

2013

September 10th
ASTM Leak Detection
Standard

October 1st
SWA Joint Meeting: Warranty
Claims

November 7th
Woodbine Race Track - Fun
Night

November 28th
Decoustic's CertainTeed Plant
Tour

December 3rd
DIIM, FCIA

2014

January 14th
SPRI Standards

February 4th
Economic Forecast - REED
Construction Data

February 13th
Curling Bonspiel

March 5th
No Frills Trade Show

April 1st
TBA

May 6th
TBA & AGM

August 14th
Annual Golf Tournament

CSC (Construction Specifications Canada) is a non-profit association committed to the ongoing development and delivery of quality education programs, publications and services for the betterment of the construction community.

MEETING NOTICE

date: Tuesday, December 03, 2013.

topic: **The DIIM of Firestopping by the Firestop Contractors International Association**
This presentation qualifies for self-directed OAA credits. (see more details inside)

speaker: Mr. Bill McHugh, Executive Director of the FCIA

location: Toronto Skating Curling and Cricket Club
141 Wilson Ave., Toronto
(1 block east of Avenue Rd.)

time: 17:15 Cocktails
18:00 Dinner
19:00 Presentation

cost: \$45 (HST incl.) members,
\$50.00 (HST incl.) non-members
\$55.00 (HST incl.) at the door,
\$226.00 (HST incl.) Booklet of 6 dinner tickets (members only)

reserve: Please make your reservation with Donna Fournier
of the CSC Toronto Chapter Office at 1-888-494-9350.

info: Program Committee Officer: Chris Hunter (Tel: 647-529-5650)
Program Committee Officer: Bruce Hudson (Tel: 416-432-6502)
Secretary/Administrative Assistant: Donna Fournier (Tel: 1-888-494-9350)

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How to Save Time when Reviewing a Project Manual for Coordination

By: Mark Clemmensen

As a Specification Writer, we are fortunate enough to work with every department within the firm and with Sub-consultants who are all working together to generate a Project Manual, in a relatively short time frame. This can provide a number of different reviewers of the Specification prior to and during the Bid Period, so it's not uncommon to see a set of eyes glaze over when a three volume, 750 page Specification is dropped onto a reviewers desk for a nice weekend read. These reviews are critical to ensure coordination between the Specifications and the Drawings, Schedules and other supplemental information provided by the Client, such as Geotechnical Reports or Hazardous Materials Abatement.



Mark Clemmensen
(Chair)

What if I were to say that there is a way to sift through a Project Manual to gain a basic understanding without having to read every page! Here are tips which I provide any reviewer to try and save them a little time when reviewing for coordination.

The Specification is broken up into a series of Divisions, which is a standard category of construction. Divisions form the framework for the project specifications. Sections are a portion of a Division that specifies work results. Sections are included in a Project Manual as needed to meet project requirements, and Sections are made of three parts; Part 1 General, Part 2 Products and Part 3 Execution. "Part 1 General" further defines Section specific information, expanding on subjects covered in Division 1 General Requirements, such as submittals. "Part 2 Products" describes the systems, assemblies, equipment, products, materials, fabrications and mixes that are to be incorporated in the project. "Part 3 Execution" details installation or application of items described in Part 2 of the Specification.

Now that the structure of a Section has been identified, it's clearly apparent that Part 2 is the life blood of each

Section because the assemblies, products or materials specified in Part 2 are interconnected to Part 1 and Part 3. What this means is that if brick is specified in Part 2 of Section 04 20 00 Unit Masonry, then subsequently, Part 1 may request specific submittals (full-size brick, grout colour, and full-size ties and accessories), as well as particular storage and handling requirements. Part 3 would detail installation requirements related to brick and any accessories required for complete installation. Alternatively, materials not indicated in Part 2 denote that these are not included in that Section, and any corresponding information in Part 1 and Part 3 would also be removed.

Therefore when reviewing for coordination, I recommend beginning with scanning Part 2 of the Section(s) to ensure that all necessary project specific information has been included. Once the coordination review is complete, a more thorough review can be done to ensure overall completeness.

**"Any fool can know. The point is to understand."
Albert Einstein**

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LEED – THIRD PARTY CERTIFICATION

By: Nancy McPherson

Designers have asked, why specify a product with an EPD (Environmental Product Declaration)?

An EPD can be used as a source of information in the procurement and purchase of products. They provide buyers with the confidence of knowing that the environmental performance of a specific product has been reviewed and validated by an independent party with expertise in Lifecycle Assessment. Having EPDs does not mean that a product has lower environmental impact than others, but provides the information to evaluate the product.



Nancy McPherson
(Interior Design Officer)

ISO 14021 — Environmental Labels and Declarations, Eco-Labels (Type I Environmental Labeling).

Type I: These labels are commonly known as eco-labels. They are multiple-criteria-based, third party programs that award a license that authorizes the use of environmental labels on goods and services indicating overall environmental preferability within a particular good or service category based on life cycle considerations.

The USGBC will be launching LEED v4 before the end of this year, and it is expected that Canadian ACPs will be introduced at the National conference in June 2014. LEED v4 has the potential to drive the reduction of building carbon emissions and take a stronger stand on human health, more so than any previous version of LEED.

Materials, for example, are evaluated more holistically using multiple attributes through approaches such as Life Cycle Assessment and Environmental Product Declarations. There is a greater emphasis on performance, as reflected in water and energy metering requirements, while integrative design, envelope commissioning, and acoustics are some of the new issues addressed within LEED v4.

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CSC Membership Drive 2013-2014

The annual membership drive will start on Friday, November 1st, 2013 and finish at the close of business on Friday, February 28th, 2014.

During that time period, any CSC member who sponsors a new member will be entitled to one ballot to be entered into the membership contest draw for each new member they sponsor.

The draw for prizes will take place at the next CSC Board of Director's Meeting scheduled for March 2014. The proposed contest prizes are as follows:

Sponsor Prizes:

1st prize: \$750.00 Gift Card

2nd – 5th prizes: \$350.00 Gift Card.

Winners will have a choice of gift cards from the outlets such as: Best Buy; Future Shop; Apple Store; Canadian Tire or Petro Canada.

The winning names and prizes will be posted on the CSC website and included in the Construction Canada Online newsletter.

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Director's Report

By: Matt Roberts



Matt Roberts
(Chapter Director)

Wow, where has the year gone? It is almost Christmas and CSC Toronto Chapter is busy introducing new initiatives to enhance the experience of being a member of the Toronto Chapter of CSC. Well, being the Chapter Director, I also have the opportunity of dealing with others from across this great country of ours. On that note, the Association is also introducing new initiatives

to enhance being a respected member of CSC.

If you are not aware, CSC holds board meetings twice a year, once in the fall and the other in the spring. On the weekend of October 19, 2013 I had the pleasure of attending my first board meeting representing the Toronto Chapter. I found it to be very interesting and well organized. My eyes were opened to the fact that CSC is actually moving forward in a very positive manner.

Some of the highlights of the meeting are as follows:

- CSC is looking for volunteers for committees. Without volunteers, the association is not strong, so if you have an interest for being on a committee, contact the Association Office and let them know.
- A new CCDC 2MA – Master Agreement Document is being released for endorsement.
- CSC is now identifying a more detailed outline of what is required for being a part of a particular committee.
- Calls for volunteers will be posted on the CSC website, keep tuned.
- Calgary conference did a fantastic job so hats off to the Calgary Chapter for providing a great conference.
- Membership dues will remain unchanged for 2014.
- The term “National Office” is to no longer be used, new term is now “Association” or “Corporation” office.
- New Corporation By-Laws will be distributed to the membership for comment in the near future.

As information becomes available, I will keep the Toronto Chapter informed. I wish you and your family a very Merry Christmas and a Happy New Year.

6th Annual Curling Bonspiel Event

By: Dinshaw Kanga



Dinshaw Kanga
(Membership Officer)

The Toronto Chapter has once again organized the 6th Annual Curling Bonspiel on February 13, 2014 at the Toronto Cricket, Skating and Curling Club following on the footsteps of similar popular bonspiel events held there over the last 5 years.

We invite all curlers, amateurs and professionals alike, and even those that have never curled before to register for this popular event. For those that have not curled before, please note that professional instructions are given by their staff before the curling begins.

The bonspiel event will be followed by a cash bar and a sumptuous roast beef dinner.

Please mark this date on your calendar.

Details regarding start time, dress code, dinner and costs are identified in the Flyer and Registration Form included in this Specifier.

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Dinner Meeting

December 03, 2013

The DIIM of Firestopping by the Firestop Contractors International Association

This Presentation qualifies for self-directed OAA Credits

THE TOPIC

This presentation will focus on the DIIM of Firestopping and spend a little time on Effective Compartmentation...and how the DIIM builds reliability of installed firestopping for fire and life safety:

- D-Design – What is proper design? Is it specified by RSW's in MasterFormat? What sections? Does it mean listed firestop systems from the UL, FM or Intertek Directory?
- I-Installation – What certifications are available for those contractors installing firestopping?
- Inspection – What standards are there for inspection? What certifications are available for Inspection Agencies?
- Maintenance, Management – What requirements are there for ongoing review of firestopping and effective compartmentation?

We will be sure the program is based on the Canada Standards and Code requirements while showing requirements from other

parts of the world for the group to understand and compare.

Our Speaker: Mr. Bill McHugh

Bill McHugh has been Executive Director of the Firestop Contractors International Association since its inception in 1999.

Bill is active at in the Building and Fire Code Development process at the National Fire Protection Association (NFPA), International Code Council (ICC), and the City of Chicago. At NFPA, he is a member of the Fire Protection Features Committee. He also serves on the ICC's 2012/2013 Fire Safety Committee and International Accreditation Services (IAS) Board of Directors. Working with Canada FCIA Members, he provides proposals to ULC's Standards Technical Panels.

At ASTM, Bill chairs the ASTM E06.21 Committee that manages the ASTM E 2174 & ASTM E 2393 Firestop Systems Inspection Standards. Bill participates at Underwriters Laboratories (UL) Standards Technical Panel in the US.

Bill has spoken at the Manitoba Institute of Architects, Thermal Insulation Association of Canada, Construction Specifications Canada Conferences. He has had articles published in Construction Canada, Engineering News Record, the Construction Specifier, Office and Commercial Magazine, Illinois Real Estate Journal, Midwest Construction, Licensed Architect and others.

Bill is a Toronto Chapter Member at Construction Specifications Canada. At the Construction Specifications Institute, (CSI), Bill is a past president, Northern Illinois Chapter, North Central Region Past President, and past Institute Director on the national board. Additionally, he travels worldwide delivering firestopping education sessions.



Bruce Hudson
(Program Committee Officer)



Chris Hunter
(Program Committee Officer)

WELCOME NEW MEMBERS

Please join me in welcoming the following new members to the CSC Toronto Chapter

Mr. Michael Shakespear Miles

Tim Hortons Inc.

Ms. Heather Button

Kearns Mancini Architects

Mr. Jason Kao

Hilti (Canada) Corporation

Mr. Kevin Willford

Garland Canada Inc.

Mr. Gazan Mirza

GAF Materials Corporation

Mrs. Camelia Butnaru

Norstar Group of Companies

Jason Walker

Metropolitan Floors



Stacey Bogdanow
(Membership Officer)

Please order YOUR name tag for only \$13.00!!!

Getting to know Jason Walker

By: Stacey Bogdanow

Tell us a little about Jason Walker

I am a 23 year veteran of the flooring industry, married with two wonderful daughters. My career has allowed me to work in all aspects of the industry, but now for the first time, I am more involved in the specification world. Current responsibilities also include some sales management and product management for both luxury vinyl flooring and acoustic underlayments. In addition to my daytime duties, I am also the current President of the Floorcovering Institute of Ontario and Vice President of the National Floor Covering Association of Canada.

How did you learn of CSC?

Two different colleagues recommended that joining CSC would be beneficial and could even help with my professional development.

Why join CSC?

We decided to join for three major reasons: First – networking. It is always a great way to meet people, learn and share best practices. Second – The CSC trade show. I've been told that it is a great event and we look forward to participating in it. Finally – the unknown. A chance to learn more about the specification side of the business, possibly take courses, offer expertise in flooring/acoustics and even more opportunities will be revealed to use through our new membership.

Do you plan on taking any courses?

If applicable – for sure! I am a strong believer in lifelong learning. I am proud to have earned my CSP designation from the Canadian Professional Sales Association as well as my CFE designation from the World Floor Covering Association. In addition, I am always looking for ways to learn more – so I can better help my clients.

Would you encourage others to become members of the CSC – Toronto Chapter?

I am a believer in involvement. Whether the CSC, the FIO or any local service organization, I think it is important for people to get involved in their industries and communities. Camaraderie is a wonderful thing and can be built by getting involved. I am hoping to be a very active member/attendee of CSC events in the future and I look forward to building new relationships within the specification world.



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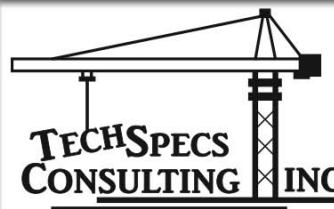
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Education Certification Officer's Report

By: Paul Wong



Paul Wong
(Education Certification Officer)

The Principles of Construction Documentation, Technical Representative and Specifier 2 courses are quickly drawing to a close with students preparing for the final exams. As we complete the fall term, CSC is preparing registration for our winter courses.

This term, CSC is offering the Construction Contract Administration, Specifier 1 and Technical Representative courses. These courses will be presented provided they have full enrollment. For now, the dates and locations listed below have been confirmed.

Construction Contract Administration:

The Construction Contract Administration (CCA) course is designed for those individuals involved in construction administration. This includes contract administrators, property managers, architects, engineers, interior designers, specification writers, building authorities, and bonding and insurance agencies. The student will have successfully completed the Principles of Construction Documentation course.

This program will be held at the Northern District Library, located at 40 Orchard View Blvd., Toronto. This course is scheduled to commence on Monday, January 13th, 2014 and will run for 14 weeks ending on April 14th, 2014.

Technical Representative

The Technical Representative (TR) course will provide a better understanding of contract documents and bidding procedures, product representation, professionalism and ethics, and will provide a new depth of understanding and explanation of concepts beyond what was previously introduced in the PCD course.

The course is designed for the individual involved in the supply section of the construction industry, such as manufacturer representatives, agents or distributors of products.

This program will be held at the Alumicor Head office, located at 290 Humblin Dr., Toronto and will run for 16 weeks starting on Monday, January 13th, 2014

Specifier 1

Specifier 1 is an intermediate level course that will take the individual beyond the concepts previously introduced in the Principles of Construction Documentation (PCD) course. Although some of the same topics are included in this course, the depth of comprehension and explanation exceed that of the PCD course. The Specifier 1 course is a prerequisite for the Certified Specification Practitioner (CSP) designation from CSC. Successful completion of the course may be credited toward the experience component requirements for the Registered Specification Writer (RSW) designation.

This program will be held at the CSC Association office, located at 120 Carlton St., Toronto and will run for 13 weeks starting on Wednesday, January 15th, 2014

Courses details, including location, costs and times can be found on CSC Toronto Chapter web site. Visit <http://toronto.csc-dcc.ca/Education/Education+in+Toronto/> for more information and to register.

Register early to avoid disappointment. Please remember that registration and payment must be received prior to the issuance of a text book. Any cancellations must be in writing. Cancellations one week prior to the start of the course will be refunded up to 50 per cent of the registration fee. Cancellations after the start of the course will not be refunded.

If you have any questions about the courses listed above, please contact Paul Wong, Professional Development Officer by email at pwong.csc@gmail.com.

Specification Officer: Specs and BIM Integration

By: Wayne Austin



Wayne Austin
(Specifications Officer)

Over the past six months, the frequency with which the topic of coordinating specifications with BIM has come up has been steadily increasing. The only clear trend seems to be that no one has arrived at what they think is a good or lasting solution.

When speaking about integrating specifications into BIM models, most folks seem cautiously optimistic about what may someday be possible, but with no sense, or timeline, of what will actually happen, and no real implementation plan beyond giving some commercial software (like e-SPECS, SpecLink-E, or Altarix) a trial spin.

Commonly overheard: Will it work with my Masters? Does it link to the model? Can I track changes? Can I just work in peace, then retire before having to deal with this BIM thing?

My earliest experience writing specifications for projects done in BIM was disheartening: the model itself was unavailable to me, and the plots made from it seemed to all consist of one, very thin line weight, and had no notes. My conversations with those working directly on the model inevitably went something like this: "Well, yes, I understand that you can just click on an object to see its properties, but you've given me paper/PDF. What are your wall and roof assemblies? Do you have a door schedule yet? A room finish schedule?"

The graphic quality, and therefore the readability, of drawings on paper from BIM seems to have greatly improved in the last few years; I find myself still not interacting with a BIM model, but still reasonably happy about that.

Over the last 16 years, I've written, or substantially re-written, the CAD manual at three different architectural firms, and had, for a time, a consultancy on the side instructing other firms on making their CAD workflow more efficient. Part of what many folks found difficult to understand was the difference between accuracy and

precision, and the relationship of each to CAD. CAD forces CAD operators to locate objects, points, lines very precisely in space. An object can't simply "be", it has to be somewhere, exactly and precisely, in a cartesian x-y-z coordinate system, measured (if you keep the AutoCAD defaults) to 1/1000th of a millimeter. Once a line is laid down in CAD, it has the gravitas and authority of a clear decision having been made, even when one has not been. That gravitas and precision of the line fool those looking at the drawing into believing it must be accurate.

Two hand drawn lines on a piece of paper, at no particular scale, with a small note beside them saying "two-by-four wall" is accurate, if not precise, and is a more valuable construction document than some of the CAD drawings I've dealt with.

I have the sneaky suspicion that something akin to this is happening with BIM: information comes automatically with objects in the model. Is it correct information? Maybe. Or not. Until a decision is made about that object's future, real-world counterpart, the answer is most likely "no." What's the process for tracking which pieces of information associated with BIM model objects are based on design decisions having been made, and which are simply the result of "default" information? Who takes responsibility for the accuracy of the information in the model? Is it the BIM operator who has the means and opportunity to add that information to the model, or the specification writer who probably does not?

I'm an optimist, and I am looking forward to forward strides by the industry in the use of BIM software -- both the ones and zeros kind, as well as the grey-matter kind. I believe that specification writers are in a good position to encourage and ensure high quality documents, regardless of the means of their production. We'll keep doing, for the construction industry, what we've been doing: enable wonderful ideas to be built, through better communication, collaboration, and quality of documentation.

If you have a good-news story or a cautionary tale relating to your experience with BIM, why not let us all know with a letter to the editor?



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Preparation is already underway for Conference 2014 which will be held in Kitchener, Ontario. Conference 2014 is brought to you by the Grand Valley, Hamilton-Niagara and Toronto Chapters of CSC.

For more information and to register, please visit <http://csc-dcc.ca/Conferences/>

Hanging by a Thread

Originally Published in Glass Canada Magazine – June 2013 By: Richard Brightling

Iconic design - two words that are often associated with the highest profile buildings in our communities but rarely associated with public health facilities. However, in the case of the recently constructed Kaye Edmonton Clinic, the client's bold vision of "a leading, state-of-the-art enabler of integrated, patient-centred care, education and research" that was most definitively not a traditional hospital opened the door to an equally bold design response. DIALOG was engaged to design a new clinic capable of achieving the client's vision on every level. In doing so, this would enable the world-class ambitions of the Kaye Clinic itself.

A key feature of the overall design is an expansive curving glass wall, rising seven stories to a height of 30m/100' enveloping a large light-filled atrium. The design intent was ambitious. The atrium and its glass wall began as an unreserved embrace of natural light, view, and ventilation – the building's eyes and lungs as well as a demonstration of the client's commitment to the physical and mental well being of their patients. The atrium also serves as the ultimate way finding device, helping patients and visitors orient themselves when they first enter the building or find their way to an upper floor. From the perspective of the University of Alberta campus, of which the Clinic is a major cornerstone, the curved glazed atrium helps anchor the primary access to the campus on one of the City's main thoroughfares.

To keep the atrium as visually light as possible, slender steel columns were used as structural support. These steel columns were requested to be minimal in size, thus a system was needed to help carry the positive and negative wind loads on the facade's expansive glass elevation. To achieve this glass feature, Stella Custom Glass Hardware was engaged to handle the required design, assist with engineering and design/manufacture/supply the glass hardware required to achieve the design team's vision.



With a system pre-engineered by DIALOG's team of architects and engineers - Stella, DIALOG, and Erdevicki Structural Engineering created a bow-truss cable support system, a proven but technically complex concept capable of holding and supporting the weight of the more than three hundred IGU units required for this feature elevation.

Stella began its mandate by building a scale model of the proposed structure to reaffirm the integrity of the proposed design and its component parts. After considerable testing, final glass specifications were calculated and finalized by glass engineers, Division 8 Consulting.

The system called for a two-part cable truss working together to create a vertical bow-shaped configuration with the ends of each cable anchored at roof and ground floor. To achieve the required bows, horizontal compression struts were used. Each cable is 36mm in diameter and tested to 945kN (capable of lifting the equivalent load of two fully-loaded tractor trailer loads). Large clevises (weighing 13kg each) attach to the end of cables and connect to anchor plates in the roof and floor.

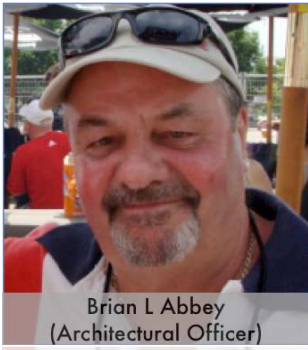
When installed, the cables were pre-tensioned to 254 kN per cable. The talented installation teams from Edmonton-based Specialty Glazing and Wayward Steel Fabricators (overseen by general contractor PCL) made this engineering feat a successful reality.

To hold the glass in place, Stella designed an adjustable "Edge Support" bracket. Over 1200 brackets are bolted to the horizontal mullion to the glass units, eliminating the need to drill holes in the glass. The glass IGUs are 2200mm high by 1300mm wide with a make-up of 10/10 tempered glass, argon filled and with Low E coating.

The same team also collaborated on a visually-minimal glass screen/guard on levels surrounding atrium. (*Continued on Page 12*)

“The World’s first really Green Building – Micro Algae Façade goes live!”

By: Brian Abbey



Brian L. Abbey
(Architectural Officer)

For a while now, it has been difficult for me to decide what my real role as your Architectural Officer is and after much thought, I have decided that it would be in the best interest if I, not only report on industry partners, allied

associations and educational institutions, but also on new and innovative materials and products that are changing the face of Architectural Technology and Building Science on a day-to-day basis. I have spent some time over the past weeks carrying out some research on the web and it is quite mind boggling to discover what’s out there in the marketplace. I thought I would share my findings by starting with the amazing, world’s first, full scale bio-reactive façade at the natural, efficient and unique BIQ house in Germany that went “live” earlier this year as micro-algae was fed into the system for the first time, and cultivated in the glass elements that make up the building’s “bio skin” that produces energy while controlling light and shade.

The BIQ House was built as part of this year’s International Building Exhibition (IBA) held in Hamburg, Germany. The façade concept is designed so that the micro algae in the bio-reactor façades grow faster in bright sunlight to provide more internal shading. The bio-reactors not only produce biomass that can subsequently be harvested but they also capture the solar thermal heat and both energy sources can be used to power the building. What this means is that photosynthesis is motivating a dynamic response to the amount of solar shading required while the micro algae are growing in the glass panels, providing a clean source of renewable energy.

Hanging by a Thread (Cont.)

By: Richard Brightling

In this day and age of computer graphics, architectural concepts can be made to look highly appealing. In the case of the Edmonton Clinic South, we believe that it’s fair to say that the finished building looks even better than the original concept drawing. But you can be the judge...

The Kaye Edmonton Clinic has turned the city’s desire for world class design into a reality. A building where patients have lauded, not only its design, but the feeling of well being that its DNA has created for all to see and enjoy.

Completed in 2012, it proudly showcases Canada’s highest cable truss system and in turn, facilitating what surely is a simply amazing light-filled atrium. It was a technically complex building to design, engineer and build, which required the collective and collaborative talents of architects and structural engineers (DIALOG); point-supported glass experts (Stella Custom Glass Hardware); specialty structural engineers (Erdevicki Structural Engineering); glass engineers (Division 8 Consulting); glazing contractors (Specialty Glazing Systems Inc); glass fabricators/suppliers (Viracon), and construction managers (PCL Constructors), not to mention bold clients (Alberta Infrastructure and Alberta Health Services).

The sides of the building that face the sun have a second outer shell that is set into the façade itself. Micro algae are tiny plants, most no larger than bacteria, that are produced within this shell. They enable the house to supply its own energy. The only thing that the micro algae have to do is simply grow.

They are continuously supplied with liquid nutrients and carbon dioxide via a separate water circuit running through the façade. With the aid of sunlight the micro algae can photosynthesize and grow. The micro algae flourish and multiply in a regular cycle until they can be harvested. *(Continued on Page 13)*

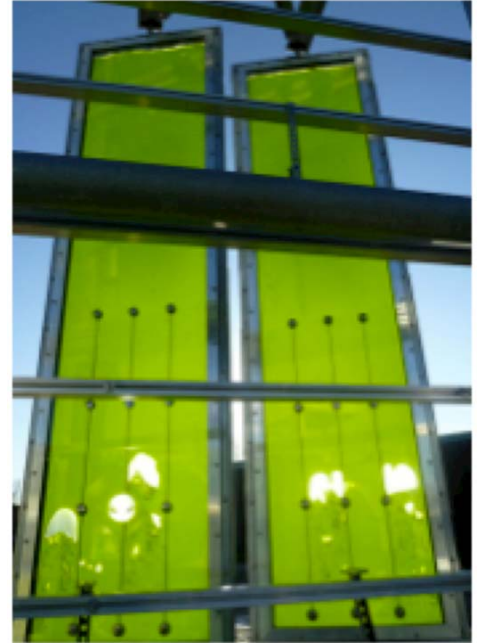
“The World’s first really Green Building – Micro Algae Façade goes live!” (Cont.)

By: Brian Abbey

They are then separated from the rest of the micro algae and transferred as a thick pulp to another part of the BIQ where the little plants are fermented in an external biogas container, so that they can be used again to generate biogas.

Micro algae are particularly well suited for this as they produce up to five times as much biomass as other terrestrial plants and contain many oils that can be used for energy.

The BIQ building draws all of the energy needed to generate electricity and heat from renewable sources and no fossil fuels are used. It is able to generate energy using the micro algae biomass harvested from its own façade. Moreover, the façade collects energy by absorbing the light that is not used by the micro algae and generating heat like a solar thermal panel, that is then either used for domestic hot water and space heating or can be directed into the ground using borehole heat exchangers. This sustainable energy concept is therefore capable of creating a cycle of solar thermal energy, geothermal energy, a condensing boiler, local heat and the capture of biomass using the bio-reactor façade.



In addition to serving the conventional purposes of insulating the building from sound, heat, and cold, and providing shade in bright sunlight; the BIQ building shows that in the future façades will be able to serve a number of different functions and be much more than just an aesthetic cladding to protect against the elements.

Spacious balconies give the residents amazing views as well as the opportunity to see the natural power plant contained in the micro algae façade up close and observe the film of matter as it grows. The greenness of the façade shows that the micro algae are breaking down the carbon dioxide and processing it through photosynthesis. This renewable form of energy production is thus visible from outside the building and is an intentional part of the architectural concept.

On this note, I would like to wish everyone a happy and safe Holiday Season and prosperous New Year!

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Specifying Static-free Floors

ESD sensitivity and risks for personal safety and electronic equipment

By: Dave Long

Originally Published in Construction Specifier Magazine - September 2011

Specifying any floor requires a special set of skills, but when it comes to static-control environments, the challenges take on even more dramatic proportions. Electrostatic discharge (ESD) is a multi-billion-dollar industry problem affecting manufacturing facilities and end-user environments that use electronic parts. Providing the right specifications presents an opportunity for design/construction professionals to help prevent personal injury, equipment failures, product returns, and critical communication errors.

ESD is the sudden, spontaneous transfer of electric current. Essentially, a charge flows through a spark between two bodies at different electrostatic potentials as they approach one another. A common example is the built-up static electricity from walking on one surface and touching another—sometimes the result is a minor shock, other times it can be permanent damage to expensive electronic equipment.

Electrostatic discharge has always presented an invisible and imperceptible threat. While people cannot feel electrostatic charges of up to 3500 V, it may only take 50 V or less to zap telephony equipment, fry circuit boards, and knock out networked computer systems. This occurs when workers walk on a charged surface, touch equipment, and release electrostatic charges trapped in them. Without the right

flooring in place, few realize this is a problem until it is too late.

To make matters worse, the ESD problem is intensifying. Electronic devices continue to become smaller and more powerful—this miniaturization reduces the room for on-chip protection, increasing vulnerability to ESD.¹ The result is more environments are at risk if they do not have specialized anti-static, fault-tolerant flooring designed to perform regardless of variables such as controlled footwear, maintenance, and humidity.

On a practical and ethical level, one wants to provide clients with flooring solutions that best meet their needs. However, designers should also protect themselves against costly litigation when things fall short—an increasing concern among industry professionals. In this light, the legal standard of “What are the basics you need to know?” is evolving to become “What else should you have known?”

Timelines of ESD

Through the 1990s, damage to electronic devices from ESD declined as many manufacturers invested in on-chip circuit protection. Unfortunately, these circuit design strategies diminished the electronic equipment’s performance—they were eventually eliminated to meet the demand for smaller components. As a result, numerous environments have become more sensitive to levels of static discharge.

Preventing the sources of static generation has become a priority for designers at electronics factories, data centers, and mission-critical environments reliant on sophisticated electronic systems. Static discharges cannot occur in a space with flooring that dissipates existing static charges and prevents new ones. Many facility managers view static-free flooring as the most effective means to prevent ESD from ever becoming a problem. (*Continued on Page 16*)



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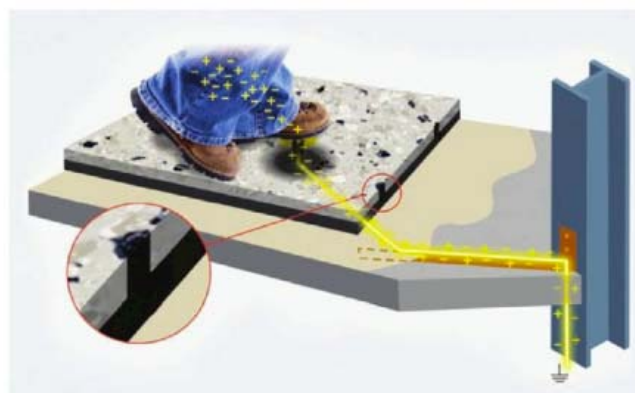
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How electrostatic discharge (ESD) flooring works.

Specifying Static-free Floors

ESD sensitivity and risks for personal safety and electronic equipment (Cont.)

By: Dave Long

Regardless of the environment, some form of static-control flooring can meet almost any space's physical, aesthetic, and ergonomic needs. In fact, facility managers in environments as diverse as semiconductor manufacturing, flight control operations, and casino command centers view static-free flooring as the most effective way to mitigate ESD problems.

Due diligence

Fortunately, installing the right kind of anti-static floor eliminates the source of ESD problems. Unfortunately, most organizations fail to understand the risks, and most specifiers do not install flooring that meets the latest industry standards. Part of the problem is a disconnect among architects, contractors, flooring distributors, manufacturers, and end users.

Flooring manufacturers and distributors know about flooring, and ESD specialists know about static prevention, but neither has much communication with the other. This puts specifiers in a bind because the information they receive from flooring professionals is usually inconsistent with that from static-control providers. Even with the best of intentions, most specifiers do not know where to turn.

Another issue hindering communication is the technical jargon—terms that are particularly confusing because they are not always used in the same way. For example, some static-dissipative tile might be marketed as an 'anti-static flooring solution,' but may not meet the needs of most applications unless polished with three to five coats of special anti-static waxes.

As another example, many specifications are written based on a resistance range; however, what happens if the range is so broad it includes an ineffective portion? Research has shown floors measuring in the upper half of the static-dissipative range often lack the ability to adequately drain static charges.² If a floor is specified as just having to be "static-dissipative," the specification allows for both the effective and ineffective portions of the range. This means the client could end up with a floor that meets the spec, but still does not prevent ESD problems.

The point is electrostatic-discharge protection is a very specialized industry—without an understanding of the terminology, specifiers and facility managers cannot tell if they are specifying the proper floor.

Due to the liabilities associated with a catastrophic ESD event, specifiers should also have some knowledge about electricity, grounding, and the associated standards and test methods.

Flooring types

Before recommending the best flooring solutions, it is important to study the environment and test for special ESD

concerns, including variables like footwear, humidity, and environmental factors. In some projects, one particular product will be preferred; in others, a combination of products will form the ESD floor plan. In any event, it is essential to have a thorough understanding of the products (i.e., rubber, vinyl, carpet, and epoxy).

The product descriptions in the following paragraphs are meant to be general, with specific attributes varying between providers. In this light, the most important variable in the flooring selection process may be to partner with a reputable manufacturer.

ESD rubber

Independent research from MIT Lincoln Laboratories recently recognized the latest generation of EC rubber flooring as having the most effective static protection for any application. It is the only fault-tolerant flooring suitable for Class-0 applications (a working definition of Class 0 is any component that fails under 200 V for the Human Body Model or Charged Device Model). EC rubber is also the only static-resistant product that works regardless of footwear.

This product group meets all domestic and international industry standards, including:

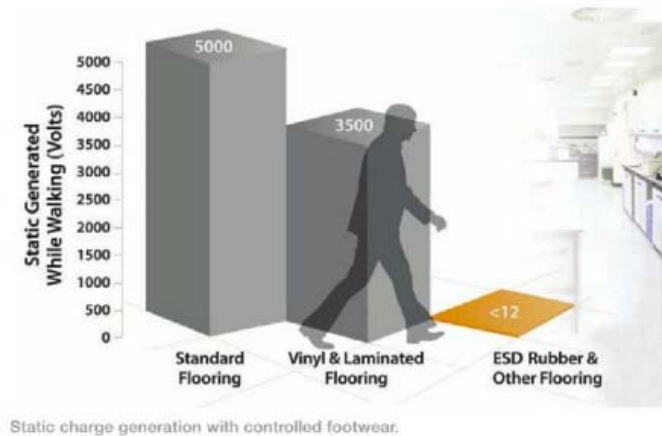
- National Fire Protection Agency (NFPA) 99, Healthcare Facilities;
- American National Standards Institute/Electrostatic Discharge Association (ANSI/ESD) S20/20-07, Protection of Electrical and Electronic Parts, Assemblies, and Equipment (Excluding Electrically Initiated Explosive Devices);³
- ANSI/ESD STM 97.1-2006, Floor Materials and Footwear: Resistance Measurement in Combination with a Person;
- ANSI/ESD STM 97.2-2006, Floor Materials and Footwear: Voltage Measurement in Combination with a Person;
- U.S. Department of Defense (DOD) 4145.26-M, DOD Contractors' Safety Manual for Ammunition and Explosives; and
- National Aeronautics and Space Administration (NASA)-grade cleanroom requirements.

Additionally, it is free of halogens, polyvinyl chloride (PVC), lead, phthalates, and asbestos. (*Continued on Page 17*)

Specifying Static-free Floors

ESD sensitivity and risks for personal safety and electronic equipment (Cont.)

By: Dave Long



Among other attributes, EC rubber is designed to last forever, can withstand heavy loads, and never needs conductive wax. Ergonomically, rubber is a better anti-fatigue floor than either epoxy or vinyl, and, like carpet, dampens noise. As it is less porous than vinyl, rubber is also easier to clean, wash, and maintain.

EC rubber is becoming a preferred option in electronics manufacturing facilities, and cleanrooms. It is also highly recommended for data and call centers, computer labs, R&D labs, hospitals, and other mission-critical environments with zero tolerance for static. In Class-0 ESD environments, the use of EC rubber, combined with controlled footwear, also eliminates the need for wrist straps for mobile personnel.

Though its installed cost is the highest among the various options, the total expense of ownership for rubber is low because it is durable and inexpensive to maintain. Nevertheless, despite its many advantages and value, the initial cost may be perceived as prohibitive.

It is important to ensure the selected rubber is 'conductive' and not 'static-dissipative,' as the latter's resistive properties exceed the recommended system resistance (i.e., less than 35 megohms) parameters of industry standards like ANSI/ESD S20.20-2007.

ESD carpeting

At one time, carpet manufacturers believed they could solve ESD problems if they could simply prevent people from getting shocks when they walked across the carpeted floor. By preventing static build-up on the people who touched the components, the reasoning was damage to computer equipment would be reduced. To an extent, they succeeded in meeting their goal. By using anti-static additives or tufting the carpet with yarns containing carbon cores, static shocks were blocked.

However, because the carbon bi-components were insulated from the exterior surface of the carpet and lacked contact points, their static-dissipative properties were rendered ineffective. The resulting products, while ideal for residential or general commercial use, did not meet the standards required by the electronics industry for the manufacturing and handling of electronic components.

ESD carpet has come a long way since the days of the so-called 'computer-grade' products. Today, in the tufting process, conductive fibres can be woven into the yarn bundle, creating an almost infinite number of contact points, providing a fast and reliable path to ground. Thanks to heavier denier conductive fibre, the new generation of ESD carpets can also withstand physical punishment in high-traffic areas.

Since they are easy to install and remove, carpet tiles are a popular choice among facility managers. Carpet tiles are installed with clean, fast-drying release adhesives, and can be placed directly over old vinyl tile or uneven concrete, which lowers installation costs. If the carpet is accidentally damaged, the area can be easily replaced without special tools or even new adhesive.

However, carpet can also have its disadvantages. It is not well-suited to accommodate heavy loads such as forklifts and pallet jacks; it is also difficult to roll carts or systems on wheels over carpet. (Continued on Page 18)

Henry

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Specifying Static-free Floors ESD sensitivity and risks for personal safety and electronic equipment (Cont.)

By: Dave Long

Further, carpeting has low resistance to chemicals and solvents, and it can be difficult to find small electronic parts when they are dropped on it.

The biggest challenge with carpet is finding one that has permanent static-control performance while still meeting the safety requirements for a floor that can be used around operational computers and electrical appliances. Some carpet tiles, often generically described as 'ESD-grade,' contain yarns too conductive on the surface to be fit for use in public or uncontrolled environments like call centers and offices.

Telecommunication facility ground standards (e.g., Alliance for Telecommunications Industry Solutions [ATIS] 0600321, Electrical Protection for Network Operator-type Equipment Positions) specifically exclude these highly conductive carpeting.

Specifiers can avoid this safety liability issue by requiring the carpet resistance between any two points (RTT) to never measure below 1 million ohms. The author is also aware of at least one carpet tile that addresses the excessive conductivity issue; this sort of product would be recommended for mission-critical applications.

ESD vinyl

Vinyl tile was the first ESD flooring material. Invented in the 1940s, the most suitable products are solid vinyl tiles (SVTs). Properly maintained SVT is attractive and can give a facility a 'hospital look' of cleanliness and shine. Many facility managers favor vinyl floors because the material is relatively inexpensive, simple to repair, and capable of handling heavy rolling loads.

Aware of the need to contain cleaning costs, some vinyl manufacturers have developed no-wax ESD solid vinyl floors that, unlike less expensive static-dissipative vinyl composition tiles (VCTs), do not require periodic wax or polish treatments to eliminate static. Most manufacturers recommend cleaning methods that steer clear of finishes, polishes, or waxes. Since the properties of SVT are the same throughout the full thickness of the tile, high-speed buffing—what maintenance professionals call 'burnishing'—is most often recommended for cleaning.

It is now possible to install certain conductive SVT in occupied spaces over old floors like VCT and epoxy. The use of conductive, dry adhesives and fast-drying pressure-sensitive adhesives that are also low in volatile organic compounds (VOCs) now enables some ESD tile to be installed atop most types of old floors.

Specifier's Checklist

- Only conductive and static-dissipative floors can be grounded. Standard flooring installed with ground strips or conductive adhesive will not offer any static protection.
- Always reference grounding standards appropriate for the space:
 - ANSI/ESD for electronics handling and manufacturing
 - ATIS 0600321 and Motorola R56 for telecommunications applications
 - FAA 019e for flight control areas
 - DOD 4145.26-M for explosives handling
- An effective static-control floor can be verified with an ohm meter to determine the electrical resistance of the material. If the material does not pass the ohm meter test, it cannot be grounded.
- Conductive floors should never require any anti-static sprays or waxes to enhance or maintain performance. The conductivity should be achieved by the material's actual permanent physical composition.
- The floor should reduce static electricity regardless of relative humidity (RH). Ask the supplier specifically about performance in very dry conditions.
- In real-world conditions, the floor must inhibit static buildup without special conductive shoes or shoe straps. When in doubt, ask for independent test data verifying this property. The data should be compiled from an installed floor and not from a lab test of new flooring.
- Never assume a 'shock-free' environment means 'static-free.' A shock-free environment only means static charges are below 3500 V.
- Do homework upfront. It is much more costly to remove an ineffective floor and replace it than to do it right the first time. Any mission-critical space is only as secure as its Achilles' heel.
- Even if the present electronics are immune to static, if they are eventually upgraded or replaced with state-of-the-art equipment, then static will be a problem. As with any potential security breach, it is always best to plan ahead.

To avoid gaps between seams, it is important to ensure the vinyl tiles will not shrink from plasticizer migration. Before buying any vinyl tile, the supplier should be asked:

- where the products were manufactured;
- whether they will be free of heavy metals, dioctyl phthalate (DOP), and bis(2-ethylhexyl)phthalate (DEHP) plasticizers; and
- if they meet all standards for squareness and electrical properties. (*Continued on Page 19*)

Specifying Static-free Floors

ESD sensitivity and risks for personal safety and electronic equipment (Cont.)

By: Dave Long

ESD epoxy

Easily installed and maintained, epoxy has matured to become a durable, high-quality ESD flooring option. Along with the solid-colored coatings typically used in parking garages and aircraft hangars, the new breed of epoxies is available in patterns as well as in multiple colors and textures. The use of multiple layers of conductive materials as part of the coating's overall thickness provides redundant paths to ground. This means, when installed properly, epoxies are highly effective in meeting most ESD standards.

In facilities where constant heavy loads and high traffic are the norm, epoxies can be a very practical flooring material. To identify the best-looking, most durable product for its facility, EMC Corp. (Franklin, Massachusetts) performed a product durability test on several flooring materials and products. As part of the test, EMC rolled 2268-kg (5000-lb) computers throughout the manufacturing area. The only flooring material not destroyed was a self-leveling, 2-mm (80-mil) thick conductive epoxy, mixed with quartz aggregate.

However, the upside of epoxy is also its downside. The floor is ruggedly hard and unforgiving; it is easily scratched, difficult to repair, slippery, and allows sound to echo throughout a facility. Further, epoxy will not prevent static without the rigid employment of special static-control footwear. This means if the users of a space are wearing normal shoes, static-control epoxy floors generate almost the same amount of static as their non-static-control counterparts.

In addition to ergonomic considerations, facilities managers should understand the color of an epoxy floor is not 100 percent stable. Over time and exposure to ultraviolet (UV) rays, epoxy has been known to yellow or haze. Another problem with epoxy is one does not know for sure what it will look like until after the floor is installed and fully cured.

Other factors affecting flooring applications

Before product selection and installation, it is essential to assess two different environments that require static-control flooring: the real world and electronic manufacturing plants.



Any time static-control carpet is considered, it would be prudent to specify a safe resistance range that offers some margin for error at both ends of the spectrum. The material cannot be too conductive, but it should still be effective in mitigating ESD.

The real world includes mission-critical environments like computer rooms, data centers, 911 dispatch centers, and magnetic resonance imaging (MRI) suites. All these operations rely on the uninterrupted use of sophisticated electronic equipment, and are free of static-control protocols like wearing wrist straps and specially grounded footwear.

Since the floor is the only line of defense against the generation of static on employees, it must inhibit charges and be fault-tolerant—that is, possess the ability to continue operation even when equipment fails. In these environments, there is little clarity on performance criteria, and this can get specifiers in trouble when they receive requests for 'anti-static flooring.' Most of the specification sheets from flooring manufacturers do not reveal what will happen under conditions involving people wearing ordinary footwear.

A typical manufacturer's spec sheet will publish static generation test measurements obtained in a walking test in controlled laboratory conditions using static-control shoes in tandem with a grounded floor (ANSI/ESD S97.2). The other common test references how much charge is generated on a subject wearing test-specific shoe sole covers composed of neolite and leather (i.e. American Association of Textile Chemists and Colorists [AATCC] 134, Electrostatic Propensity of Carpets). However, neither test method sheds light on the implications for real-world environments.

Independent research consultants like Dangelmayer Associates and The ESD Journal have determined EC rubber will likely inhibit static charges on people wearing most types of shoes. At the same time, they have proven static-control options like epoxies, high-pressure laminates, and vinyl (conductive or dissipative) generate significant charges with people wearing most standard footwear. In other words, these materials, regardless of conductivity and grounding, are static-generating antagonists under these conditions.

In mission-critical areas, static-control carpeting offers excellent static mitigation properties. Research has shown carpet tiles manufactured with conductive yarns, conductive pre-coats, and special backing will inhibit static generation on people wearing standard or static-control footwear.

However, there is a caveat: Some carpet yarns are too conductive and could put people in danger if they were to come in contact with AC-line voltages from servers and data storage equipment. In fact, the manufacturing process of ESD carpet produces significant variations in conductivity, with resistive properties varying from less than 10,000 to more than 100,000,000 ohms within the same batch of carpet tile. The first number is below the lowest resistance limits allowed by NFPA 99 for safety; the second is indicative of a material that will not drain static as fast as it is generated. (Continued on Page 20)

Specifying Static-free Floors ESD sensitivity and risks for personal safety and electronic equipment (Cont.)

By: Dave Long

As far as specifiers are concerned, it is imperative to identify material with consistent electrical properties for both safety and static mitigation performance—and ultimately to preclude liability.

Any time static-control carpet is considered, it would be prudent to specify a safe resistance range that offers some margin for error at both ends of the spectrum. The material cannot be too conductive, but it should still be effective in mitigating ESD. This author suggests quantitatively specifying a material resistance range above 100,000 and less than 100,000,000 ohms—the ‘sweet spot’ illustrated in Figure 1.

Before specifying any carpet, the material should be thoroughly tested for resistance to ground, as well as resistance between two surface points on the same tile. The logic behind requiring two tests is to weed out overly conductive, unsafe materials. Regardless of lab tests or information on a manufacturer’s specification sheet, the supplier should certify the resistive properties of the floor after installation and before it is turned over to the owner. This is particularly important because an acceptable resistance range is different in an electronics manufacturing facility than in a 911 call center.

When dealing with the world of electronic manufacturing, international standards require use of specialized footwear, packaging, and wrist straps. However, these standards are not easily enforced, and workers are often lax. The upshot is in the static-free manufacturing world, as well as end-user environments, it is best to strive for maximum static protection.

Standards and certification

Many methods and industry standards have led to the creation of standardized technical specifications that match flooring application requirements. As noted, electronics manufacturers require anyone handling static sensitive parts to follow rigorous grounding protocols.

The electronics industry designates spaces where grounding is necessary as electrostatic protected areas (EPAs). Grounding protocols used in EPAs are outlined in ANSI/ESD S20.20-2007, but this standard offers little instructional value for controlling static in real-world environments like data centers, call centers, and healthcare facilities.

A close reading of ANSI/ESD 20.20-2007 should eliminate the argument over whether ‘static-dissipative’ or ‘conductive’ flooring is better suited for static-control flooring. The requirements summary section, in Table 2, Section 8.2, sensibly encourages material selection based on multiple variables and several test standards, and not based on choosing a broad range of resistance designated as ‘conductive’ or

Grounding Starts Here

1. Account for all types of footwear when evaluating anti-static properties of the floor. Most flooring brochures state performance parameters based on the use of special anti-static footwear.
2. Do not specify based on terms like ‘static-dissipative’ or ‘conductive.’ Specify based on actual ohms range. (Figure A shows the ideal range for mission-critical applications.)
3. Ensure floor can be used near operational electrical equipment. (Visit www.allaboutcircuits.com/vol_1/chpt_3/4.html for help in calculating leakage current at various resistance and voltage conditions.)
4. Require conductive adhesive for all tile installations. Standard non-conductive adhesives are acceptable for sheet flooring when the flooring material is produced with a conductive bottom surface.
5. The specification should contain upper limit for body voltage generation:
 - ANSI/ESD S97.2—ideal upper limits;
 - Mission Critical (MC)—should not exceed 1000 V;
 - EPA—cannot exceed 100 V; and
 - Class 0 ESD—should not exceed 25 V.
6. State resistance-to-ground (RTG) values using ANSI/ESD S7.1-2005 test methods.
7. Specification should account for margin for error. This author suggests specifying an uninstalled (i.e. RTG) resistance range between 100,000 and 10,000,000 ohms.
8. State “electrical properties must be independent and not rely upon temperature, humidity, or any surface additives, waxes, finishes, polishes, or sprays.”
9. Require post-installation verification using a calibrated ohm meter. Floor must measure above 25,000 ohms to meet NFPA 99 resistive parameters in the installed condition. Upper limit should measure below 35 million ohms to easily address ANSI/ESD S20.20-2007 system resistance parameters.
10. State the floor must comply with Table 2 Section 8.2 on page of ANSI/ESD S20.20-2007 for EPA applications.
11. For EPAs, specify system resistance limit of less than 3.5×10^7 per test method ANSI/ESD S97.1.
12. Require a post-installation certification that will include testing resistive properties per ANSI/ESD S7.1-2005 between surface points (RTT) and point to ground (RTG). Tests will include measuring two points on the same surface of selected tiles. (For best practices, electrical properties should be warranted for the life of the floor.)
13. Require a grounding frequency of one ground connection per 93 m² (1000 sf) and at least one per room or installation area.
14. Specify a maximum of 25 ohms resistance between auxiliary ground and building ground conductor.

‘static-dissipative.’ Instead, the standard calls for specific numerical values. This is also the way an architectural specification should characterize materials with electrical properties. (*Continued on Page 21*)

Specifying Static-free Floors

ESD sensitivity and risks for personal safety and electronic equipment (Cont.)

By: Dave Long

ANSI/ESD S20.20-2007 requires that no person have the ability to develop a body voltage in excess of 100 V. Body voltage is measured using test method ANSI/ESD S97.2. In theory, it should not be possible for persons to generate more than 100 V if they are part of a system resistance measuring below 35 megohms. However, there are several circumstances where this assumption has proven invalid.

Conclusion

It is important to ensure the floor specified meets or exceeds the standards mentioned throughout this article. However, post-installation certification is also important. Most facility managers do not know whether they comply with anti-static flooring standards—and they may be at risk if they are non-compliant.

Ideally, facilities should ensure they are protecting worksites on three levels: personal safety, static-control performance, and environmental health. To ensure flooring meets electrical safety specifications after installation, some manufacturers offer audits.

Meanwhile, specifiers should recognize the ESD flooring industry will continue to grow, presenting significant challenges and opportunities at the same time. In this arena, education will remain the most powerful tool. In the final analysis, all industry professionals should be working toward the same goal—providing the best flooring options for clients. To realize this outcome, the entire project team needs to appreciate what is at risk and begin to speak the same language.

About the Author

Dave Long is president and CEO of Staticworx, a manufacturer of electrostatic discharge (ESD) flooring products that protect worksites with customized solutions. Based out of Watertown, Massachusetts, with an office on the West Coast, he works directly with contractors, design professionals, and end-users in selecting flooring such as rubber, carpet, vinyl tile, epoxy, and adhesives. Long is a member of the ESD Association, the National Emergency Number Association (NENA), and the U.S. Green Building Council (USGBC). He blogs regularly at www.staticworx.com and www.esdfile.com. Long can be contacted via e-mail at dave@staticworx.com and is currently booking AIA accredited seminars. Book your own seminar by clicking [here](#).

Notes

- 1 This is known as "Moore's Law." Intel Corp.'s co-founder Gordon Moore predicted the number of transistors on a chip will double about every two years.
- 2 See David E. Swenson et al's "Resistance to Ground and Tribocharging of Personnel, as Influenced by Relative Humidity" from the 1995 EOS/ESD Symposium Proceedings.
- 3 This can be downloaded at no cost at www.esda.org.

Glossary of Terms

AATCC 134: Created by the American Association of Textile Chemists and Colorists, this standard measures the electrostatic propensity of carpets—their tendency to generate a charge. It measures the amount of static generated by a neolyte or leather shoe sole stepping on a carpet surface in a controlled room environment.

ANSI/ESD S20.20-2007, Protection of Electrical and Electronic Parts, Assemblies, and Equipment in EPAs (ESD Protected Areas): This standard covers the requirements necessary to design, establish, implement, and maintain an ESD control program to protect electrical equipment susceptible to damage from human body model (HBM) discharges greater than or equal to 100 volts.

Anti-static Flooring: The generic term 'anti-static' refers to a condition where static generation is inhibited during contact and separation with a different material. Anti-static, or static-control, flooring can either be static-dissipative or -conductive.

Conductive: This term refers to a material's ability to conduct a charge to ground; usually indicated by an electrical resistance range measured in ohms—a minimum of 2.5×10^4 (25,000 ohms) to a maximum of 1.0×10^6 (1 million ohms).

Conductive flooring: Unlike highly conductive materials such as copper and steel, conductive flooring is actually relatively resistive. Conductive floors like static-dissipative floors are classified based on their electrical resistance to ground measured in ohms of resistance. The resistance to ground of a properly specified, conductive floor is $> 2.5 \times 10^4$ and $< 1.0 \times 10^6$ measured per ANSI/ESD STM 7.1. Conductive flooring always meets all three recommended electrical parameters of ANSI/ESD S20.20.

Dissipative tile: Usually composed of carpet, synthetic rubber, or vinyl composition, these floor tiles are used for mitigation of ESD. Static-dissipative tile inherently meets the electrical properties of "static dissipative flooring" without anti-static waxes, finishes, and glazes. These floors are not necessarily anti-static and should be carefully evaluated in applications where special controlled footwear will not be used.

ESD-grade carpet tile: Used to control the accumulation of electrostatic discharge on people, chairs, and tables, these modular floor tiles are made of conductive carpet and a thermoplastic backing, usually manufactured using conductive fibers woven into the carpet face. These tiles are designed to provide an electrical path to ground for the dissipation of unwanted static electricity charges in applications where electronics are stored, manufactured, used, or handled. An ESD-grade flooring material will remain conductive at any relative humidity (RH) level. (Not to be confused with computer-grade or low Kv carpet materials.)

ESD floors: This is a generic, catch-all term for any type of floor covering with anti-static properties. It should not be used in a specification.

Ground: In electrical terms, ground is the safe point of discharge of unwanted static electricity; it represents zero electrical potential. When something is grounded, it is neutral and has no charge. Attaching a conductive floor to ground ensures the static charges will be diverted to the earth through the conductive floor system.

Insulative: The property of 'insulation,' which applies to normal footwear, refers to a material's ability to store as opposed to conduct. An insulator is the opposite of a conductor. In the case of carpet construction, all fibers are insulators unless a conductive coating is applied to the external perimeter of the fibers. Insulated fibers will both generate and store static electricity; they cannot be grounded.

Low-kV computer grade: "Low-kV" is a synonym for anti-static or computer-grade carpet. It will not generate as much static electricity as standard carpet, and reduces the associated shock hazards. The typical human threshold for feeling a static zap is 3.5 kV, or 3500 volts.

NFPA 99, Standard for Healthcare Facilities: Created by the National Fire Prevention Agency, this standard provides a test methodology for measuring the conductivity of flooring and other surfaces. It was originally designed in the 1960s for use in hospital operating rooms that used explosive gases for anesthesia.

Ohm: Ohms are the SI units of electrical resistance, defined to be the electrical resistance between two points of a conductor when a constant potential difference applied between these points produces a current of one ampere. The resistance in ohms is numerically equal to the magnitude of the potential difference. One 'Meg' equals 1 million ohms or 1.0×10^6 —the maximum electrical resistance level for a conductive flooring specification. The lowest end of the range is 25,000 Ohms or 2.5×10^4 —anything less is considered an electrical shock hazard.

Path to ground: The electrical link between a conductive material and the earth.


Point-to-point resistance: The resistance in ohms measured between two electrodes placed on any surface.

Resilient flooring: A type of flooring designed to be durable, resistant to stains and water, and comfortable to stand on. Resilient flooring resists penetration by water, making it less likely than textile-based flooring to become a breeding ground for mold and mildew. Resilient flooring withstands heavy foot traffic. The materials used to make resilient flooring resist scuffing and damage from rolling furniture, dollies, or pallet jacks that are dragged across the floor. Rubber flooring is also slip-resistant, making it an ideal solution for wet applications in manufacturing facilities.

Resistance to ground: The resistance in ohms measured between a single electrode placed on a surface and ground.

Static-dissipative flooring: These floors are defined by a property called electrical resistance (measured in ohms). The important parameter for describing a floor is the static-control flooring resistance to ground or path to ground. To meet the qualification of static-dissipative, a floor must have an electrical resistance to ground of $> 1 \times 10^6$ (one million ohms) and $< 1 \times 10^9$.

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Thursday, February 13, 2014. 6th ANNUAL CURLING BONSPIEL



- 20 Minutes of Professional Lessons
- Six ends of Curling
- Must wear Sports Attire
- Bring Curling Shoes or Clean Running Shoes (No Leather Soles)
- Bring your Curling Broom if you have one
- Business Casual Dinner (no jeans/running shoes)
- Famous Roast Beef Dinner (please advise of dietary constraints)

Location: Toronto Cricket, Skating & Curling Club
141 Wilson Avenue, Toronto, ON. M5M 3A3.
Curling & Dinner: \$70.00 per person + HST

Curling : 2-4 pm – Cocktails (Cash Bar) 4-5 pm – Dinner 5-8 pm



Thursday, February 13, 2014. 6th ANNUAL CURLING BONSPIEL

Event Registration

Name: _____ Email: _____

Company Name: _____

Address: _____

City: _____ Province: _____ Postal Code: _____

Tel: _____ Fax: _____ Cell: _____

ADDITIONAL GUESTS

Name: _____ Name: _____

Name: _____ Are your guests part of your team: Yes/No.

PAYMENT INFORMATION*

Payment method: Visa: _____ Cheque: _____ Sponsorship Voucher: _____

- Registration and payment by credit card is only through Karelo at www.csctoronto.ca
- Registration and payment by Sponsorship; please send this form to the address below
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FINAL BILLING

I am registering: _____ persons @ \$79.10/each (\$70 + \$9.10 HST)

Signature: _____

Total Amount Due: \$_____ (A receipt will be issued) Date: _____

Construction Specifications Canada Toronto Chapter, 28 Fallingbrook Crescent, Lindsay, ON. K9V 0B3.
Phone/Fax 1 888 494 9350 - djfourmier@csctoronto.ca - www.csctoronto.ca

Curling & Dinner \$70.00 per person + HST

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Advertising in *The Toronto Specifier* offers the benefit of distribution to a minimum of 900 industry members every month for 10 issues (September 2013 to June / July 2014). The issue preceding the No Frills Trade Show is forwarded to the four other Ontario CSC chapters in addition to our regular e-mail distribution.

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Isabelle Champagne (647) 269-8580

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Dinner Sponsorship \$235+HST

- One complimentary dinner ticket
- A table top display before and after dinner
- A three minute PowerPoint presentation that will loop throughout dinner
- A one-page electronic advertisement that is included in the previous month's Specifier
- Advanced notification of your display dates in the Specifier

Choice of date is on a first-come, first-served basis.

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- Single Business Card ad placed in the Specifier for 10 issues (one name only; \$40 charge for changing the card during the print run)

Cost of package if purchased individually: \$535+HST

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- Double Business Card ad placed in the Specifier for 10 issues (three names maximum on business card; \$40 charge for changing the card during the print run)
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- Registration for CSC No Frills Trade Show: aisle table
- Two tickets to CSC Social Event (Curling Bonspiel or Fun Night)

Cost of package if purchased individually: \$2,070+HST

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- Upgrade to Wall Table, without electricity, at CSC No Frills Trade Show.
- Golf Day Package (includes four tickets for golf and dinner)

Cost of package if purchased individually: \$2,920+HST

Diamond Sponsorship \$3,190+HST

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- CSC No Frills Luncheon Table (eight tickets)
- CSC No Frills Luncheon Wine Sponsorship
- Plaque presented to sponsor at upcoming dinner meeting recognizing Diamond Sponsorship.

Cost of package if purchased individually: \$3,870+HST

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Contact person: _____

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Please select sponsorship level:

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- ☐ Gold Sponsorship (\$1,560.00 + \$202.80 HST = \$1,762.80)
- ☐ Platinum Sponsorship (\$2,230.00 + \$289.90 HST = \$2,519.90)
- ☐ Diamond Sponsorship (\$3,190.00 + \$414.70 HST = \$3,604.70)

Payment method: Cheque only. Please make cheques payable to: **CSC Toronto Chapter**

Mail a copy of the completed form together with payment to:

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28 Fallingbrook Crescent
Lindsay, Ontario K9V 0B3

For more information, contact:

Isabelle Champagne at champagnei@chicagometallic.com (647-269-8580),
Wayne Austin at wayne.austin@norr.com (416-926-4300 x3527), or
Donna Fournier at djfournier@csctoronto.ca (1-888-494-9350).

Note: The Sponsorship year runs from September 1, 2013 to August 31, 2014. Sponsors are to provide business card graphic for business card ads, and company logo *jpeg* or *png* digital file for website packages, as well as the desired URL to which to link.

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Thank-You!

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May 21 – 25, 2014
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please print

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Full Name of Companion (if registering): _____ Companion E-mail: _____

Are you a CSC or CSI Member? ☐ YES ☐ NO Is this your first CSC conference? ☐ YES ☐ NO

REGISTRATION FEES All fees are in Canadian Dollars

Full Conference registration fees include all technical sessions, scheduled luncheons/breakfasts, Fun Night and Presidents Ball

Companion Fees include all scheduled luncheons/breakfasts listed on Companion schedule, tours/transportation, Fun Night and President's Ball

	UNTIL APRIL 15	AFTER APRIL 15	ON-SITE (subject to availability)
Members (full Conference)	\$ 495.00	\$ 570.00	\$ 650.00
Members (Single day)	\$ 250.00	\$ 300.00	\$ 375.00
Indicate day: <input type="checkbox"/> Thursday <input type="checkbox"/> Friday			

Non-Member (full Conference)	\$ 600.00	\$ 670.00	\$ 750.00
Non-Member (Single day)	\$ 300.00	\$ 350.00	\$ 400.00
Indicate day: <input type="checkbox"/> Thursday <input type="checkbox"/> Friday			

* Student (full Conference)	\$ 250.00	\$ 295.00	\$ 395.00
* Student (Single day)	\$ 40.00	\$ 50.00	\$ 75.00
Indicate day: <input type="checkbox"/> Thursday <input type="checkbox"/> Friday			

** Companion	\$ 425.00	\$ 470.00	\$ 595.00
Additional Companion	\$ 495.00	\$ 570.00	\$ 650.00

► Single day registrations include technical sessions & scheduled lunch only.

ADDITIONAL TICKETS

Full conference and companion registrations include one of each of the following, order additional tickets **ONLY** for guests

FUN NIGHT	\$150.00	PRESIDENT'S BALL	\$ 95.00
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of tickets required: _____ # of tickets required: _____

IMPORTANT:

Please send payment with registration form. All registered delegates will receive confirmation of their registrations via fax/e-mail, or post. All registrations are non-refundable/non-transferable within 2 weeks before conference dates. Cancellations prior to 2 weeks must be in writing and a \$100 cancellation fee will be charged.

PAYMENT

Delegate registration fee: \$ _____

** Companion Registration fee \$ _____

Additional Tickets \$ _____

Sub Total: \$ _____

HST (13%) (R10697097) \$ _____

TOTAL AMOUNT \$ _____

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☐ Cheque (Payable to CSC) # _____

☐ Visa ☐ MasterCard ☐ American Express

Card Number: _____

Expiry Date: _____ Security code _____

Date: _____

Signature: _____

Registered "Delegates" will not be permitted on the Companions program.

* Student - is an individual undergoing training in a school of architecture, engineering, or technology- Photo ID is required at the registration desk – space is limited and must be registered prior to conference

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Mail/fax to: **CSC (Construction Specifications Canada)**, 120 Carlton Street, Ste 312 Toronto, Ontario, M5A 4K2
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NEW DAY!
Wednesday, March 5, 2014

Registration Form and Invoice

Please note: Registration form must have full company name, address, telephone number and name of person in your organization who will co-ordinate your participation.

Organization

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City

Postal Code

Telephone No.

Fax No.

E-Mail Address

Contact Person

Date Stamp				
	Registration #			

Please correct mailing label as necessary

Don't be late!
Registration Deadline
is February 1, 2014

Indicate type of table and number (maximum of 2)
Table type is on a paid first come, first served basis.

			CSC Member	Non-Member	
<input type="checkbox"/> 1	<input type="checkbox"/> 2	Aisle Table(s)	<input type="checkbox"/> \$800.00 ea.	<input type="checkbox"/> \$1080.00 ea.
<input type="checkbox"/> 1	<input type="checkbox"/> 2	Wall Tables(s)	<input type="checkbox"/> \$950.00 ea.	<input type="checkbox"/> \$1230.00 ea.
<input type="checkbox"/> 1	<input type="checkbox"/> 2	Wall Tables(s) with Electrical Service	<input type="checkbox"/> \$1050.00 ea.	<input type="checkbox"/> \$1330.00 ea.
		Guest Speaker Luncheon <input type="checkbox"/> \$550.00 Table of 8	<input type="checkbox"/> \$80.00 per person + HST	
		Wine Sponsor <input type="checkbox"/> \$300.00 + HST		

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ADD - 13% HST # 106970973RT

TOTAL: \$

☐ **Yes!**

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My payment is enclosed with my registration.

Mail registration form with cheque to:

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Lindsay, ON K9V 0B3
Toll Free/Fax: 1-888-494-9350

Please make your cheque payable to CSC Toronto Trade Show
Unless otherwise requested, your cancelled cheque is your receipt.

To pay by credit card, please register on line at:
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