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EMC

Radio

Telecom

Environmental

Product Safety

International Approvals

Think outside the ITE box:

new regulatory requirements and their impact on the manufacturers

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Agenda

9:30-11:00 - Introduction and overview of changes in IEC 60950-1 Second Edition.

- **Manufacturer responsibilities resulting from safety standard changes.**
- **Overview of the latest developments in world of ITE certification.**

11:15-12:45 - Zoom-in on critical changes.

- **Requirements for special installations and applications.**
- **Component selection for CB and NRTL approval.**

13:00-14:00 - Lunch

14:00-15:30 - Review of requirements for Outdoor Equipment

- **Environmental protection issues related to certification**
- **Construction issues not related to IP rating.**

15:45-17:00 - Questions and Answers.

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Part 1 (9:30-11:00)

Overview of changes in Regulatory requirements related to IEC 60950-1 Second Edition.

- **Manufacturer responsibilities resulting from safety standard changes.**

- **Overview of the latest developments in world of ITE certification.**

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Background

The latest version of IEC 60950-1, its Second Edition, and its collateral standards were published in 2005.

It supersedes its predecessor, IEC 60950-1, First Edition, originally published in 2001.

IEC collateral standards to be used with IEC 60950-1

- **Part 21: Remote power feeding**
- **Part 22: Equipment Installed Outdoors**
- **Part 23: Large Data Storage Equipment**

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CE: Effective date information

European Standardisation Organisation (1)	Reference and title of the standard (and reference document)	Reference of the superseded standard	Date of cessation of presumption of conformity of the superseded standard Note 1
Cenelec	EN 60950-1:2006 Information technology equipment — Safety — Part 1: General requirements (IEC 60950-1:2005 (modified))	EN 60950-1:2001 and its amendment Note 2.1	1.12.2010
Cenelec	EN 60950-21:2003 Information technology equipment — Safety — Part 21: Remote power feeding (IEC 60950-21:2002)	None	—
Cenelec	EN 60950-22:2006 Information technology equipment — Safety — Part 22: Equipment installed outdoors (IEC 60950-22:2005 (modified))	None	—
Cenelec	EN 60950-23:2006 Information technology equipment — Safety — Part 23: Large data storage equipment (IEC 60950-23:2005)	None	—

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CE: Manufacturer responsibilities

Manufacturer responsibilities resulting from harmonized standard changes

At the end of transition period on December 1st (date of cessation), EN 60950-1:2001 and its amendment will be withdrawn.

Once withdrawn, this standard will be removed from the EU list of harmonized standards and will no longer provide a presumption of conformity for the purposes of CE marking.

This presents a potential problem for holders of DoC specifying these withdrawn standards at the time of placing product on the market.

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CE: Placement on the market

Definitions

A product is placed on the Community market when it is made available for the first time. This is considered to take place when a product is transferred from the stage of manufacture with the intention of distribution or use on the Community market.

The concept of placing on the market refers to each individual product, not to a type of product, and whether it was manufactured as an individual unit or in series.

DoC dated before Date of cessation of presumption of conformity of the superseded standard as specified in OJ may or may not be allowed. But any revisions of product or adding new products to the family is definitely unacceptable.

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CE: Manufacturer responsibilities (cont)

- **The contents of the Declaration of Conformity remain the responsibility of the manufacturer.**

- **Manufacturer is to determine how the changes in the applicable Directive or harmonized standard apply to his equipment.**

- **All manufacturers with DoC and Certificates citing withdrawn Directives or standards should review their equipment against the requirements of the new Directive and its applicable standards, and issue new DoC.**

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UL: Effective date information

UL is in the process of removing Effective Date information from UL's ITE related standards. Instead, they provide Effective Date information on UL Web site.

http://www.ul.com/hitech/ite/dates.html

It is recommended to check from time to time so that you will have the most current Effective Date information.

NOTE: A UL effective date is one established by Underwriters Laboratories Inc. and is not part of the ANSI approved standard, meaning you should check the policy of your NRTL to make sure they agree to evaluate your product to the previous version.

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UL: Effective date information (cont.)

UL 60950-1, 2nd Edition

Date of publication: March 27, 2007

Date of withdrawal of previous standards: As of December 1, 2010, new product submittals will be evaluated using all the requirements in UL 60950-1 Second Edition.

Products that are certified by Underwriters Laboratories Inc. to previous ITE standards may continue to be certified without further investigation, unless otherwise communicated by UL. However, any significant changes made to these products will be evaluated to the standard(s) used for new product submittals as of the date of the change request, i.e., UL 60950-1 Second Edition.

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UL 60950-22 (Equipment Installed Outdoors)

Date of publication: April 23, 2007

Date of withdrawal of previous standards: Since UL 60950-22, First Edition is the first edition of this standard, new product submittals will be evaluated using all the requirements in UL 60950-22 First Edition. Since similar requirements have been used to evaluate presently Listed products of this type, no review of presently Listed products is necessary.

UL certification practices resulting from the publication of the 60950-22 standards were not changed. UL practice before 60950-22 was available is outlined in the *UL Application Guideline: Certification of ITE Installed Outdoors (June 01, 2001)*.

However, other NRTLs were less consistent in application of additional requirements for outdoor applications.

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IEC/EN/UL 60950-1, 2nd Edition

Various comments of this presentation are based on CERTIFICATION IMPACT ANALYSIS by UL – technical papers by Thomas M. Burke, Principal Engineer of UL Inc.

Unless otherwise noted, all Sub-clause/Annex references are to IEC 60950-1, Second Edition and IEC 60950-22.

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1.1.1 Equipment Covered by this Standard

Component approval and its implications.

For the first time, the Standard explicitly covers under its scope ITE component and subassemblies, such a component switch mode power supplies.

Scope states that such components and subassemblies may not comply with “every aspect of the standard, provided that the complete information technology equipment, incorporating such components and subassemblies, does comply.”

The same consideration is inherent to UL’s Recognized Component Conditions of Acceptability (CoA). They are required to determine if testing performed on subassembly covers ALL safety aspects of application in complete equipment.

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Component approval

Introduction of concept "component approval" can create a gap between your expectations for coverage of component assessment, and actual testing performed.

Components covered under UL Component Recognition Mark program are considered incomplete and are intended to be installed into another device, system or end-product. In terms of safety, such components are only intended for factory installation, not field installation.

As the End-use equipment manufacturer, you become responsible for ALL safety aspects of complete equipment and its installation, even those of incorporated certified components.

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Example 1 for component approval limitations

Q: **Telecom terminal equipment is installed outdoors and powered by 12VDC via terminal block. Can such power supply be used for this purpose without additional evaluation?**

MEAN WELL

60W Single Output Switching Power Supply **CLG-60 series**

■ Features :

- Universal AC input / Full range
- Protections:Short circuit/Over load/Over voltage/Over temperature
- Built-in active PFC function
- IP67 design for indoor or outdoor installations
- UL1310,Class 2 power unit
- Cooling by free air convection
- 100% full load burn-in test
- Suitable for LED lighten and moving sign applications.
- High realibility
- 3 years warranty

(for 48V only) (except for 48V) IP67

SPECIFICATION

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Example 1 for component approval limitations (cont.)

A: **NO!!! And there are many reasons for it.**

1. **Components covered under UL Component Recognition Mark program are considered incomplete and are intended to be installed into another device, system or end-product. In terms of safety, such components are only intended for factory installation, not field installation.**

2. **Standard UL1310 and IEC60529 do not cover UL or CE Requirements for Telecom terminal equipment installed outdoors. Applicable standards are EN/UL60950-1 2nd Edition and EN/UL60950-22.**

3. **Other aspects of installation to be considered, like Installation Category for Over-Voltage Protection (OVP), outdoor or plenum cable ratings, and the like.**

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Example 1 for component approval limitations (cont.)

Q: **Manufacturer puts a plug, provide installation instructions and evaluate to end-use equipment standard as part of installation. Is it OK?**

Still No! SVT rated cable on input side of power supply is not acceptable for outdoor installation.

Nomenclature Key used for cable identification are as follows.

S = Service Grade (also means extra hard service when not followed by J, V, or P)
J = Hard Service
V = Light duty cable
T = Thermoplastic
W = Outdoor-includes sunlight resistant jacket and wet location rated conductors

Examples:

SVT—Thermoplastic insulated cord, with or without 3rd conductor for grounding purposes; 300V. (PVC)
SJT— Junior hard service, thermoplastic insulated conductors and jacket. 300V. (PVC)
SJTW—Same as SJT except outdoor rated. (PVC)

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Component approval

The gap between your expectations for coverage of component assessment, and actual testing performed can be further increased if component is approved to earlier editions of IEC60950.

Main problems

- **Surge arrester in AC power interface (almost every PS)**
- **New policy of NCB for specific installations**
- **Grounding**
- **Limited power source requirements for all signal ports**

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1.5.9 Surge Suppressors

New sub-clause on Surge Suppressors.

IEC, CE: For surge suppression devices used in Primary Circuits, they are required to be a Voltage Dependent Resistor (VDR) type, like a MOV/Varistor and to be subjected to new requirements in Annex Q, Voltage Dependent Resistors (VDR).

Annex Q requires investigation to (a) preferred climatic category, (b) maximum continuous voltage, and (c) pulse current requirements, per IEC 61051-2, Varistors for use in electronic equipment – Part 2: Sectional specification for surge suppression varistors.

UL, CSA: Annex P.2 says that all IEC component standard requirements in UL standard are replaced by the relevant requirements of CSA and UL component standards as listed in this annex. For 1.5.9, it calls UL1449 must be used instead of IEC 61051-2.

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Transition of Recognized Component Transient Voltage Surge Suppressors (XUHT2)

UL advertised that all existing Recognized Component surge protection devices complying with UL1449 2nd Edition should be upgraded to the latest requirements contained in UL1449 3rd Edition by September 30, 2009.

One result of this change is that the upgraded devices are certified under the new category VZCA2 and the current category XUHT2 will be obsolete.

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Manufacturing issues with Surge Suppressors

End-use products complying with IEC/EN/UL60950-1 1st Edition and employing PS with MOVs may have problems with getting approvals to 2nd Edition (requires PS schematics), and also with follow-up inspections.

End-of-life issues should be considered. Note CoC for PS should mention type of varistor as called in Report!

Also, Production Line Tests to be considered when common mode protection is used!

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1.5.9 Surge Suppressors (cont.)

Per Table 2J of UL 60950-1:2007 below component power supply rated 100-240V; OVC II can be used in equipment installed outdoors and rated 120V; OVC III. In this case, no additional protection is required as transient rating is 2500V of power supply is not exceeded.

AC MAINS SUPPLY voltage [a] up to and including	MAINS TRANSIENT VOLTAGE [b] V peak	
	Overvoltage Category	
V r.m.s.	I	II
50	330	500
100	500	800
150 [c]	800	1 500
300 [d]	1 500	2 500
600 [e]	2 500	4 000

[a] For equipment designed to be connected to a three-phase, three-wire supply, where there is no neutral conductor, the AC MAINS SUPPLY voltage is the line-to-line voltage. In all other cases, where there is a neutral conductor, it is the line-to-neutral voltage.

[b] The MAINS TRANSIENT VOLTAGE is always one of the values in the table. Interpolation is not permitted.

[c] Including 120/208 V and 120/240 V.

[d] Including 230/400 V and 277/480 V.

[e] Including 400/690 V.

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2.10.3 Clearances

To assist with the consistent application of the Standard, a new clause provides guidance on how to determine the Mains Transient Voltages has been added, which includes specific guidance for equipment connected to

- **The AC Mains Supply (2.10.3.2a),**
- **Earthed DC Mains Supply (2.10.3.2 b),**
- **Unearthed DC Mains Supply (2.10.3.2 c), and**
- **Battery Operation (2.10.3.2 d).**

Reference is made to new informative Annex Z, Overvoltage Categories, which provides some additional guidance on how to identify specific Overvoltage Categories based on the intended installation location.

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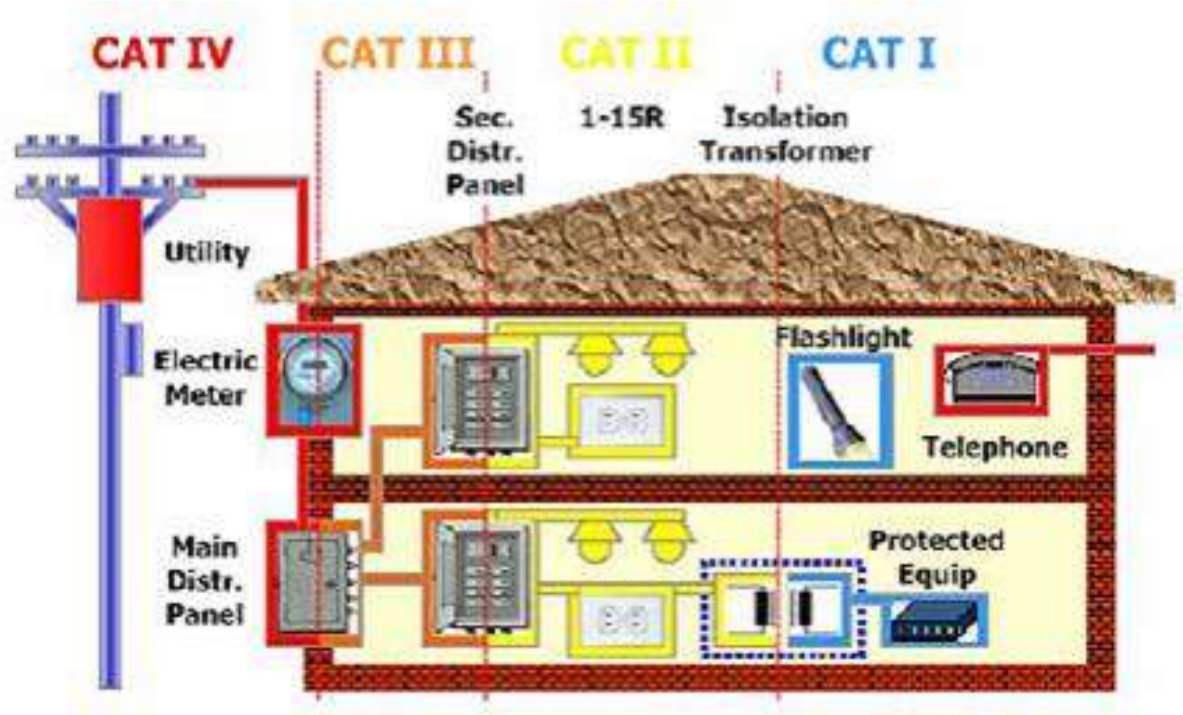
Example 1 for component approval limitations (cont.)

IEC 60664 Installation category for equipment that will be supplied mains power from a dedicated outdoor service (e.g. transformer on a utility pole), or mains power from a branch circuit originating from inside a building is Installation Category III.



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Example 1 for component approval limitations (cont.)

Table G.1 – AC mains transient voltages

AC MAINS SUPPLY voltage [a] V r.m.s.	MAINS TRANSIENT VOLTAGE [b] V peak			
	Overvoltage Category			
	I	II	III	IV
up to and including 50	330	500	800	1 500
over 50 up to and including 100	500	800	1 500	2 500
over 100 up to and including 150 [c]	800	1 500	2 500	4 000
over 150 up to and including 300 [d]	1 500	2 500	4 000	6 000
over 300 up to and including 600 [e]	2 500	4 000	6 000	8 000

[a] For equipment designed to be connected to a three-phase, three-wire supply, where there is no neutral conductor, the AC MAINS SUPPLY voltage is the line-to-line voltage. In all other cases, where there is a neutral conductor, it is the line-to-neutral voltage.

[b] The MAINS TRANSIENT VOLTAGE is always one of the values in the table. Interpolation is not permitted.

[c] Including 120/208 V and 120/240 V.

[d] Including 230/400 V and 277/480 V.

[e] Including 400/690 V.

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Example 1 for component approval limitations (cont.)

Table 2K – Minimum clearances for insulation in primary circuits and between primary and secondary circuits

CLEARANCES in mm															
PEAK WORKING VOLTAGE [a]	MAINS TRANSIENT VOLTAGE														
	1 500 V [c]						2 500 V [c]						4 000 V [c]		
up to and including	Pollution degree														
	1 and 2 [b]			3			1 and 2 [b]			3			1, 2 [b] and 3		
V	F	B/S	R	F	B/S	R	F	B/S	R	F	B/S	R	F	B/S	R
71	0,4	1,0 (0,5)	2,0 (1,0)	0,8	1,3 (0,8)	2,6 (1,6)	1,0	2,0 (1,5)	4,0 (3,0)	1,3	2,0 (1,5)	4,0 (3,0)	2,0	3,2 (3,0)	6,4 (6,0)
210	0,5	1,0 (0,5)	2,0 (1,0)	0,8	1,3 (0,8)	2,6 (1,6)	1,4	2,0 (1,5)	4,0 (3,0)	1,5	2,0 (1,5)	4,0 (3,0)	2,0	3,2 (3,0)	6,4 (6,0)
420	F 1,5 B/S 2,0 (1,5) R 4,0 (3,0)												2,5	3,2 (3,0)	6,4 (6,0)
840	F 3,0 B/S 3,2 (3,0) R 6,4 (6,0)														
1 400	F/B/S 4,2 R 6,4														
2 800	F/B/S/R 8,4														

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Example 2 for component approval limitations

MEAN WELL

700W True Sine Wave DC-AC Power Inverter **TS-700 series**

■ Features :

- True sine wave output (THD<3%)
- High surge power up to 1400W
- High efficiency up to 91%
- Power ON-OFF switch
- Standby saving mode can be selectable
- Front panel indicator for operation status
- Built-in fan ON-OFF control function
- Protections: Bat. low alarm / Bat. low shutdown / Over voltage / Over temp. / Output short / Reverse polarity / Overload
- Application : Home appliance, power tools, office and portable equipment, vehicle and yacht ...etc.
- 2 years warranty

FC E13 CE

SPECIFICATION

MODEL		TS-700-112□	TS-700-124□	TS-700-148□	TS-700-212□	TS-700-224□	TS-700-248□
	RATED POWER (Typ.)	700W					
	MAXIMUM OUTPUT POWER (Typ.)	800W for 180 sec. / 1050W for 10 sec. / surge power 1400W for 30 cycles					
	AC VOLTAGE	Factory setting set at 110VAC			Factory setting set at 230VAC		
		100 / 110 / 115 / 120VAC selectable by setting button S.W			200 / 220 / 230 / 240VAC selectable by setting button S.W		

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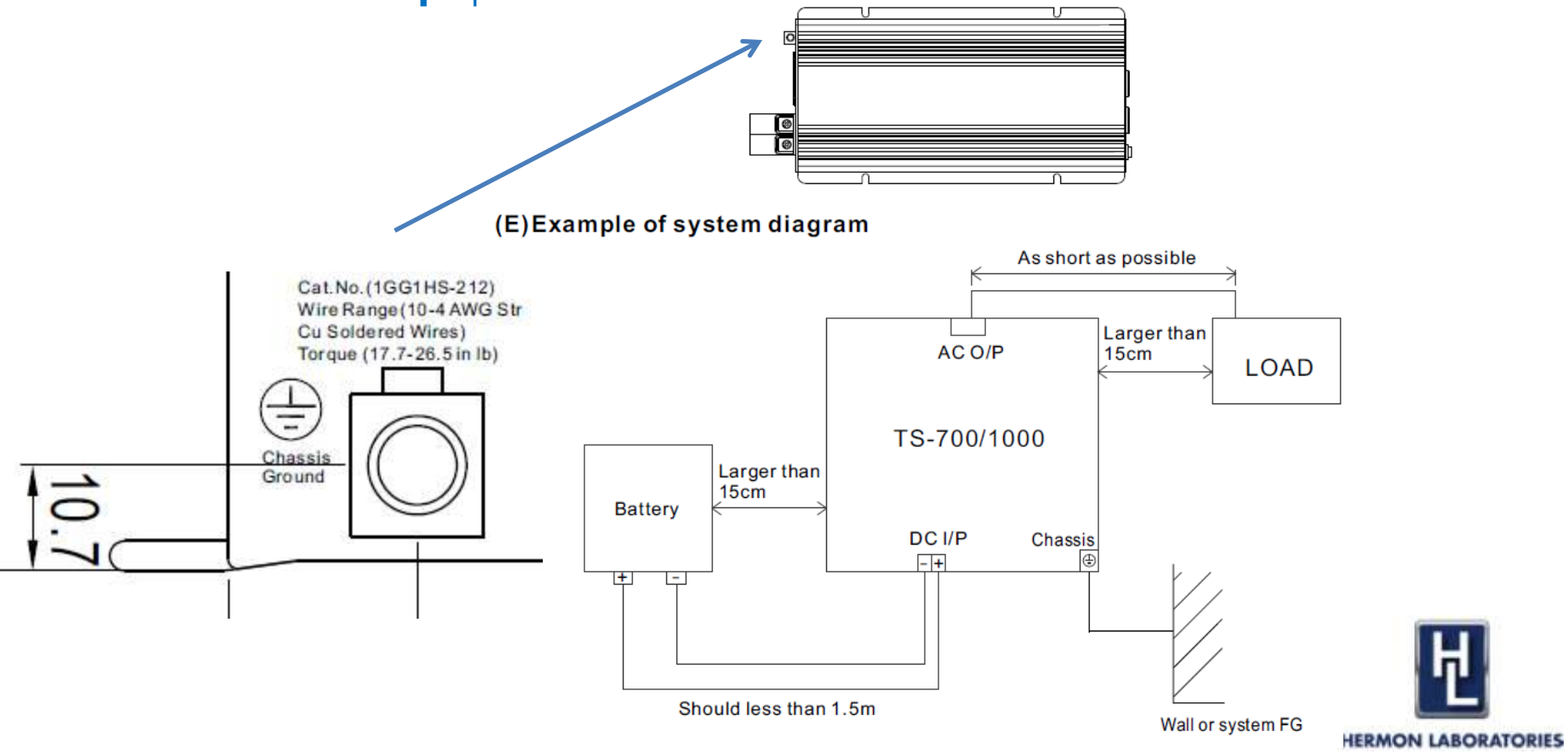
Example 2 for component approval limitations (cont.)

ITE ac/dc converter is installed on a vehicle and powered by 12VDC via terminal block.

Q: **Can such power supply have grounded AC outlet for connecting AC Class I ITE equipment?**



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2.6.3 Protective Bonding Conductors

A: **NO, unless grounding is provided as required per user manual.**

Rework of sub-clause to clarify its intended application.

2.6.3.4 incorporates requirement based on the trip characteristics of overcurrent protection devices.

Test duration is 120 seconds at 200% of the Protective Current Rating for circuits protected by devices with a Protective Current Rating up to 30 A.

UL: New Note 1 clarifies in the U.S./Canada the Protective Current Rating of a circuit associated with Pluggable Equipment Type A is 20A.

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2.1.1.8 Energy Hazards – DC Mains Supplies

This is a new requirement for ITE intended to be connected to a DC Mains supply.

ITE connected to a DC Mains supply is required to have at its point of disconnection energy levels that are not considered a Hazardous Energy Level, or

if hazardous, a Hazardous Energy Level that is removed within 2 seconds of disconnection.

A HAZARDOUS ENERGY LEVEL exists if the voltage, U, is 2 V or more, and the stored energy, E, exceeds 20 J. ($E = 0,5\ CU^2$)

Please also note the car is Pollution Degree 3!

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Hazard Based Safety Engineering (HBSE)

HBSE is a new direction which has been already implemented for machinery and medical equipment, and it is penetrating other equipment categories including ITE. Follow up on newest updates!

Example: For purposes of UL ITE certification, ITE intended for children may be considered different than ITE that children may be exposed to.

There are no explicit restrictions or limitations placed on ITE that children might be exposed to, other than what is contained in the UL/IEC 60950-1.

However, when ITE is specifically marketed for this user segment and is intended to be used by children, or it incorporates child-based themes in its design, the level of concern and potential for foreseeable abuse increases, so the requirements in UL/IEC 60950-1 are supplemented by other appropriate requirements.

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Applying HBSE to safety

NCB may require supplementing UL/IEC 60950-1 with the additional requirements that are determined by use of sound HBSE principles.

Through HBSE, it will be determined whether there are any potential hazards that are not adequately addressed by UL/IEC 60950-1 and whether additional requirements are needed that supplement the base UL/IEC 60950-1 requirements.

If potential hazards are identified by HBSE that are not addressed in UL/IEC 60950-1, appropriate requirements from other IEC/EN/UL or other standards can be used

Example: UL will consider UL 696 or ASTM F963 for ITE intended for children.

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Conclusions

“Plug and play” approach to using components in your end-use product will most likely not work.

Make sure to understand limitations of your components and prepare to cover them in end-use product investigation.

- **Certification level, Conditions of acceptability, Installation instructions and user manual must be obtained and reviewed**

- **Relevant safety and regulatory issues must be passed over “back-to-back” to the end-product user (like lithium battery instructions for mother board incorporated in end-use product).**

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Conclusions (cont.)

You need to understand your product environment to provide expected level of safety.

System approach has always been required, but 3rd Edition put more stress on “thinking outside the box” and NCB are encouraged to apply HBSE.

Remember that in many cases the final acceptance is provided by National Certification Body and/or local regulation authority.

In Europe and USA, the final acceptance of equipment at a particular installation remains the responsibility of the Authority Having Jurisdiction (AHJ).

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Looking into a future

IEC 62368 (Safety of Audio/ Video, Information and Communication Technology Equipment) has been already issued. It covers products currently under the scopes of both IEC 60950-1 and 60065, but it is not a merger of these two standards.

IEC 62368 is a new standard containing mostly new requirements that were developed using HBSE. It is less technology (construction) dependent and more performance based.

The objective is that it will allow for implementation to a broader range of products and applications without leaving holes in coverage of safety aspects.

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Part 2 (11:15-12:45)

Zoom-in on critical changes

- **Requirements for special installations and applications.**
- **Component selection for CB and NRTL approval.**

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2.3.2 Separation of TNV Circuits From Other Circuits

IEC 60950-1:2005: Complete rewrite and rework of separation requirements for TNV circuits from other circuits and accessible parts.

Provides more practical "separation" options that apply to modern designs involving telecommunication circuits, including ITE that is not earthed and ITE without isolation between SELV and TNV circuits.

Q: **Under what conditions 12-48VDC power, Ethernet and E1/T1 should be considered TNV and require such separation?**

A: **Depends whom you ask!**

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Separation of TNV Circuits From Other Circuits (cont.)

TUV RNA position on UL60950-1 and UL60950-22 regarding outdoor cables is different from UL and ETL.

UL Application Guidelines (PAG) for ITE installed outdoors specifies that external data circuits should be considered SELV if exposed wiring is less than or equal to 140 feet, and treated as TNV-1 if exposed wiring is greater than 140 feet.

ETL accepts UL PAG as is.

TUV position is that data wires exit the building assumed to be TNV1. Their rational is based on the references made in Annex NAE for the NEC. The NEC describes specific conditions for limiting the lightning exposure. One of these conditions is length not to exceed 140 feet, but there are further conditions for grounded conduit, burial etc.

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2.5 Limited Power Sources

Significant rework of subclause affects most ITE products.

Classification of LPS is changed. Protection schemes from "inherently" or "not inherently" limited are changed to "without an overcurrent protection device" or "with an overcurrent protection device."

The previous 5 example constructions (e.g., output inherently limited in compliance with table 2B) have been reduced to 4.

Relaxation for sources without an overcurrent protective device: all maximum VA limits are now 100 VA, i.e., output voltages equal or less than 20 V no longer have a VA limit of 5xUoc.

Q: **If it is a relaxation, how does it affect certified ITE products?**

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3.5.4 Data Ports

A: **Indirectly.**

2nd Edition adds new requirement that SELV circuits associated with data ports that supply/source power to other devices shall be classified as a Limited Power Source (LPS).

This may have not been tested during certification to 1st Edition.

The rationale supporting this revision includes the consideration that many manufacturers who produce devices/accessories intended for connection to these ports consider the enclosures of their devices/accessories Decorative Parts. As a result they use HB materials, which the Standard only justifies if the power source supplying power to the device is LPS.

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2.10.4-5 Creepages and Solid Insulation

1st Edition allows 0.4mm spacing for reinforced insulation on inner layers of PCB.

If 90C is exceed, multi-layer PCB must be changed to provide higher spacing for internal layers.

Previous practice is covered by Exemption in 2.10.5.5 which applies only for printed boards using pre-preg if the temperature of the printed board measured during the test of 4.5.2 does not exceed 90 C.

For thin sheet materials with non-separable layers of three layers or more, the requirements in 2.10.5.8, 2.10.5.9 and Annex AA are more onerous than 1st Edition requirements.

Greatest impact will be on Reinforced Insulation with 3 or more layers since new testing per Annex AA, Mandrel Test, will be required.

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4.2.11 Rack Mounted Equipment

Additional construction, performance & marking requirements have been added for Rack Mounted Equipment to evaluate slide rail designs during their installation, service and maintenance.

The requirements consist of

- **Construction requirement that end stops be provided (4.2.11),**
- **Variable – Mechanical Strength Test (4.2.11.1),**
- **250 N – Mechanical Strength Test (4.2.11.2), also applies to End Stops (4.2.11.3), and**
- **Rack Mounted Equipment Marking (4.2.11.4).**

4.2.11 tests applied to complete rack/cabinet systems that include both the rack mount equipment, complete set of slide rail components and rack, unless the rack mounted equipment is investigated and specified for use in a specific OEM's rack/ cabinet.

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4.3.8 Batteries

A new requirement for Operator-replaceable batteries for Transportable Equipment (e.g., battery packs) requires that the contacts/terminals be designed so they cannot be shorted with the test finger, or if shorted, the batteries are inherently protected without creating a hazard.

For products incorporating UPS: new requirement requires a battery tray if the battery contains liquid or gel electrolyte.

Protection of very small size lithium battery, like ML414RU by Sanyo Energy (diameter 4.8mm, height 1.4mm, weight 0.08g). If UL Recognized, then no protection circuitry may be required (depends on NCB). If it is not UL Recognized, but safe current and voltage rating is provided, then a battery protection circuit may be required.

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Component selection for CB and NRTL approval.

CB rules for components acceptance define 4 potential situations for component requirements:

- **There is an existing IEC standard for the component;**
- **There is no IEC standard but there is a regional or national standard for the component;**
- **No component requirements exists;**
- **The end-product standard contains component requirements.**

http://www.iecee.org/Operational_documents/iecee_documents/od-cb2039_ed.1.0.pdf

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Conclusions.

UL is not “worst case” for fuses, internal cables and power supplies any longer!

Using National Difference allowances for National Standards (like UL 1449 for surge suppressors) can prevent obtaining CB Report.

CB and NRTL approval status for components and sub-assemblies should be provided ahead of investigation.

If component approvals are adequate and acceptable, CB, NRTL and CE projects should take the same timeframe.

Acceptance of construction or component is very much dependant on certification path.

Watch latest developments in IEC component standards.

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Part 3 (14:00-15:30)

Review of requirements for Outdoor Equipment

- **Environmental protection issues related to certification.**
- **Construction issues not related to IP rating.**

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1.1 Scope - Equipment Covered

This Part 2 Standard only applies to ITE intended to be “installed” in an outdoor location. ITE that may be used outdoors is not Outdoor ITE unless the manufacturer specifies it is intended to be used outdoors continuously.

This standard also applies to empty Outdoor Enclosures supplied for housing ITE to be installed in an outdoor location. This supports certification programs of empty ITE cabinets intended to be installed outdoors.

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Environmental protection issues

IP rating only is not sufficient also for Europe! Requirements are more similar to UL50E.

Also, NEMA Ratings and IP “Equivalency Charts” cannot be used at face value.

Type 4 is compared to IP56, but you cannot use it for claiming compliance to UL60950-22.

UL has special product category, Information Technology and Communications Equipment Cabinet, Enclosure and Rack Systems, NWIN.

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4.1 Ambient Air Temperature

The ambient temperature (Tma) range used to determine compliance with performance requirements is either –33C/+40C or other values specified by the manufacturer.

This requirement can be viewed as a minimum performance level within this "minimum safety standard."

Since the –33C/+40C default values are relatively moderate, manufacturer-specified values likely will be more commonly used.

Note – The Nordic countries have declared/specified a minimum extreme of –50 C.

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5 Marking and Instructions

Requires that installation instructions include any details necessary to document any special features needed for protection of the equipment from conditions in an Outdoor Location.

When a manufacturer of an Outdoor Enclosure classifies a product in accordance with IEC 60529, the IP code is required to be “declared” (e.g., in installation practice/instructions), but it is not required to be marked on the enclosure.

In most cases, IP code must be verified by test.

UL60950-22 additionally requires Outdoor Enclosure to be classified and marked in accordance with UL 50 or CAN/CSA C22.2 No. 94. Per UL, such a declaration or marking is only applicable to an Outdoor Enclosure, not Outdoor Equipment. Other NCB requires marking in any case.

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6.1 Voltage Limits of User-Accessible Parts

For “User-Accessible conductive parts” in an Outdoor Location, these parts are required to be SELV, except that the voltage limits are halved (e.g., 30 V d.c.).

Applicability of this requirement to ‘parts’ of the system that may be user accessible, but that have no ‘circuits’ that are “user-accessible conductive parts” (like a User accessible cable/connector assembly with no exposed circuits) shall be considered.

Such parts/circuits can operate at normal ‘dry location’ SELV levels if the ‘circuits’ are not actually “user-accessible.”

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8.1 General construction requirements

Requires corrosion to be addressed, including potential corrosion of the Outdoor Enclosure, connectors, dials etc., if they serve as a functional part of the Outdoor Enclosure.

Outdoor Enclosures are not allowed to carry current during normal operation (e.g., Secondary circuit connected to chassis, thus chassis becoming part of the Secondary circuit) if this could cause corrosion that would impair safety.

Per UL50E, section 7.2.1.1 the enclosures made of the following materials shall be considered to comply with the indoor and outdoor corrosion requirements:
a) Copper, aluminum, or stainless steel; and
b) Bronze or brass containing at least 80 percent copper.

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8.5 Gaskets

Gaskets used to allow the Outdoor Enclosure to comply with the Part 2 performance requirements are required to be subjected to the relevant tests in Annex D.

They shall be secured by adhesive or mechanical means (8.5.3). There may be some additional consideration need to be given to appropriate performance testing for the adhesive, if used with gaskets.

UL has approval category JMLU2 for Gaskets and Seals, but UL 157 used for this category does not have the same compression test as detailed in UL 60950-22, D3. Therefore the test would need to be conducted or a gasket complying with all applicable requirements of UL 60950-22 would need to be used

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9.1 Protection from Moisture

Performance testing related to protection from moisture is conducted either per IEC 60529, based on the desired IPX code, or per Annex B (Water Spray Test).
At the conclusion of the test,

Outdoor Enclosures may have no water entering the Enclosure, and Outdoor Equipment may have water enter the Enclosure if it would not present a hazard as described. Water is permitted to enter an Outdoor Enclosure with electronic equipment inside it if the impact on safety of water entering the enclosure can be determined and there is no hazard. This would apply to a complete system, i.e., cabinet with internal electronic components/ subassemblies.

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10 Mechanical Strength of Enclosures

Outdoor Enclosures and Outdoor Equipment are required to have adequate mechanical strength, similar to Indoor ITE.

However, for equipment with a polymeric enclosure the Impact Test per Sub-clause 4.2.5 of 60950-1 is to be carried out at the minimum ambient temperature specified by the manufacturer (Tma), or –33 C if no such ambient is specified.

After the application of the test, not only is accessibility to hazardous parts a concern, but also ingress of dust and moisture.

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Q & A

Thank You!

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