Stethem <stethem@aegisarmor.com> February 26, 2014 10:02 AM

Fwd: IEC 62792: draft electroshock weapon measurement method standard

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Kenneth J. Stethem | Chairman & CEO | Aegis Industries
2275 Research Blvd. Ste. 500 | Rockville, MD 20850
O: 202.280.8942 | F: 240.715.9637 | M: 240.888.1570
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From: <mark@kroll.name>
Subject: **RE: IEC 62792: draft electroshock weapon measurement method standard**
Date: February 1, 2013 2:17:50 PM EST
To: mike@leonesio.com, "Paulter Jr, Nicholas G." <paulter@nist.gov>, "Dorin Panescu" <u_1234_99@yahoo.com>, "Charles Martin" <Charles.Martin@ontario.ca>, "Dave Jenkins" <dmj114@psu.edu>, "Donna Wood" <donna.wood@drdc-rddc.gc.ca>, "Mikhail Kontorov" <mic200653@mail.ru>, "Mikhail Kontorov" <mikhail.kontorov@gmail.com>, "Norimitsu Ichikawa" <ichikawa@cc.kogakuin.ac.jp>, "Ron Van Wieringen" <ron.vanwieringen@ontario.ca>, "Ronghua Wang" <wrh@tc104.com>, "Andrew Dennis" <adennis@cookcountytrauma.org>, "Andy Adler" <adler@sce.carleton.ca>, "Debra Stoe" <debra.stoe@usdoj.gov>, "Doug Klint" <doug@taser.com>, "Ed Hughes" <elh5@psu.edu>, "Graham Smith" <graham.smith@homeoffice.gsi.gov.uk>, "Henry Halperin" <hhalper@jhmi.edu>, "Ian Sinclair" <ian.sinclair@mpbc.ca>, "Jeffrey Ho" <jeffrey.ho@hcmed.org>, "Jim Sweeney" <jsweeney@fgcu.edu>, "John Letteney" <letteney@southernpines.net>, "John Peters" <john@ipicd.com>, "John Webster" <webster@engr.wisc.edu>, "Ken Stethem" <stethem@aegisarmor.com>, "Larson, Donald R." <donald.larson@nist.gov>, "Marc Lapierre" <marc.lapierre@forces.gc.ca>, "Max Nerheim" <max@taser.com>, "Michael Brave" <brave@laaw.com>, "Mike Gardner" <mikegardner@fuse.net>, "Mike Leonesio" <mike@forcetech.org>, "Neil Corney" <corney.neil@gmail.com>, "Pat Reilly" <jpreilly@ieee.org>, "Ray Fish" <rfish@soltec.net>, "Rick Wyant" <rick.wyant@wsp.wa.gov>, "Robert Gruder" <bgruder@karbonarms.com>, "Sushil Sharma" <sharmas@gao.gov>, "Wayne McDaniel" <mcdanielwc@missouri.edu>, "William Katsaris" <wkenkatsaris@gmail.com>, "Yasuaki Hagimoto" <yasuaki.hagimoto@gmail.com>

Nick

I do not believe we presently have enough published scientific data to begin working on a performance/safety standard. Since the present measurement standard draft is essentially physics driven we already have the science.

A quick glance at PubMed shows that we are rapidly learning a lot about the performance and safety of ESWs. However we still have many fundamental open questions. Obviously, safety and effectiveness standards will rely largely on the charge and pulse rate. We know that much. Consider these basic questions:

1. How would we compare a 400 microcoulomb pulse that is 400 μs long with a 100 μC pulse that is 100 μs long? Which is the more effective? Which has the great cardiac risk? They each have a pulse average current of 1 ampere but they have significantly different efficiencies and cardiac risk. How do we quantify that in order to set intelligent limits?

2. Not all ESWs will have the same pulse rate. Consider 2 different ESWs that have the same average current of 2 mA. Model A has a 200 microcoulomb and as pulse rate of 10 PPS while model B has a 100 microcoulomb but a higher pulse rate of 20 PPS. Which is the more effective? Which has the great cardiac risk?

If you know the answers to either of these questions, I invite you to share them with the group as they will be essential for writing a performance standard. Until then, I encourage everyone on this email to help fund or do some relevant quantitative studies. Until we have some quantitative answers to the effects of waveform and pulse rate any performance standard would be almost pure guesswork.

Let me put it another way with respect to the present draft standard. The present draft standard anticipates measuring the waveform parameters to better than 1% accuracy. Answers to the simple questions 1 and 2 above can only be estimated to within the nearest 50-100% today. (Again, if anyone has access to any unpublished data that improves on that accuracy, I invite them to share it with the group.) We clearly have a long way to go before we can begin to think about a performance/safety standard that can match — even within a order of decimal magnitude — the precision and accuracy of the present draft.

Thanks

Mark

Mark W. Kroll, PhD, FACC, FHRS, FIEEE, FAIMBE
Mark Kroll & Associates, LLC
Box 23, Crystal Bay, MN 55323, USA
Adjunct Professor of Biomedical Engineering
University of Minnesota, Minneapolis, MN
Cal Poly University, San Luis Obispo, CA

-------- Original Message --------
Subject: RE: IEC 62792: draft electroshock weapon measurement method standard
From: <mike@leonesio.com>
Date: Fri, February 01, 2013 12:39 pm
To: "Paulter Jr, Nicholas G." <paulter@nist.gov>, "Dorin Panescu" <u_1234_99@yahoo.com>, "Charles Martin" <Charles.Martin@ontario.ca>, "Dave Jenkins" <dmj114@psu.edu>, "Donna Wood" <donna.wood@drdc-rddc.gc.ca>, "Mikhail Kontorov" <mic200653@mail.ru>, "Mikhail Kontorov" <mikhail.kontorov@gmail.com>, "Norimitsu Ichikawa" <ichikawa@cc.kogakuin.ac.jp>, "Ron Van Wieringen" <ron.vanwieringen@ontario.ca>, "Ronghua Wang" <wrh@tc104.com>, "Andrew Dennis" <adennis@cookcountytrauma.org>, "Andy Adler" <adler@sce.carleton.ca>, "Debra Stoe" <debra.stoe@usdoj.gov>, "Doug Klint" <doug@taser.com>, "Ed Hughes" <elh5@psu.edu>, "Graham Smith" <graham.smith@homeoffice.gsi.gov.uk>, "Henry Halperin" <hhalper@jhmi.edu>, "Ian Sinclair" <ian.sinclair@mpbc.ca>, "Jeffrey Ho" <jeffrey.ho@hcmed.org>, "Jim Sweeney" <jsweeney@fgcu.edu>, "John Letteney" <letteney@southernpines.net>, "John Peters" <john@ipicd.com>, "John Webster" <webster@engr.wisc.edu>, "Ken Stethem" <stethem@aegisarmor.com>, "Larson, Donald R." <donald.larson@nist.gov>, "Marc Lapierre" <marc.lapierre@forces.gc.ca>, "Mark Kroll" <mark@kroll.name>, "Max Nerheim" <max@taser.com>, "Michael Brave" <brave@laaw.com>, "Mike Gardner" <mikegardner@fuse.net>, "Mike Leonesio" <mike@forcetech.org>, "Neil Corney" <corney.neil@gmail.com>, "Pat Reilly" <jpreilly@ieee.org>, "Ray Fish" <rfish@soltec.net>, "Rick Wyant" <rick.wyant@wsp.wa.gov>, "Robert Gruder" <bgruder@karbonarms.com>, "Sushil Sharma" <sharmas@gao.gov>, "Wayne McDaniel" <mcdanielwc@missouri.edu>, "William Katsaris" <wkenkatsaris@gmail.com>, "Yasuaki Hagimoto" <yasuaki.hagimoto@gmail.com>

Nick,

I wanted to chime in regarding the continuing interest in including performance components in the measurement standard.

I would agree with many in this group that a performance standard (aka safety and efficacy standard) is long overdue. But lets not, in our haste to correct previous shortcomings, develop a standard that addresses everything but solves nothing. As you have repeatedly stressed, this project is about developing a measurment method standard.

The standard, as currently presented, represents industry "best practices" for pulse generator waveform characteristic measurement and, more importantly (at least to me), does not limit measurements (or the technician) to parameters deemed important and/or set forth by any particular manufacturer.

That said, I believe an independently developed ESW performance standard is long overdue. Maybe those of us who have shown interest in developing safety and efficacy guidelines should consider starting preliminary discussions regarding the formal development of this standard. Obviously this would not be the forum for such discussions, but I would be interested in starting the process. Is there any interest in moving forward on this?

Mike

Michael Leonesio
Founder/President
Leonesio Consulting, LLC
Tel: (423) 933-1911

-------- Original Message --------

Subject: RE: IEC 62792: draft electroshock weapon measurement method standard
From: "Paulter Jr, Nicholas G." <paulter@nist.gov>
Date: Fri, February 01, 2013 8:26 am
To: Dorin Panescu <u_1234_99@yahoo.com>, Charles Martin <Charles.Martin@ontario.ca>, Dave Jenkins <dmj114@psu.edu>, Donna Wood <donna.wood@drdc-rddc.gc.ca>, Mikhail Kontorov <mic200653@mail.ru>, "Mikhail Kontorov" <mikhail.kontorov@gmail.com>, Norimitsu Ichikawa <ichikawa@cc.kogakuin.ac.jp>, Ron Van Wieringen <ron.vanwieringen@ontario.ca>, Ronghua Wang <wrh@tc104.com>, Andrew Dennis <adennis@cookcountytrauma.org>, Andy Adler <adler@sce.carleton.ca>, "Debra Stoe" <debra.stoe@usdoj.gov>, Doug Klint <doug@taser.com>, Ed Hughes <elh5@psu.edu>, Graham Smith <graham.smith@homeoffice.gsi.gov.uk>, "Henry Halperin" <hhalper@jhmi.edu>, Ian Sinclair <ian.sinclair@mpbc.ca>, Jeffrey Ho <jeffrey.ho@hcmed.org>, Jim Sweeney <jsweeney@fgcu.edu>, John Letteney <letteney@southernpines.net>, John Peters <john@ipicd.com>, John Webster <webster@engr.wisc.edu>, Ken Stethem <stethem@aegisarmor.com>, "Larson, Donald R." <donald.larson@nist.gov>, Marc Lapierre <marc.lapierre@forces.gc.ca>, Mark Kroll <mark@kroll.name>, Max Nerheim <max@taser.com>, Michael Brave <brave@laaw.com>, Mike Gardner <mikegardner@fuse.net>, Mike Leonesio <mike@forcetech.org>, Neil Corney <corney.neil@gmail.com>, Pat Reilly <jpreilly@ieee.org>, Ray Fish <rfish@soltec.net>, Rick Wyant <rick.wyant@wsp.wa.gov>, Robert Gruder <bgruder@karbonarms.com>, Sushil Sharma <sharmas@gao.gov>, Wayne McDaniel <mcdanielwc@missouri.edu>, William Katsaris <wkenkatsaris@gmail.com>, "Yasuaki Hagimoto" <yasuaki.hagimoto@gmail.com>

Hello Dorin,

Thank you for your comments.

Typically, current pulse generators (like an ESW) are described by the amplitude (for a given load or voltage range), peak amplitude (for a given load or voltage range), repetition rate, transition duration (common jargon terms are rise time and fall time) (for a given load), pulse width, duty cycle, and maybe output impedance. The list I suggest addresses all of these. To your specific points:

1. Charge – The terms “average level” or “absolute average level” (sections 5.3 and 5.4) describe a summation over a user-defined interval. Therefore, these terms are applicable for charge when multiplied by the summation interval. There have been a couple of discrepancies in the group, including whether to rectify the charge and when in the epoch to start and stop the summation. However, this term is not used by pulse generator manufacturers to qualify their products and its relevance here is for safe use or efficacy, which is not the purpose of this standard. I think that is where many people want to take this standard. Safe use and efficacy would be the subject of a subsequent standard that would use our standard as a reference and hopefully be based on work by the medical research community as to what constitutes safe use and efficacy in a general population.
2. Energy – multiply the current and voltage waveforms, then apply the previous comment. Again, not a parameter used to qualify a pulse generator.
3. Repetition rate – If the waveform is parsed, per section 5.1, the number of pulses will have been discovered. Repetition rate is a somewhat meaningless term when pulses are missing, which is often the case. The logical thing to do would be to generate a pulse occurrence history which could provide many different parameters: pulse separation, pulse duration, pulse period, and the statistics of these. Parsing the waveform and then finding the peak in each waveform sub-epoch allows a pulse occurrence history to be developed.

One last point, which is not necessarily to address your comments: The 62792 is a measurement method standard. This standard is not a substitute for a performance standard that should and must be based on accurate and reliable knowledge describing the physiological effects of ESW. This standard is to be used to characterize the ESW and not its application.

Best wishes,

Nick

From: Dorin Panescu [mailto:u_1234_99@yahoo.com]
Sent: Thursday, January 31, 2013 11:55 PM
To: Charles Martin; Dave Jenkins; Donna Wood; Mikhail Kontorov; Mikhail Kontorov; Norimitsu Ichikawa; Ron Van Wieringen; Ronghua Wang; Andrew Dennis; Andy Adler; Debra Stoe; Doug Klint; Ed Hughes; Graham Smith; Henry Halperin; Ian Sinclair; Jeffrey Ho; Jim Sweeney; John Letteney; John Peters; John Webster; Ken Stethem; Larson, Donald R.; Marc Lapierre; Mark Kroll; Max Nerheim; Michael Brave; Mike Gardner; Mike Leonesio; Neil Corney; Pat Reilly; Ray Fish; Rick Wyant; Robert Gruder; Sushil Sharma; Wayne McDaniel; William Katsaris; Yasuaki Hagimoto; Paulter Jr, Nicholas G.
Subject: Re: IEC 62792: draft electroshock weapon measurement method standard

Hi Nick,

Seems that this draft too either keeps on ignoring or postponing guidance about how to measure charge, energy and repetition rates. I think several other folks on this team have agreed multiple times that these characteristics are essential for an accurate characterization of any ESW.

Thanks,

Dorin

--- On Thu, 1/31/13, Paulter Jr, Nicholas G. <paulter@nist.gov> wrote:

From: Paulter Jr, Nicholas G. <paulter@nist.gov>
Subject: IEC 62792: draft electroshock weapon measurement method standard
To: "Charles Martin" <Charles.Martin@ontario.ca>, "Dave Jenkins" <dmj114@psu.edu>, "Donna Wood" <donna.wood@drdc-rddc.gc.ca>, "Mikhail Kontorov" <mic200653@mail.ru>, "Mikhail Kontorov" <mikhail.kontorov@gmail.com>, "Norimitsu Ichikawa" <ichikawa@cc.kogakuin.ac.jp>, "Ron Van Wieringen" <ron.vanwieringen@ontario.ca>, "Ronghua Wang" <wrh@tc104.com>, "Andrew Dennis" <adennis@cookcountytrauma.org>, "Andy Adler" <adler@sce.carleton.ca>,

"Debra Stoe" <debra.stoe@usdoj.gov>, "Dorin Panescu" <u_1234_99@yahoo.com>, "Doug Klint" <doug@taser.com>, "Ed Hughes" <elh5@psu.edu>, "Graham Smith" <graham.smith@homeoffice.gsi.gov.uk>, "Henry Halperin" <hhalper@jhmi.edu>, "Ian Sinclair" <ian.sinclair@mpbc.ca>, "Jeffrey Ho" <jeffrey.ho@hcmed.org>, "Jim Sweeney" <jsweeney@fgcu.edu>, "John Letteney" <letteney@southernpines.net>, "John Peters" <john@ipicd.com>, "John Webster" <webster@engr.wisc.edu>, "Ken Stethem" <stethem@aegisarmor.com>, "Larson, Donald R." <donald.larson@nist.gov>, "Marc Lapierre" <marc.lapierre@forces.gc.ca>, "Mark Kroll" <mark@kroll.name>, "Max Nerheim" <max@taser.com>, "Michael Brave" <brave@laaw.com>, "Mike Gardner" <mikegardner@fuse.net>, "Mike Leonesio" <mike@forcetech.org>, "Neil Corney" <corney.neil@gmail.com>, "Pat Reilly" <jpreilly@ieee.org>, "Ray Fish" <rfish@soltec.net>, "Rick Wyant" <rick.wyant@wsp.wa.gov>, "Robert Gruder" <bgruder@karbonarms.com>, "Sushil Sharma" <sharmas@gao.gov>, "Wayne McDaniel" <mcdanielwc@missouri.edu>, "William Katsaris" <wkenkatsaris@gmail.com>, "Yasuaki Hagimoto" <yasuaki.hagimoto@gmail.com>
Date: Thursday, January 31, 2013, 11:19 AM
Hello everyone,

I hope that you enjoyed our short hiatus from work on our IEC standard and are now ready to re-engage.

Attached is a draft (in Word and pdf formats) of our IEC 62792 that reflects acceptance of your inputs thus far and, using highlighting or Word's Track Changes, that also shows additions and deletions to the text, as now listed:

1. Clause 2 (Normative References): added reference to the SI
2. Clause 3 (Terms and definitions): added new definitions for terms introduced in Clause 5.
3. Clause 5 (Waveform parameters)
a. Added text for the entire clause
b. Deleted previous clause 5 outline (reason described in comment block)
c. Question regarding measurement uncertainty
4. Clause 6 (Test report): deleted (reason described in comment block)

Let's try to have your review complete and inputs to me by 1700 (UTC-5) on 29 March 2013. I will send periodic reminders.

Best wishes, and thank you again for your efforts,

Nick
N.G. Paulter, Project Leader
Project Team 62792, Technical Committee (TC) 85, International Electrotechnical Commission
Mail Stop 8102
100 Bureau Drive
National Institute of Standards and Technology
Gaithersburg, MD 20899
301-975-2405