encouraged to investigate each of the committees listed there and to contact the chairman of any that interest you for a further explanation of the committee, its functions and options to participate in their activities.

You will be surprised (and thrilled) to discover that, indeed, “the reward of a mitzvah (good deed) is a mitzvah (the good deed itself).” You are guaranteed to enjoy and personally benefit from your volunteering. So many IEEE and PSES members cannot be wrong.

Globalization and Diversity

Great achievements are not born from a single vision but from the combination of many distinctive viewpoints. Diversity challenges assumptions, opens minds and unlocks our potential to solve any problem we may face.

The 21st century may be entitled “the Age of Globalization,” and our Society strives to be and I believe succeeds in being truly global. Indeed, my being elected as the first non-U.S. President of the PSES is the best proof that the PSES was and is a truly a global society. The ADCom of PSES is fortunate to have members from China, Australia, Israel, Canada, Argentina, and of course—the U.S.! We are (almost) all across the globe! I consider this one of the greatest successes of the PSES and I hope, during my term of office, to lead the PSES in the path of further globalization, not neglecting the excellent foundation we have now, which we will continue to support and make even stronger.

No doubt, globalization is a major endeavor, requiring that bridges be laid across diverse geographic, political, and cultural as well as language barriers. However, experience has shown that communicating as engineers-to-engineers, we can bridge the gaps! Goodwill and vision have led us and will con-

tinue to do so. As we watch the tip of the compass, we see that (almost) everywhere it points around the globe safety counts! What a potential for us to grow, to serve, to lead.

It is my personal plan to expand the PSES to regions of the World where it is not currently present, Africa and the Middle East, in particular. Asia and Central and South America will also be in the focus of our actions and there is much that the PSES can and will do to assist in the formation of new chapters and support existing chapters. After all, safety should have no physical boundaries. Let us recognize and see the beauty and benefits of diversity, and work together, across the barriers, to make the world a better (and safer) place for us all.

“One generation passeth away, and another generation cometh”

In closing my first President’s Message, I would like to humbly express my gratitude for the honor bestowed on me in giving me the opportunity to serve as your President for the next two years. I will do my best to fulfill the expectations placed in me.

I would like to express my personal gratitude to Murlin Marks, the outgoing President, to become now the Immediate Past President, for his own outstanding service to the PSES. I have learnt to appreciate Murlin’s dedication and thoroughness in the years I have been working with him for the benefit of the PSES.

ADCom Meetings

Just in case you have the time, inclination and opportunity, I want to remind all our members that all meetings of the PSES ADCom are **open**. Any members who want to attend will be most welcome. This would be your opportunity to take a look at the manner our Society is run, and even have chance to express your own opinion on issues in debate. You may even find it interesting enough to make you want to run for the Board at its next election!

The schedule of ADCom meetings is posted on the Society web site (<http://ewh.ieee.org/soc/pses/bod.html>). If you can’t attend an ADCom meeting

in person to tell us your thoughts; note that the contact information of all members of the ADCom is listed on the above web page.

Please be assured that as President, I and the PSES ADCom, are at your service, and my e-mail inbox is open to you all. I hope to be able to meet as many of you as possible during my term, wherever you are around the globe. I would be glad to hear from you, with any suggestion, comment, or just a friendly message. Please do not hesitate to e-mail me at: eb.joffe@ieee.org.

Happy Holidays!

Elya B. Joffe, President Elect, Product Safety Engineering Society

Immediate Past President's Message

The 2011 PSES elections are over and here are the results. Again this year every single nominee received a significant number of votes.

Our 2012–2014 Board of Directors:

Paul Wang
Mike Nicholls
Steli Loznen
Juha Junkkarinen

Not Elected were:

Luiz Araujo
Dr. Lock Kai Sang

The IEEE wants us to have 50 percent more people running for office than the number of positions we have open. For our society, at least six people have to run for office each year, as there are four director positions, each with a one year term of office. We had the six people required this year (as well as last year) and want to thank all of those who ran including those who did not win the election.

I would like to thank Dan Arnold, Patty Knudsen, Thomas Shefchick, and Jim Knighten for serving on the Election Committee. This is my last year as Immediate Past President of the society, which makes it my last year as the chair of the elections committee. Although being president of the society takes a lot of time, it was a very good experience.

Please consider running for office next year and someday taking your turn as President of the society, it really is worth the effort.

Also I would like to thank the outgoing BoD members for their services on the PSES BOD.

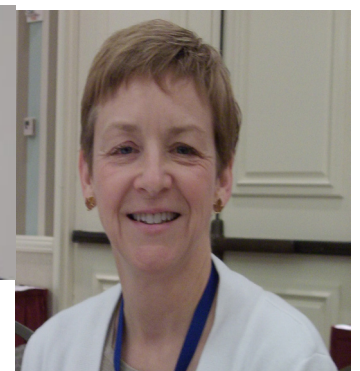
Jack Burns
Jim Pierce
Richard Pescatore
Ivan Vandewege

Jim Bacher
Immediate Past President, IEEE PSES

Continued on Page 23



Dan Arnold



Patty Knudsen



Thomas Shefchick



Jim Knighten



Jim Bacher

Technically Speaking

What is the difference between ELV and SELV circuits?

by Richard Nute



Introduction

Equipment circuits can be divided into two broad classes:

- 1) circuits which are “safe,” and
- 2) circuits which are “unsafe.”

This article discusses the characteristics of “safe” equipment circuits, that is, circuits that can be touched.

“Unsafe” equipment circuits must be provided with means such that the circuits cannot be touched. Such safeguards are not discussed here.

Equipment “safe” circuits can be further divided into:

- 1) those that are safe against electric shock, and
- 2) those that are also safe against electrically-caused fire.

These “safe” circuits are known by various names, each of which has its own characteristics:

Extra-Low Voltage (ELV),
Safety Extra-Low Voltage (SELV),
Limited Current, and
Limited Power.

However, the definitions and requirements for these “safe” circuits are not consistent among the various safety standards that use these terms.

Extra-low voltage (ELV) definition

Extra-low voltage, ELV, is a term from International Electrotechnical Commission (IEC) documents.

The basic definition for extra-low voltage is given in the IEC Electropedia, the online version of the IEC 60050. See Table 1. All other definitions, including the definition given by IEC 60950-1, are based on this definition. (Note that IEC 60065 does not use the term ELV or extra-low voltage.) A list of referenced standards appears at the end of this article.

Table 1

Source	Clause	Definition
IEC Electropedia (IEV)	extra-low voltage (IEV number 826-12-30) ELV (abbreviation)	voltage not exceeding the relevant voltage limit of band I specified in IEC 60449
IEC 61140, Third edition 2001-10	extra-low-voltage (ELV) (3.26)	any voltage not exceeding the relevant voltage limit specified in IEC 61201
IEC 60950-1, Second Edition, 2005-12	ELV CIRCUIT (1.2.8.7)	SECONDARY CIRCUIT with voltages between any two conductors of the circuit, and between any one such conductor and earth (see 1.4.9), not exceeding 42,4 V peak, or 60 V d.c., under normal operating conditions, which is separated from HAZARDOUS VOLTAGE by BASIC INSULATION, and which neither meets all of the requirements for an SELV CIRCUIT nor meets all of the requirements for a LIMITED CURRENT CIRCUIT

In its most general form and as defined in the IEC Electropedia, extra-low voltage simply identifies a source whose potential difference (voltage) does not exceed a low value. ELV is simply a low voltage. For example, ELV could be a low-voltage secondary circuit, or could be a battery circuit, or could be the non-isolated low-voltage control circuits in the primary side of a switching-mode power supply. (Many safety professionals would probably disagree that any part of a primary circuit could be ELV; the definition, however, is simply that of a potential difference.)

IEC 60950-1 uses the term *ELV circuit*. An IEC 60950-1 *ELV circuit* is not just ELV, but a *secondary circuit* separated from hazardous voltage by *basic* insulation. (For IEC 60950-1, a low-voltage secondary circuit separated from hazardous voltage by functional insulation is *not* an ELV circuit.) *ELV* and the IEC 60950-1 *ELV circuit* are not the same things.

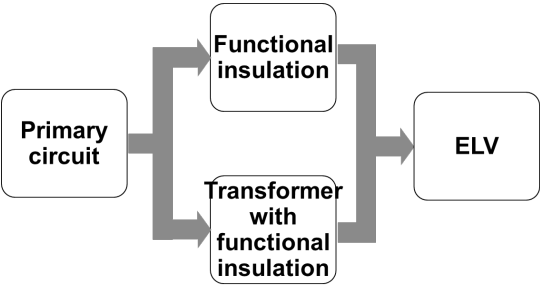
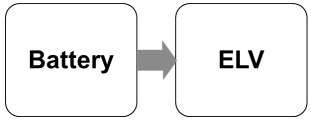
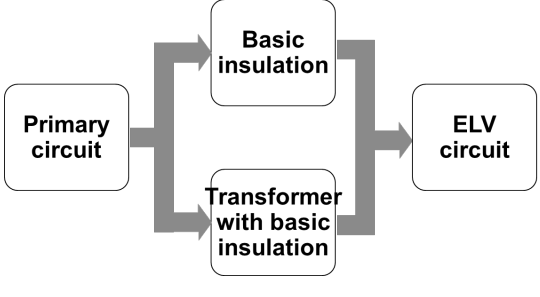
IEC 60950-1 is not the only standard that defines ELV as a circuit with specific parameters. IEC 61892-3 requires ELV to be supplied from a safety isolating transformer. In some standards, ELV supplied from a safety isolating transformer is deemed SELV.

IEC 60364-4-41 introduces FELV (functional extra-low voltage), SELV (safety extra-low voltage) and PELV (protected extra-low voltage). FELV and PELV are not discussed here.

The definition of ELV is not consistent within the IEC. In some cases, ELV is just a voltage. In other cases, ELV is not just a voltage but includes some degree of isolation (or separation) from higher voltages, or other low voltage circuits, or both. See Table 2.

Table 2

Definition	ELV circuit configurations
IEC Electropedia and IEC 61140 (not an ELV circuit per IEC 60950-1)	<pre> graph LR PC[Primary circuit] --> FI[Functional insulation] PC --> VD[Voltage divider] FI --> ELV[ELV] VD --> ELV </pre>

IEC Electropedia and IEC 61140 (not an ELV circuit per IEC 60950-1)	 <pre> graph LR PC[Primary circuit] --> FI[Functional insulation] PC --> TFI[Transformer with functional insulation] FI --> ELV[ELV] TFI --> ELV </pre>
IEC Electropedia and IEC 61140 (not a secondary circuit so is not an ELV circuit per IEC 60950-1)	 <pre> graph LR B[Battery] --> ELV[ELV] </pre>
IEC Electropedia, IEC 61140, and IEC 60950-1	 <pre> graph LR PC[Primary circuit] --> BI[Basic insulation] PC --> TBI[Transformer with basic insulation] BI --> ELV[ELV circuit] TBI --> ELV </pre>

Extra-low voltage value

The IEC Electropedia specifies extra-low voltage as not exceeding band I voltage of IEC 60449, and IEC 60449 defines two building installation voltage bands. Band I is extra-low voltage. Band 2 is all building installation voltages exceeding extra-low voltage. IEC 60449, Table 1, band I, specifies 50 volts ac (for frequencies not exceeding 60 Hz.) See Tables 3 and 4.

Table 3

IEC 60449 Voltage bands for electrical installations of buildings	Band I covers: <ul style="list-style-type: none"> – installations where protection against shock is provided under certain conditions by the value of voltage; – installations where the voltage is limited for operational reasons (e.g., telecommunications, signaling, bell control and alarm installations).
	Band II contains the voltages and supplies to household, commercial, and industrial installations. This band contains all the voltages of public distribution systems in the various countries.

Table 4

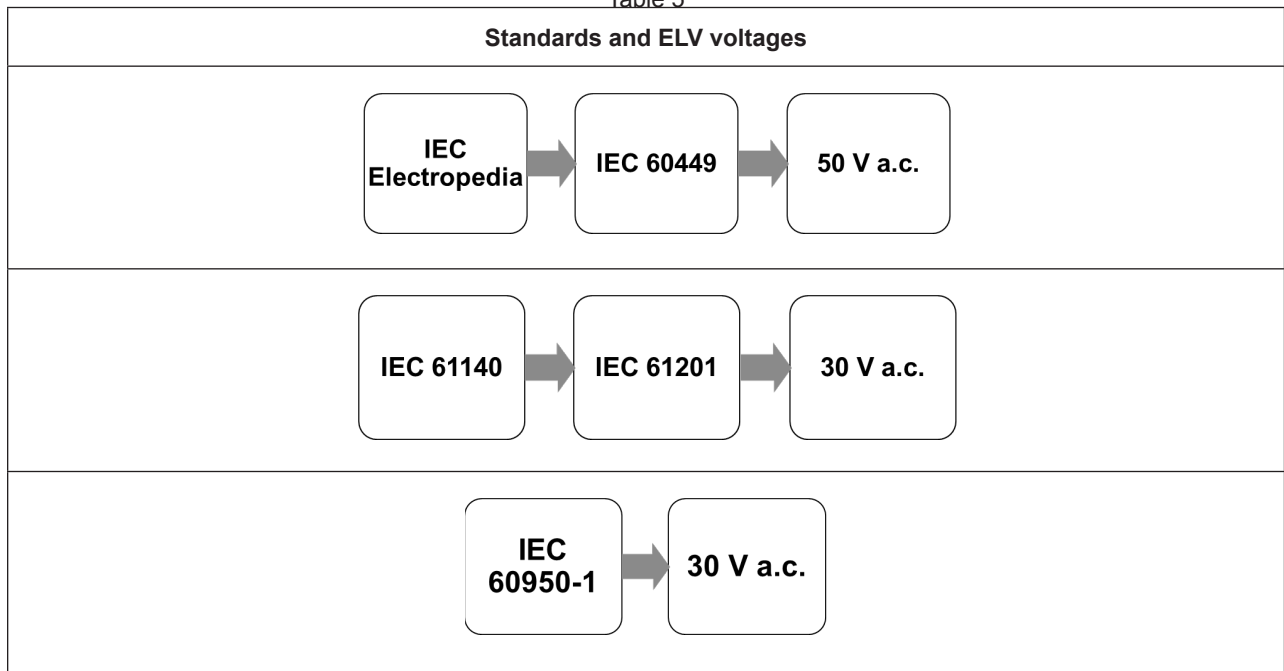
IEC 60449 Table 1 Voltage bands			
Bands	Earthed systems		Isolated or not effectively earthed systems *
	Phase to earth	Between phases	Between phases
I	$U \leq 50$	$U \leq 50$	$U \leq 50$
II	$50 < U \leq 600$	$50 < U \leq 1\,000$	$50 < U \leq 1\,000$

U = nominal voltage of the installation.

* If the neutral is distributed, electrical equipment supplied between phase and neutral is to be chosen so that its insulation corresponds to the voltage between phases.

The IEC sources for values of ELV are noted in Table 5.

Table 5



Within the IEC, some standards are designated as “basic safety publications.” A basic safety publication addresses a specific safety-related matter, and applies to many electrotechnical products. Product safety standards *should* follow the basic safety publication.

The IEC Electropedia definition for ELV refers to IEC 60449. IEC 60449 (which specifies ELV value as not exceeding band I, 50 V) is *not* an IEC basic safety publication. Therefore, IEC product safety standards are not required to follow IEC 60449. The ELV value of 50 volts (from IEC 60449) should not be used by product safety standards.

IEC 61140 refers to IEC 61201 for the value of ELV. IEC standards IEC 61140 and IEC 61201 *are* basic safety publications. The voltages specified in IEC 61201 *should* be the authoritative values.

IEC 61201 does not specify a single voltage limit for ELV. IEC 61201 specifies voltage limits for the combination of five parameters:

- voltage;
- contact area;
- contact wetness (dry, wet, salt-water wet);
- current path through the body; and
- the body reaction (startle, tetanization, fibrillation).

For product safety standards that use IEC 61201 ELV values, the actual value of extra-low voltage can differ among the various product safety standards according to the five parameters. The extra-low voltage value is typically chosen as one which would not likely result in *perception* of current in the body. Many standards use 30 volts ac. For 30 volts ac, the IEC 61201 parameters are given in Table 6.

Table 6

Voltage	30 volts a.c. maximum
Contact area	1 square centimeter maximum
Contact wetness	Dry
Body current path	Any
Body reaction	not startle, but perception possible

For most equipment, these parameters are reasonable.

Definitions for Safety extra-low voltage (SELV)

Safety extra-low voltage is a special case of extra-low voltage.

In most cases, SELV is simply defined as a voltage not exceeding the ELV value

- under normal operating conditions, and
- under single fault conditions.

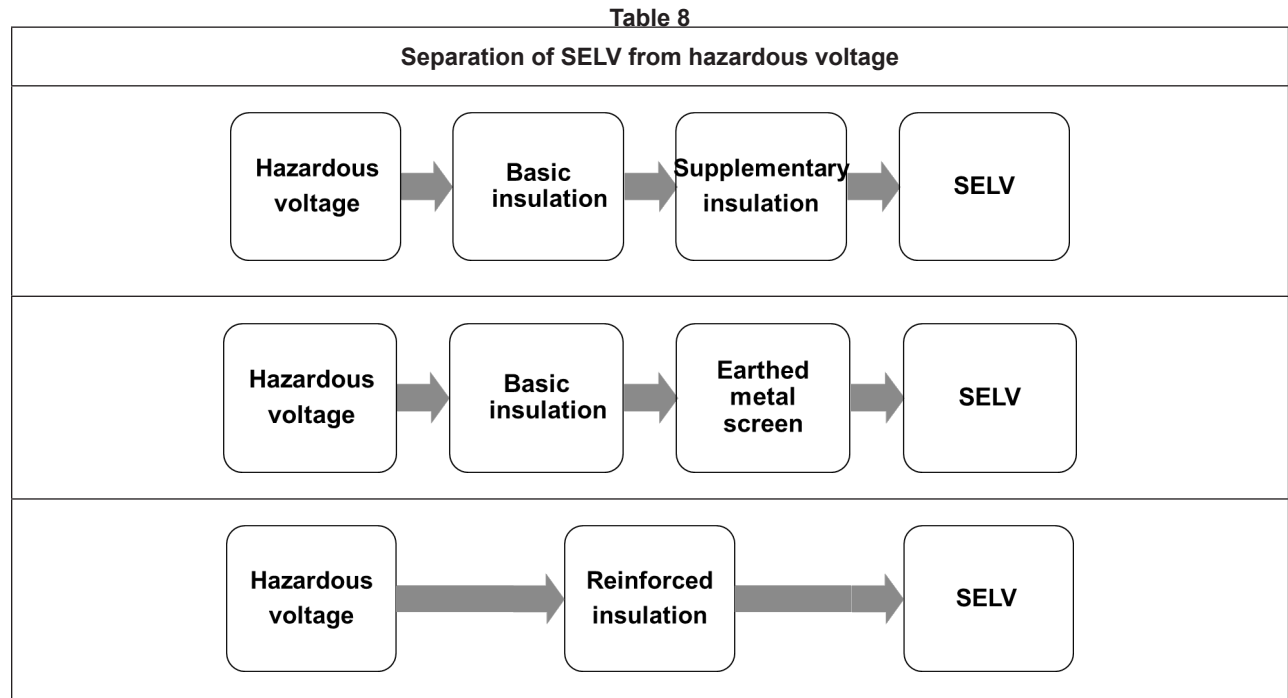
Some of the SELV definitions are in Table 7. (IEC 60065 does not use SELV.)

Table 7

Source	Clause	Definition
IEC Electropedia (IEV)	SELV system (IEV number 826-12-31)	electric system in which the voltage cannot exceed the value of extra-low voltage: – under normal conditions and – under single fault conditions, including earth faults in other electric circuits NOTE – SELV is the abbreviation for safety extra low voltage.
IEC 61140, Third Edition 2001-10	SELV system (3.26.1)	an electrical system in which the voltage cannot exceed ELV: – under normal conditions; and – under single-fault conditions, including earth faults in other circuits
IEC 60950-1, Second Edition, 2005-12	SELV CIRCUIT (1.2.8.8)	SECONDARY CIRCUIT that is so designed and protected that under normal operating conditions and single fault conditions, its voltages do not exceed a safe value NOTE 1 The limit values of voltages under normal operating conditions and single fault conditions (see 1.4.14) are specified in 2.2. See also Table 1A. NOTE 2 This definition of an SELV CIRCUIT differs from the term “SELV system” as used in IEC 61140.

Usually, this means the ELV must be isolated (separated) from voltages exceeding ELV by both basic insulation and supplementary insulation. See Table 8.

In other cases, e.g., IEC 60950-1, SELV voltage is specified without reference to ELV (although the SELV and ELV voltages are the same).



Limited current circuit

A limited current circuit is the current-mode version of SELV. It is a circuit whose prospective touch voltage exceeds ELV and whose current does not exceed a specified value under normal operating conditions and under single fault conditions.

The concept of a limited current circuit is that of a current source, while SELV is that of a voltage source.

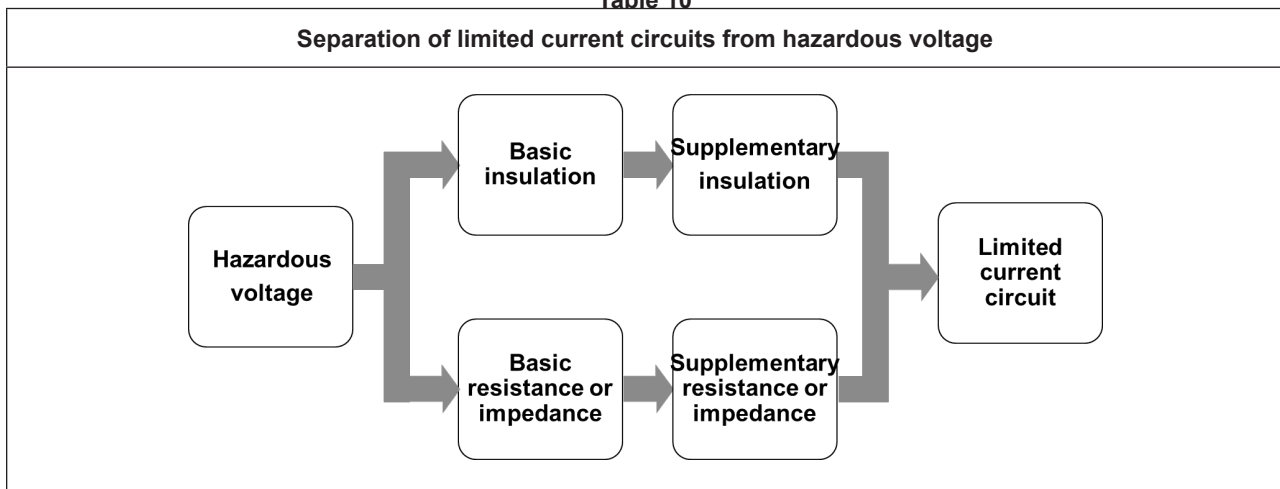
Limited current circuit definitions are shown in Table 9. Also see Table 10. Basic, supplementary, and reinforced impedances are often provided by Y-capacitors as specified in IEC 60384-14.

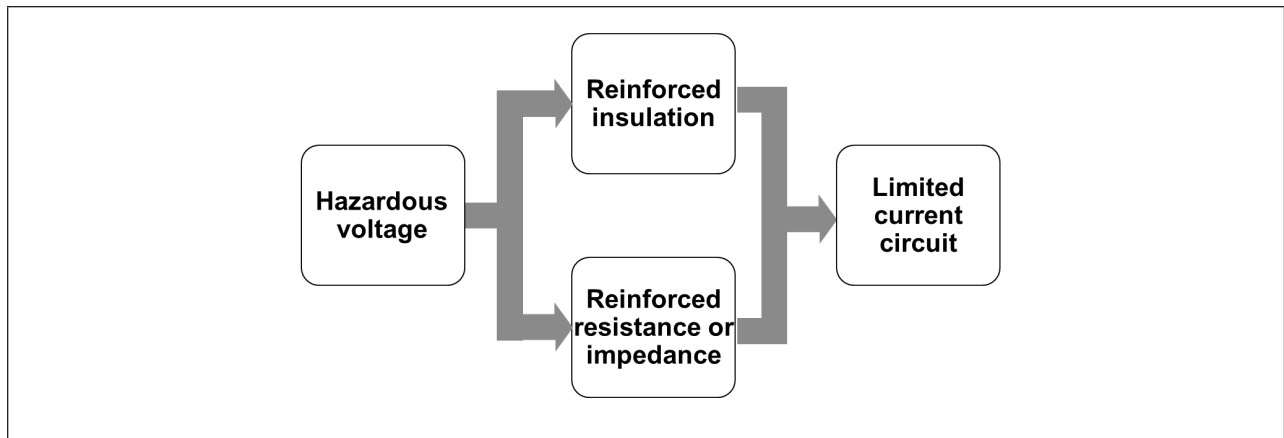
Table 9

Source	Clause	Definition
IEC glossary	limited current circuit (from IEC 62282-5-1, ed. 1.0 (2007-02))	circuit which is so designed and protected that, under both normal operating conditions and single fault conditions, the current which can be drawn is not hazardous NOTE For specific limits, refer to 2.4 of IEC 60950.
IEC 61140, Third edition 2001-10	limited-current-source (3.28)	device supplying electrical energy in an electric circuit – with protective-separation from hazardous-live-parts, and – which ensures that the steady-state touch current and charge are limited to non-hazardous levels, under normal and fault conditions
IEC 60950-1, Second Edition, 2005-12	LIMITED CURRENT CIRCUIT (1.2.8.9)	circuit that is so designed and protected that, under both normal operating conditions and single fault conditions, the current that can be drawn is not hazardous NOTE The limit values of currents under normal operating conditions and single fault conditions (see 1.4.14) are specified in 2.4.
IEC 60065, Seventh Edition, 2005-12	Determination of HAZARDOUS LIVE parts (9.1.1.1)	the TOUCH CURRENT, expressed as the corresponding voltages U_1 and U_2 , and measured in accordance with IEC 60990, with the measuring network described in annex D of this standard, exceeds the following values: – for a.c.: $U_1 = 35$ V (peak) and $U_2 = 0,35$ V (peak); – for d.c.: $U_1 = 1,0$ V. NOTE 2 The limit values of $U_2 = 0,35$ V (peak) for a.c. and $U_1 = 1,0$ V for d.c. correspond to the values 0,7 mA (peak) a.c. and 2,0 mA d.c. The limit value $U_1 = 35$ V (peak) for a.c. corresponds to the value 70 mA (peak) a.c. for frequencies greater than 100 kHz.

Table 10

Separation of limited current circuits from hazardous voltage





Leakage current (the current in the protective earthing conductor) and touch current (the current from an accessible part to earth) are manifestations of limited current circuits.

The maximum value of limited current is 0.5 mA, 3.5 mA or 5 mA, depending on the standard.

Various standards specify measurement of the current supplied to a limited current circuit with a resistance of 1500 or 2000 Ω connected in series with the source. This series resistance reduces the current in the circuit. However, for 0.5 mA current, the value of this resistance is largely inconsequential to the measured value. Table 11 gives the measured current differences between an ammeter (short-circuit current), 1500 Ω resistance, and 2000 Ω resistance. The higher the value of limited current, the greater the difference. Measuring the current with an ammeter always gives a pessimistic value.


Note that limited current requirements do not apply to ELV or SELV circuits; limited current circuits apply only when the prospective touch voltage exceeds the ELV voltage.

Prospective touch voltage is the voltage *before* the part is touched. Touch voltage is the voltage *when* the part is touched by a body part (simulated with a 1500 Ω or 2000 Ω resistor). If the circuit is a current source, then the prospective touch voltage and the touch voltage will be radically different. If the circuit is a voltage source, then the prospective touch voltage and the touch voltage will be nearly the same.

Table 11

Short-circuit current	Measurement differences due to current sampling resistor value compared to short-circuit current
0.5 mA	
3.5 mA	
5.0 mA	

Continued on Page 20

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Limited power circuit

In the USA, doorbells are supplied by a transformer whose output is ELV and limited power. (The output may also be SELV, but I am unable to confirm this.) The output of a doorbell transformer is intended to be both shock-proof and fire-proof. This means that the wiring from the doorbell transformer need not follow wiring rules for mains wiring. The wires could be small. The connections do not require a junction box. And the circuit can be accessible.

The transformer design is such that the output could be shorted for an indefinite time without causing the transformer to overheat or the insulation to fail. When the short is removed, the transformer works as normal. The transformer is said to be *impedance-protected* or *inherently limited*.

Some household applications require more power than can be delivered by an impedance-protected transformer. In this case, the transformer output is provided with a fuse. And, in some cases, the transformer windings are provided with a thermal protector.

These basic parameters for limited power were adapted into computer safety standards to minimize the need for costly fire enclosures for low voltage circuits and to eliminate the need for external wiring to follow mains wiring rules. The computer requirements were evolved to include electronic overcurrent protection instead of a fuse. Table 12 provides the IEC definitions.

Table 12

Source	Clause	Definition
IEC glossary	limited power sources (from IEC 62282-6-100, ed. 1.0 (2010-03))	electrical supply either isolated from a mains supply or supplied by a battery or other device (i.e. fuel cell power unit) where the voltage, current, and power levels are either inherently or non-inherently limited to levels that do not result in an electric shock or fire hazard NOTE An inherently limited power source does not rely on a current-limiting device to meet limited power requirements although it may rely on an impedance to limit its output. However, a non-inherently limited power source relies upon a current-limiting device such as a fuse, etc. to meet limited power requirements.
IEC 60950-1, Second Edition, 2005-12	Limited power sources (2.5)	A limited power source shall comply with one of the following, a), b), c) or d): a) the output is inherently limited in compliance with Table 2B; or b) a linear or non-linear impedance limits the output in compliance with Table 2B. If a positive temperature coefficient device is used, it shall pass the tests specified in IEC 60730-1, Clauses 15, 17, J.15 and J.17; or c) a regulating network limits the output in compliance with Table 2B, both with and without a simulated single fault (see 1.4.14) in the regulating network (open circuit or short-circuit); or d) an overcurrent protective device is used and the output is limited in compliance with Table 2C.

Continued on Page 22

Call for Papers, Workshops, and Tutorials

The IEEE Product Safety Engineering Society seeks original, unpublished papers and tutorials on all aspects of product safety and compliance engineering including, but not limited to:

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Product Specific: Consumer, medical, computer (IT), test and measurement, power supplies, telecommunication, industrial control, electric tools, home appliances, cellular and wireless, etc.

Hazard Specific: Electrical, mechanical, fire, thermal, chemical, optical, software, functional, reliability, risk assessment, etc.

EMC / RF: Electromagnetic emissions, electromagnetic immunity, regulatory, Introduction to EMC/RF for the safety engineer and compliance engineer.

Components: Grounding, insulation, opto-couplers, cables, capacitors, connectors, current-limiters, transformers, current-limiters, fuses, lasers, ferrites, environmental, electromagnetic suppression & protection, surge protectors, printed wiring boards, etc.

Certification: Electromagnetic emissions & immunity, Environmental, Product safety, Processes, safety testing, regulatory, product liability etc.

Standards Activities: Development, status, interpretations, country specific requirements, Laboratory Accreditation, etc.

Research: Body physiological responses to various hazardous energy sources, unique safeguard schemes, electrically-caused fire, forensic methods etc.

Environmental: RoHS, WEEE, EuP (Energy-using Products), Energy Star, Packaging Directives, REACH (Chemical), CeC, etc.

Demonstration Papers: Demonstrations of product safety testing techniques including mechanical, electrical, fire, etc.

Author's Schedule **All dates require that the associated documents be loaded into EDAS by the due date**

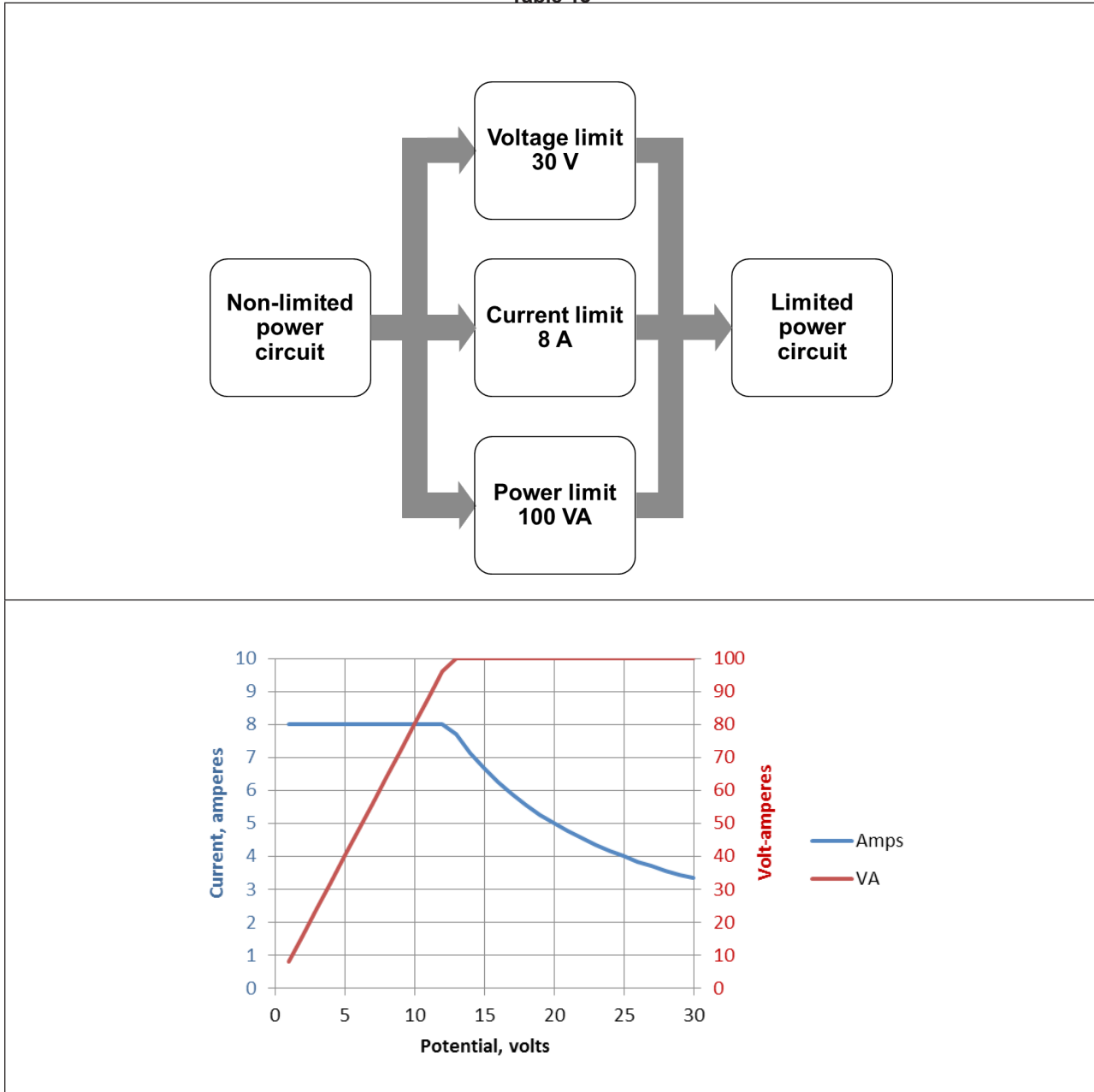
Abstract submission	May 15, 2012
Notification of Abstract Acceptance	June 1, 2012
Draft formal paper / presentation	July 1, 2012
Formal Final Paper	August 1, 2012
All Final Papers and Presentations	September 1, 2012

Prospective authors should submit e-papers using the on-line EDAS submission system. Please go to the Author's Kit page of the PSES web for comprehensive submission instructions including paper templates on the author tab at:



A limited power source has three parameters, voltage, current, and power. These three parameters are interdependent. See Table 13. While the IEC glossary requires the source to be isolated from the mains, IEC 60950-1 does not. (Many safety professionals would probably disagree that a limited power source could be ELV and not SELV.)

Table 13



Richard Nute, Vancouver, Washington, USA, is a product safety consultant. He is a Life Senior Member of the IEEE, member of the Board of Directors, IEEE/PSES, and Chief Technical Officer, IEC TC108/HBSDT

Referenced standards

Standard	Title
IEC 60050	<i>International Electrotechnical Vocabulary</i>
IEC 60065	<i>Audio, video and similar electronic apparatus – Safety requirements</i>
IEC 60364-4-41	<i>Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock</i>
IEC 60384-14	<i>Fixed capacitors for use in electronic equipment Part 14: Sectional specification: Fixed capacitors for electromagnetic interference suppression and connection to the supply mains</i>
IEC 60449	<i>Voltage bands for electrical installations of buildings</i>
IEC 60950-1	<i>Information technology equipment – Safety – Part 1: General requirements</i>
IEC 61140	<i>Protection against electric shock - Common aspects for installation and equipment</i>
IEC 61201	<i>Use of conventional touch voltage limits – Application guide</i>
IEC 61892-3	<i>Mobile and fixed offshore units – Electrical installations – Part 3: Equipment</i>
IEC 62282-5-1	<i>Fuel cell technologies - Part 5-1: Portable fuel cell power systems - Safety</i>
IEC 62282-6-100	<i>Fuel cell technologies - Part 6-100: Micro fuel cell power systems - Safety</i>

Continued from Page 9

TAC News

Information Technology Equipment

The IEEE PSES Technical Committee for Information Technology Equipment meets via teleconference for one hour the third Monday of every month at 3PM Central Time. Recent topics of conversation have included halogen free cables; progress of the new safety standard for ITE and Audio Video, IEC 62368; usage and transportation concerns related to lithium batteries; applicable safety requirements for high current equipment; and the recast Low Voltage and EMC Directives.

Persons interested in joining should contact Gary Schrempp at gary_schrempp@dell.com.

Telecom Safety

Current topics being discussed at the monthly meeting include:

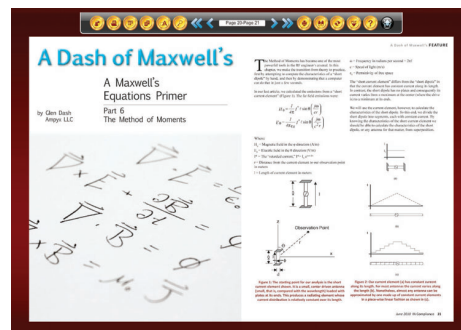
- New Telcordia GR-3171-CORE, Issue, Generic Requirements for Network Elements Used in Wireless Networks Physical Layer Criteria. Tendency is not to follow the NEC, but go to the Telcordia standards. In some case requirements of GR standards and NEC conflict. A new standard should not ignore common practice in the industry. This will be brought to the attention of the GR-3171-CORE committee.
- Revisions to 60950-22 standards – Proposal on battery ventilation. Incidents of explosions have been reported. Tom Burke of UL asked Don Gies to join the US TAG for TC108, so now we have representation on the TAG for TC108.
- Reviewing section 8.3 of 60950-22 and what is meant by “corrosion.”
- Submitted proposal to revise UL 60950-21 for remote feeding telecommunication (RFT) circuits so that it aligns with GR-1089-CORE Issue 6 and the requirements in the draft version of the ATIS line powering standard.



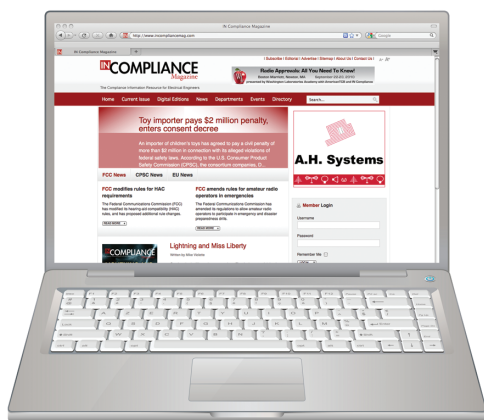
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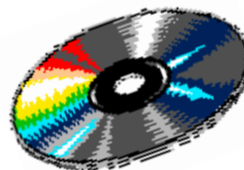
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Author Guide

Information for
Prospective Authors of PSEN
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The
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Inside...

About the *PSEN*

What we cover

What we do not cover

General do's and don'ts

Some policies and procedures

The article

Sizing guide for your article

About the *PSEN*

An information resource for the product safety community

Beginning with its first issue in late 2005, the *PSEN* has endeavored to provide both news of the Product Safety Engineering Society and articles that deliver useful information.

Most *PSEN* readers are actively involved in product safety as manufacturer compliance professionals, conformity assessment staff, standards developers, and consultants.

Finding and publishing information that meets the needs of this wide-ranging group of readers is a responsibility we take very seriously.

Editorial goal

Our editorial goal is to provide information of use to most of our readers in every issue. Therefore, we publish a variety of materials in each issue and avoid "theme" issues that concentrate on a single topic. Aside from news reporting, the heart of our coverage is the submitted articles that make up a significant portion of the editorial content of each issue.

Everything we publish is evaluated against two criteria:

1. It must be related to the activities of product safety professionals.
2. It must be useful information for a reasonable portion of our readers, who are located in a variety of countries.

We stay away from information that is simply "interesting" or "nice to know" and topics that are not useful to product safety professionals. Articles must not be "advertorial" in nature, as detailed on page 6 of this Guide.

What we cover

Description	<p>The <i>PSEN</i> covers topics related to safety throughout the life-cycle of products, from concept and design to manufacturing, use, and disposal or recycling. The nature of the topics ranges from technical to people-related to conference coverage.</p> <p>These are examples of subjects addressed in <i>PSEN</i> articles:</p> <ul style="list-style-type: none">• Hazard-Based Safety Engineering• Properties of plastics• EMC as it relates to product safety• Product safety tests• International concerns and issues• Earthing and bonding• Risk assessment• Designing beyond requirements of standards• Models for injury or protection against it• Standards harmonization activities• Product marking and instructions• Influences of national codes• Measurements and testing• Test equipment• Letters to the Editor
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What we do not cover

Topics not related to product safety professionals' activities	Although article topics are sometimes related indirectly to product safety (an example: relevant psychology) the <i>PSEN</i> does not publish articles that, however valuable, do not have a connection with the activities of product safety professionals.
Non-product types of safety	The <i>PSEN</i> does not cover safety topics or issues beyond those related to products. Examples of such topics are general workplace safety and process design.
R&D	The <i>PSEN</i> is not a research magazine. We don't report on basic R&D or the equipment it uses.

General do's and don'ts

Do

Familiarize yourself with the **PSEN** before proposing an article. If your topic doesn't relate to our areas of coverage, you will waste your time and ours.

Get right to the point in your writing. Both our editors and our readers will appreciate the time you save them by not beating around the bush. Treat your topic in a generic fashion. Use of company names or brand names in articles is inappropriate.

Be prepared to sign a transfer of copyright form for your **PSEN** feature article. We require copyright ownership of all feature articles.
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Submit the manuscript as a Microsoft Word document. A manuscript can be submitted as an e-mail attachment or on a disk. Preferred format is 1-inch margins all around, 12-point Times New Roman font, single-spaced. Do not embed illustrations in the Word document. If placement is important, indicate illustration locations by marker notes in the text.

Include illustrations (as separate files). We strongly urge the use of graphic materials: useful, informative illustrations. At least one per published page is desirable. If you need information additional to what is presented below, contact Jim Bacher at jbacher@speakeasy.net.

Keep a copy of everything you send us. There is always the possibility of a lost document.

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Don't

Submit your article material or idea to another publication at the same time.

Expect to see your material published in the next issue. The nature of publishing is such that months may pass between acceptance and publication.

Send unsolicited materials that you want returned.

Some policies and procedures

Deadline	<p>The PSEN is published quarterly during the last month of each calendar quarter. The following deadlines for submitted articles are necessary in order to meet that schedule.</p> <p>1Q issue: February 1 2Q issue: May 1 3Q issue: August 1 4Q issue: November 1</p> <p>The more lead-time you can provide, the better.</p>
Payment	<p>Contributed articles are not paid.</p>
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The article

Where to start	Although we occasionally reprint articles of special interest, <i>PSEN</i> editors are constantly looking for good, original articles. The submitted article is the mechanism by which you can publish in the <i>PSEN</i> . We prefer that you contact us prior to writing your manuscript so that we can guide you in the content. Queries should include an abstract or outline describing the proposed content. Indicate availability of photos or other illustrative materials.
You can't talk just about your own product	In most instances, articles must be exclusive to the <i>PSEN</i> , noncommercial, and broadly applicable. All references to individual manufacturers or proprietary products will be deleted. Your editor will make sure the information provided is unbiased. Manuscripts that appear to be unbalanced in their discussions of products or technologies will not be published.
Illustrations	<p>Photos submitted may be color prints, or preferably, high-resolution digital photos. Minimum usable size for a digital photo is approximately 1280 x 960 pixels (1+ megapixels). Much preferred size is 1800 x 1200 pixels (2+ megapixels) or even larger. Color prints should be clearly identified by means of a label placed on the back side. Do not write on the back side of prints.</p> <p>Scans should be high-resolution, 300 dpi minimum. Save scans as "tif" files.</p> <p>Other illustrations, such as diagrams, tables, checklists, and sidebars need not be in finished form; we will prepare final versions.</p>
Help	It's your article, but your editor is ready to help you make it shine. If you have useful information to contribute, but find that writing is like going to the dentist, talk with the editor. We may be able to help you share your knowledge.
Understand the medium and the audience	Please take particular note of pages 2 and 3 regarding our editorial approach, what we cover, and what we do not. <u>You need to know who our readers are and what types of information we supply to them.</u> Match the technical level of your presentation to the needs of our readers. Neither highly technical treatises nor shallow treatments help our readers.
Plan the length	See the sizing guide on the next page.

Sizing guide for your article

Our publishing requirements regarding article length are quite flexible. Almost all submitted articles printed in *PSEN* range between one and four pages in length.

Because of the intricacies of laying out the printed page, there is no simple formula by which you can determine how much space your article will require. A solid page of text contains roughly 500 words.

Your editor may specify a maximum length for your article as a number of pages. That means your word count is limited to 500 words/page minus illustration area. (Use the "Tools/Word Count" function in Word to get a count.) Additionally, the first page of the article has space for fewer words because of the space required by the title, byline, etc.

Also included in the word count is a tagline that you may place at the end of the article. The tagline identifies you and your affiliation. Here is an example of a tagline for an article by Joe Geschmutz:
Joe Geschmutz is product safety manager for wifflethingeys at XYZ Inc. He has worked in the product safety field for 11 years, both in manufacturing and at an NRTL.

Product Safety Engineering Newsletter

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Closing dates for submitted articles:

1Q issue: February 1
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We invite applications for Institutional Listings from firms interested in the product safety field. An Institutional Listing recognizes contributions to support publication of the IEEE Product Safety Engineering Newsletter. To place ad with us, please contact Jim Bacher at j.bacher@ieee.org

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