



# Accredited Standards Committee C63<sup>®</sup>

## Electromagnetic Compatibility

### Subcommittee 5: Immunity Testing and Measurements

Chair: [Ed Hare](#)

Vice Chair: [Steve Whitesell](#)

Secretary: [Jerry Ramie](#)

March 6, 2018; 1:30 PM – 3:30 PM - EST

Webinar

### Approved Meeting Minutes

1. **Call to Order: Chair** - The Vice-Chair called the meeting to order at 1:36PM-EST.

1.1 **Announcements: Chair's remarks** - none

1.2 **Meeting logistics announcements: Host**

1.3 **Introductions: Secretary – roll call** (record attending members with their affiliations and guests separately below) **Report any roster errors to the ASC-C63<sup>®</sup> Secretary** (insert [SC5 membership roster](#) from the website as shown below) [Ross Carlton](#) to become a Member? (see below)

### Subcommittee 5 Membership Roster

Name	Role within SC	Affiliation
<a href="#">Berger, Stephen</a>	Member	TEM Consulting
<a href="#">Fanning, Craig (a)</a>	Member	Elite Electronic Engineering
<a href="#">Griffin, Andy (a)</a>	Member	Cisco Systems
<a href="#">Hare, Ed</a>	Chair	ARRL
<a href="#">Heirman, Don (a)</a>	Member	Don HEIRMAN Consultants
<a href="#">Hoolihan, Dan</a>	Member	Hoolihan EMC Consulting
<a href="#">Lombardi, Rick</a>	Member	Visteon Corporation
<a href="#">Long, Randy</a>	Member	ANSI-ASQ National Accreditation Board dba L-A-B
<a href="#">Ramie, Jerry</a>	Secretary	ARC Technical Resources, Inc.
<a href="#">Schaefer, Dave</a>	Member	TUV SÜD America
<a href="#">Silberberg, Jeffrey L</a>	Member	FDA Center for Devices & Radiological Health
<a href="#">Whitesell, Steve</a>	Vice Chair	Whitesell Consulting
<a href="#">Zimmerman, Dave (a)</a>	Member	Spectrum EMC

Guests and Observers: (non-voting) Ross Carlton

1.4 **Quorum: (50% of roster + 1) constitutes a quorum.** (rounding down) (13 roster members / 2 = 6.5 + 1 = 7.5 (therefore 7 people are required for a quorum) **Was quorum achieved? (No)** If not, any actions taken are subject to confirmation by electronic ballot or at a future meeting. (Quorum is not required for Working Group meetings)

2. **Approval of the Agenda: Secretary** - The Agenda was approved by acclamation.

2.1 **Approval of the previous Minutes** - 20180130 [Minutes of the previous meeting](#) - The previous Minutes were [approved](#) by acclamation.

2.2 **Review of the [patent slides](#)** - The slides were shown and all agreed to abide by the patent policy.

### 3. Review of [Subcommittee Membership](#): Secretary - Report any errors to the ASC-C63<sup>®</sup> Secretary -

#### 3.1 Review of Membership Guidelines – any members at risk?

##### Subcommittees:

For an individual to remain a voting member of a Subcommittee, active participation in Subcommittee meetings and regular responses to Subcommittee email votes is required. Should a member fail to attend at least one of three consecutive scheduled meetings (in person or remotely via web conference (when used)) or respond to at least one of every two consecutive Subcommittee email votes, their membership in that Subcommittee may be at risk.

Note: Abstentions shall be treated the same as a “yes” or “no” vote regarding the requirement to respond to email votes.

##### Working Groups:

For an individual to remain a member of a Working Group, active participation is required. Should a member fail to attend at least one of three consecutive scheduled meetings (in person or via web conference (when used)) their membership in that Working Group may be at risk. Individual Working Groups may establish additional participation criteria and/or modify this requirement.

##### Member Attendance Log:

SCS Members	Apr 2014	Nov 2014	May 2015	Nov 2015	May 2016	Nov-16	May-17	Nov-17	2018Jan
Stephen Berger	X	X			x			x	
Craig Fanning						x		x	x
Andy Griffin	X	X	x	W	x	x			
Ed Hare	X	X	X	X	x	x	x	x	x
Don Heirman	X	X	X	X	x	x	x	x	x
Dan Hoolihan	X	X	X	X	x	x		x	
Rick Lombardi	X		W	W	x	x	x	x	
Randy Long				X	x	x		x	
Jerry Ramie	X	X	X	X	x	x	x	x	x
David Schaefer		X	X	W		x			
Jeff Silberberg	X	X	X	X	x	x	x	x	x
Steve Whitesell	X	X	X	X	x	x	x	x	x
Dave Zimmerman	X		X	W	x	x	x	x	x

**Members at risk?** These members are at risk: **Andy Griffin (a)**, **Dave Schaefer** (Dave Schaefer attended, Andy sent his "Apologies" so no letters will be sent)

**3.2 Consideration of new members?** [Ross Carlton](#) to become a Member? (Technical Expert for ETS-Lindgren?) [Application for C63<sup>®</sup> Subcommittee Membership](#) Ross will submit his completed Membership Application in Piscataway.

### 4. Approval of [Scope and Duties](#): Chair - (Spring meeting only) (Report approval or any changes to the Main Committee)

**Scope** (changed at the last meeting to read:)

**Subcommittee 5 is responsible for developing and maintaining new and existing ANSI ASC C63<sup>®</sup> standards for immunity testing techniques and associated instrumentation as requested by the Main Committee ANSI ASC C63<sup>®</sup>.**

The new Scope will be submitted to the Main Committee in Piscataway.

#### 4.1 Election of Officers (as required)

**5. Working Group reports - Chair** - [More information about each standard](#) is available on the Standards Status Matrix page of the [C63® web site](#). This information will be reviewed for accuracy at each Subcommittee meeting.

**5.1 C63.9 – Office Equipment Immunity - Heirman** (insert link to [WG report](#)) Verify accuracy of document [status matrix](#) content and report any errors to the ASC-C63® Secretary.

C63.9-2014 <a href="#">Learn more</a>	Office equipment immunity	<a href="#">SC 5</a>	<a href="#">Heirman, Don</a>	<a href="#">C63.9 PINS</a>	PINS approved to revise 2008 edition including the 2014 reaffirmation.
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### **C63.9: C63.9-2008 American National Standard for RF Immunity of Audio Office Equipment to General Use Transmitting Devices with Transmitter Power Levels up to 8 Watts**

**Contact:** [Heirman, Don](#)

**Scope:** This standard provides recommended test methods and limits for assuring the RF immunity of office equipment to general use transmitters with transmitter power up to 8 watts

**Status:** Reaffirmed in 2014. Revision currently underway to update references, add coverage for interference threats from newer technologies such as LTE, consider latest test instrumentation and techniques, and clarify alternative test methods.

**Purchase:** [IEEE Store](#). To purchase individual standards, go to the IEEE store and search on the standard number.

### **Is this information correct? (Yes)**

**For C63.9. Mr. Heirman reports:** Next meeting of WG is 13 March. Here is an overview of actions pending.

It will be to get progress from those I assigned action items from the CISCO ballot.

At the last webinar meeting the WG reviewed the CISPR comments on the last reaffirmation ballot to revise C63.9 on the immunity of audio office equipment. At the end of that discussion, I as chair, was given an action item-44 which is:

**AI-44:** Don to use Andy's comment matrix to assign work to the members who attended today. What do the members think are the hot topics? (separation distance, test method, test levels, antenna, amplifier requirement, modulation)

Those that attended were

Don Heirman (**DNH**), Jerry Ramie (**JR**), Andy Griffin (**AG**), Ross Carlton (**RC**), Jeff Evans (**JE**)

While not on the webinar, here are other WG member initials who I don't want to leave out: Steve Berger (**SB**), Ed Hare (**EH**), Dan Sigouin (**DS**) and Jeff Silberberg (**JS**)

I am also involving our super editor Tim Harrington (**TH**) to focus on the editorial comments.

**5.2 C63.15 – Immunity Measurement & Instrumentation - Heirman** (insert link to [WG report](#)) Verify accuracy of document [status matrix](#) content and report any errors to the ASC-C63® Secretary.

C63.15-2017 <a href="#">Learn more</a>	Immunity Measurement & Instrumentation	<a href="#">SC 5</a>	<a href="#">Heirman, Don</a>	<a href="#">C63.15 PINS</a>	Published 2017
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### **C63.15: C63.15-2017 American National Standard Recommended Practice for the Immunity Measurement of Electrical and Electronic Equipment**

**Contact:** [Heirman, Don](#) (Working Group Chair)

**Scope:** This immunity measurement and measurement instrumentation recommended practice document complements the emission measurement procedures specified in ANSI C63.4 noting that C63.15 is a recommendation while C63.4 is a

standard. The immunity methods are of use to manufacturers who want to produce a reliable product working in the customer location RF environment to reduce customer complaints. This document generally covers the frequency range of 30 Hz to 10 GHz. The test instrumentation needed to replicate the RF environment is also identified that will support the immunity testing.

**Status:** Published in 2017 (working group disbanded)

**Purchase:** [IEEE Store](#). To purchase individual standards, go to the IEEE store and search on the standard number.

**Is this information correct? (Yes)** (as corrected above) **AI-56:** Jerry to implement new [Status Matrix](#) C63.15 text changes above in red. **AI-57:** Jerry to close [C63.15 working group roster](#) on SC5 roster page.

**For C63.15, Mr. Heirman reports:** The editor—Lisa Perry—and Tim/me have agreed on what is the final edit. I expect it to be published this month. I sent an email to Lisa asking for a “firm” date of publication. This will then close down the WG with no “next meeting”. Final text has been submitted to Lisa, forwarded to MEC editing through to publishing. It is now posted and for sale. Complimentary copies to be issued to contributors.

**5.3 C63.16 – ESD Test Methodology - Whitesell** (insert link to [WG report](#)) Verify accuracy of document [status matrix](#) content and report any errors to the ASC-C63® Secretary.

C63.16-2016 <a href="#">Learn more</a>	ESD Test Methodology	<a href="#">SC 5</a>	<a href="#">Whitesell, Steve</a>	No active PINS	Current. (published 5/10/16) Working group disbanded
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### C63.16: C63.16-1993 American National Standard Guide for Electrostatic Discharge Test Methodologies and Criteria for Electronic Equipment

**Contact:** [Whitesell, Steve](#) (Working Group Chair)

**Scope:** This guide provides electrostatic discharge (ESD) test considerations that a manufacturer should use in assessing the expected ESD effects on products in a wide range of environments and customer use. The focus is well beyond that used to simply show that a product complies with a local, regional, or international standard or regulation. The guide includes unique new material on testing of charged peripherals being connected to a system and system components being placed in a docking station. It also includes information on the use of preliminary investigatory testing to identify test points, methods for visually documenting the location of those test points, and the use of a stepped approach in ratcheting up the test voltage to determine failure thresholds. The annexes include test plan and data sheet examples along with more background on air and contact discharge for those who want to further understand the differences in these methods.

**Status:** Current. Guide was published 10 May 2016. Working group disbanded.

**Purchase:** [IEEE Store](#). To purchase individual standards, go to the IEEE store and search on the standard number.

**Is this information correct? (Yes)**

**5.4 C63.24 – On-Site Generic Immunity testing - Heirman** (insert link to [WG report](#)) Verify accuracy of document [status matrix](#) content and report any errors to the ASC-C63® Secretary.

C63.24-draft <a href="#">Learn more</a>	On-Site Generic Immunity testing	<a href="#">SC 5</a>	<a href="#">Heirman, Don</a>	<a href="#">C63.24 PINS</a>	New recommended practice restarted (joint task with IEEE 473); new PINS needed
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### C63.24-draft: American National Standard Recommended Practice for In-Situ RF Immunity Evaluation of Products, Instrumentation, and Control Systems in High Reliability Installations

**Contact:** [Heirman, Don](#) (Working Group Chair)

**Scope:** This recommended practice provides an in-situ EMC immunity qualification test for products, instrumentation, and control systems in their installed environment. The standard will focus on installation environments that require a high level of confidence that these products and systems have a high level of EMC immunity. This project will provide a generic method for evaluating the RF immunity of electronic products, instrumentation, and control systems, as and where installed or operated. A particular focus is on immunity to RF sources that may enter the environment, intentionally or

unintentionally or be integrated into the operating environment. The characteristics of RF sources in the environment will be used to establish the levels and test methods.

**Status:** New recommended practice. Consideration being given to working as a joint project with the revision of EMC Society standard IEEE 473 on RF site survey measurement. PINS will need revision.

**Purchase:** Not yet available for sale.

## Is this information correct? (Yes)

**for C63.24, Mr. Heirman reports:** we are making progress with a common text for test setup location with P473. P473 is making progress on their draft. C63.24 needs its members to get to work on any amendment we want to do with the draft. The next meeting is 27 April.

So far I am the only one writing new material. Here is the C63.24 contribution to the joint work of both committees. It is text to be inserted into both documents on test setup location.

### Proposed text for both C63.24 and P473 on documenting measurement site characteristics and test sites.

Don Heirman  
2/22/18

*In the draft C63.24, the following can be placed in Clause 5.1 to replace what is there or to augment what is there starting the clause with the material below..*

*In P473, the following can be placed in Clause 5.5, first, second and third paragraphs, replacing what is there now.*

#### **General**

*Site measurements can be performed in many locations each with the potential for nearby or surrounding objects that can affect the measurements, it is imperative to record exactly where it was performed and then the results of the measurement itself. The degree of the effect is dependent upon the frequency of radiated electric or electromagnetic field, the area of nearby conductive material, and the proximity of such material to the measurement location. Conductive material such as metal or salt water (for outdoor and seaside measurements) has the greatest effect on electromagnetic fields. Reflection, scattering, and diffraction are primary mechanisms by which field measurements are disturbed. Other features of the measurement site that generally affect the measurement is the surface where the measurement is made. For outdoor measurements, this may be earth with unknown composition and for inside buildings, it is the floor with unknown or very limited construction and material makeup.*

*In the planning stage, it is important to document any site feature likely to affect the measured result. To capture measurement site features that may affect the measurement, a scaled map or drawing should be used to record such features; scale factors should be shown to relate all features to the actual surrounding location which may be in the open area removed from buildings, inside a building, or an enclosure such as a sea vessel. Such a map or drawing should be based on published documents or a measured sketch of the measurement location. Such documents for performing measurements outside buildings in an open area may include existing geological or civil survey maps, and on blueprints or architectural drawings where applicable and available. Inside buildings there may be blueprints or architectural drawings to use to mark the test site.*

#### **Measurement Information**

*It is important to document what is the extent of the work to be performed. This is generally called the test plan. The plan should include:*

- *The purpose of the test, e.g. determining the EM levels where user equipment may be or is installed indoors and where a new building will be erected in an open space.*
- *Test location using GPS for outdoor sites and building floor plans for indoor sites.*

- Test procedure such as measuring the conducted and radiated EM sources
- Test instrumentation to measure the conducted and radiated EM sources
- Point of contact to coordinate the work, especially for making measurements inside a privately-owned building

*For both indoor and outdoor test sites, the following should be recorded*

- The electromagnetic environment for surveying the EM sources that are to be recorded for site surveying. This should include the level of known transmitter sources used inside buildings that may be higher levels than those that are from sources outside the building. Location of EM sources is also important for both indoor and outdoor measurements
- Grounding and bonding needed for equipment to be installed or installed.
- For radiated measurements are both electric and magnetic field strengths to be recorded

### **Measurement Setup outside buildings**

*In such a map or measurement location drawing, obstacles for measurements made outside buildings in open areas should include*

- 1) Weather conditions including temperature, gusty wind, and precipitation that might affect radiated emission results.
- 2) Terrain and soil conditions, e.g. wet/dry earth, frozen soil, tall grass, and flatness of the test area.
- 3) Above ground structures, such as buildings (note type of construction—brick, cinder block, reinforced concrete, etc.), metallic fences, and broadcast and cellular phone antennas
- 4) Suspended cables, such as power, telephone, and those used for cable television (note the number of cables, routing, location of drop wires, power-line ratings, and the type, number, and location of supporting structures)
- 5) Underground conduits for water, power, gas, oil, etc (this has to be found by contacting these utilities as they are not generally visible)
- 6) Other major obstacles associated with the terrain, including foliage (note density)
- 7) Proximity to roads and highways close in to the measurement site.

*Photographs should be taken to document major features of the region surrounding the measurement site.*

### **Measurement Setup inside buildings**

*In maps or drawings for measurements made inside buildings, these items should be included:*

- 1) Surrounding walls and type of walls (sheetrock, conductive material, etc.), ceiling (conductive or sheet rock/ceiling panels/suspended ceiling, etc.) and floor (carpeted, type of material, raised, etc.)
- 2) Opening to the outside of the room, especially those on the perimeter of the building (windows, doors, etc.)
- 3) Locations of conductive support columns
- 4) Penetrations into the room for electrical (lighting and power), HVAC (note where the metallic ducts are), and plumbing
- 5) Furniture is room is partially occupied (focus on metallic desks, filing cabinets, computer network equipment, etc.)

*Photographs should also be taken to document major features of the region surrounding the measurement site.*

## **6. Other Old Business: Chair - none**

**6.1 Written reports** - Written reports of this Subcommittee meeting shall be presented by the Subcommittee Chair at the Main Committee meeting. These reports shall be made using the [PowerPoint template](#). Prior to the Main Committee meeting, the [SC report](#) and [approved previous meeting minutes](#) shall be provided to the projectionist for showing on the screen at the Main meeting. The Presentation and any written report shall also be sent by the Subcommittee Chair to the ASC-C63® [Newsletter editor](#).

**6.2 Coordination with SC2 for definitions** - Before any Working Group draft can be submitted to Subcommittee for approval, the document must be provided to the SC2 Chair for evaluation and coordination of the definitions used.

**6.3 Coordination with SC3 for harmonization** - Before any Working Group draft can be submitted to the Subcommittee for approval, the document must be provided to the SC3 Chair for evaluation and coordination of any harmonization effort.

**7. New Business: Chair** - none

**8. C63.org website use and updates: Secretary** - We normally post documents to the [SC5 protected area](#). If any SC or WG needs help with this posting, a Technical Secretary is available to assist.

**9. Review of the Action Items: Secretary**

**9.1 Review of Action Items from this meeting:** Action Items were reviewed and all Members agreed that they understand their meaning.

**9.2 Review of Action Items from previous meeting:** The consolidated Action Item table from the previous meeting Minutes are shown below:

**Consolidated Action Items from 01/30/18 Meeting of SC5**

Action Item #	Subject	Responsible Person(s)	Status	Delivery Date	Comments
AI-40:	Steve to offer such an amended version of IEC 61000-4-2, with C63.16 content inserted, for submission to TC77B from SC3.	Steve Whitesell	Open	3/6/18	We need suggested text submitted in WORD version of 61000-4-2
AI-50:	Steve to ask Jennifer for WORD version of 61000-4-2 to provide amended text to SC3	Steve Whitesell	Closed	3/6/18	Not avail.
AI-51:	Jerry to send reminders to Griffin & Schaefer re/ their attendance.	Jerry Ramie	Closed	3/6/18	Sent 1/30
AI-52:	Ed should contact Jennifer Santulli for direction and attention to C63.15 editing by 2/9/18	Ed Hare	Closed	2/9/18	
AI-53:	Jerry to implement new changes to C63.16 matrix entry as shown in green above.	Jerry Ramie	Closed	3/6/18	Changed 1/30
AI-54:	Jerry to implement new changes to C63.24 matrix entry as shown in green above.	Jerry Ramie	Closed	3/6/18	Changed 1/30
AI-55:	Don will confirm that definitions for his documents(C63.9, C63.15, and C63.24 have been submitted to SC2 for their review and comments.	Don Heirman	Closed	3/6/18	

**Discussion of Action Items above**

AI-40: Discussion of comments



Template for comments and secretariat observations					Date: 5/8/2017	Document: IEC 61000-4-2 Ed 2.0 2008-12	Project:
MB/ NC <sup>1</sup>	Line number (e.g. 17)	Clause/ Subclause (e.g. 3.1)	Paragraph/ Figure/ Table/ (e.g. Table 1)	Type of comment <sup>2</sup>	Comments	Proposed change	Observations of the secretariat
US1		Appendix A5		TE	Identifying test points - Investigatory testing is used for guidance in the selection of test points. The object of this testing is to indicate susceptible areas of the EUT so that more detailed testing can be performed in those areas.  Because the frequency content delivered in air discharge changes both with arc length and test voltage, gradually-increasing voltage levels should be applied during investigatory testing. Beginning the investigation at lower test levels reduces the chance of EUT damage and increases the likelihood that upsets are noted. This applies for contact discharge testing as well.	Consider C63.16 section 6.4.3, and particularly 6.4.3.3, which discusses doing preliminary testing to identify test points, starting with low voltages and working up.	
US2		Section 5		TE	Apply steps to contact discharge instead of contact discharge at one voltage – See comment above regarding gradually increasing the voltage levels to increase likelihood that upsets may be detected prior to causing EUT damage.	Consider applying steps to contact discharge. See C63.16 section 6.4.4.1.	
US3		Section 8.3.2	Final paragraph	TE	Specify a speed of approach for air discharge - The speed of approach of the discharge electrode is a critical factor in the rise time and amplitude of the ESD event.	Consider specifying a speed of approach for air discharge testing. See C63.16 section 6.4.4.5.	
US4		Section 8.3.3.3		TE	Improve consistency of spacing for VCP – Just a convenient way of consistently achieving the 10 cm spacing for the VCP	Consider 10mm cm non-conductive spacers and handle to the VCP for consistent spacing from the EUT to the VCP. See C63.16 section 6.4.5.2.	
US5		Section 8.3.2		TE	Points of discharge – The point is to cover scenarios involving ESD events that occur when laptop computers, tablets, cordless and cellular telephones, etc. are carried across a carpeted surface and then placed in a docking station or charge cradle. It also covers the case of hand-carried or recently moved peripheral equipment (USB memory stick, flash drive, portable hard drive, etc.) being plugged into a computer or other device that is already connected to ground.	Consider adding a section or paragraph that deals with unique ESD procedures such as mating charged devices with uncharged devices. See C63.16 section 7.	

Proposed text:

## 5 Test levels

The preferred range of test levels for the ESD test is given in Table 1.

Contact discharge is the preferred test method. Air discharges shall be used where contact discharge cannot be applied. Voltages for each test method are given in Table 1. The voltages shown are different for each method due to the differing methods of test. This does not imply that the test severity is equivalent between test methods.

Details concerning the various parameters which may influence the voltage to which the human body may be charged are given in Clause A.2. Clause A.4 also contains examples of the application of the test levels related to environmental (installation) classes.

~~For air discharge testing, the test shall be applied at all test levels in Table 1 up to and including the specified test level. For contact discharge testing, the test shall be applied at the specified test level only unless otherwise specified by product committees. Incrementally increasing test levels are required to expose the product to the full range of waveform amplitudes and frequency content. Some products have a tendency to exhibit susceptibility responses when exposed to some ESD voltages but not others [King].~~

~~When performing air discharge testing, the test voltage should be increased in steps from the minimum to the selected test severity level. The lower test level has a faster current rise time that might disrupt the operation of the device. It is also helpful to start contact discharge testing at a low voltage level and increase in steps to the maximum specified test level if it is desirable to determine the threshold of failure.~~

~~In the absence of other requirements, it is recommended to use 1 kV steps for contact discharge and 2 kV steps for air discharge. The lower test level starting point is suggested to be at 2 kV or 4 kV. The final severity level should not exceed the manufacturer's specified value or the required compliance level in order to avoid damage to the equipment.~~

Further information is given in Clauses A.3, A.4 and A.5.

Table 1 – Test levels

Contact discharge		Air discharge	
Level	Test voltage kV	Level	Test voltage kV
1	2	1	2
2	4	2	4
3	6	3	8
4	8	4	15
≥ 5	Special	≥ 5	Special



Selection of test points was discussed, the consensus was it should remain Informative in an Annex. Steve Whitesell to move all proposed changes to main IEC 61000-4-2 text into informative annex instead. Exception is the addition of two bullet items in the Test Report section 10, which will remain as proposed technical changes. (pursuant to **AI-40** above)

We discussed a technical requirement in 7.2.1 submitted by Dave Zimmerman (shown in red below) and agreed to propose a modified version as a technical change to the document for purposes of clarification.

### 7.2.1 Test requirements

The following requirements apply to tests performed in laboratories under environmental reference conditions outlined in 8.1.

A ground reference plane (GRP) shall be provided on the floor of the laboratory. It shall be a metallic sheet (copper or aluminum) of 0,25 mm minimum thickness; other metallic materials may be used but they shall have at least 0,65 mm minimum thickness.

The ground reference plane (GRP) shall project beyond the EUT for floor standing equipment, or and the horizontal coupling plane (when applicable for tabletop equipment) by at least 0,5 m on all sides, and shall be connected to the protective grounding system.

Steve W. discussed Rick Lombardi's suggestion that we include ESD simulators used in automotive testing. The ISO -10605 (2008) specs were shown:

**Table 2 — Contact discharge mode current specifications**

Typical capacitance/ resistance values	Peak current/ charge voltage  A/kV	Tolerance  %	Current at $t_1$ / charge voltage  A/kV	Tolerance  %	Current at $t_2$ / charge voltage  A/kV	Tolerance  %
150 pF / 330 $\Omega$	3,75	$\pm 10$	2 (at $t_1 = 30$ ns)	$\pm 30$	1 (at $t_2 = 60$ ns)	$\pm 30$
330 pF / 330 $\Omega$	3,75	$\pm 10$	2 (at $t_1 = 65$ ns)	$\pm 30$	1 (at $t_2 = 130$ ns)	$\pm 30$
150 pF / 2 000 $\Omega$	3,75	+30 0	0,275 (at $t_1 = 180$ ns)	$\pm 30$	0,15 (at $t_2 = 360$ ns)	$\pm 50$
330 pF / 2 000 $\Omega$	3,75	+30 0	0,275 (at $t_1 = 400$ ns)	$\pm 30$	0,15 (at $t_2 = 800$ ns)	$\pm 50$
NOTE 1 The peak current level is taken from the measurement system without any data interpolation.						
NOTE 2 The target used with this measurement system fulfils the requirements of Clauses A.1 and A.2. An example is defined in Annex B.						
NOTE 3 The measurement times (30 ns, 60 ns, 65 ns, 130 ns, 180 ns, 360 ns, 400 ns and 800 ns) are derived from the resistance-capacitive (RC) time constant $-40\%$ (current $t_1$ ) and $+20\%$ (current $t_2$ ), to define two values on the falling slope of the current pulse in accordance with IEC 61000-4-2.						

Examples of calculated contact discharge waveforms in accordance with the specifications in Table 2 are given in Figures 3 a) and 3 b).

However, it was decided not to include this information as part of our proposed changes.

**10. Time and place of next meeting: Chair - May 2, 2018 - Piscataway, NJ**

**11. Closing remarks and Adjournment: Chair -** The Vice-Chair thanked the attendees for their contributions and good discussions and the meeting was adjourned at 3:04PM-EST.

\*\*\*\*\* End of Meeting \*\*\*\*\*

**Consolidated Action Items from 03/06/18 Meeting of SC5**

Action Item #	Subject	Responsible Person(s)	Status	Delivery Date	Comments
<b>AI-40:</b>	Steve to offer such an amended version of IEC 61000-4-2, with C63.16 content inserted, for	Steve Whitesell	<b>Open</b>	5/2/18	We need suggested text submitted in

	submission to TC77B from SC3.				WORD version of 61000-4-2
AI-56:	Jerry to implement new <a href="#">Status Matrix</a> C63.15 text changes above in <b>red</b> .	Jerry Ramie	Closed	5/2/18	Posted 3/6
AI-57:	Jerry to close <a href="#">C63.15 working group roster</a> on SC5 roster page.	Jerry Ramie	Closed	5/2/18	Posted 3/6