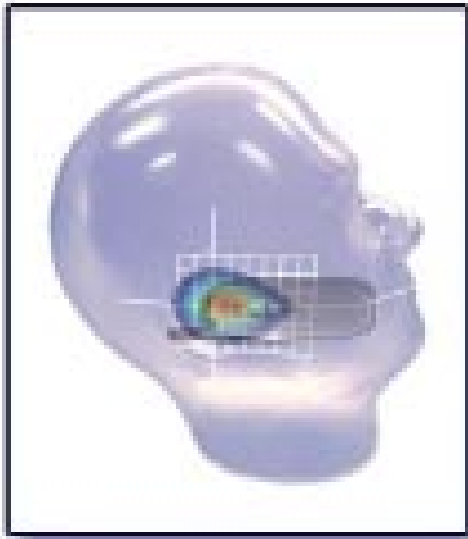


SCIENCE



Specific Anthropomorphic Mannequin (SAM) Phantom (From IEEE Std 1528™)

IEEE Safety Standards for EM Fields

With roots dating back to 1884, the IEEE is today the world's largest technical professional society, with more than 365,000 members in over 150 countries. The development of internationally recognized voluntary standards, through an open consensus process, has long been a major effort of the IEEE. In 1960, IEEE co-sponsored the first US radio frequency (RF) safety standards project (C95); the first RF safety standard (C95.1) was published in 1966. Later, C95.1-1982 was the first national standard in which field limits were derived from the frequency-dependent dosimetric quantity *specific absorption rate* (SAR). Dosimetry and a threshold SAR of 4 W/kg are now the bases for most of the world's RF safety standards and guidelines, including those of ICNIRP, NATO, NRPB and the US DoD. IEEE standards are "living" documents that continue to be refined through the worldwide volunteer efforts of stakeholders for the safe use of electromagnetic energy.

SAFETY

ICES Purpose & Process

Today, operating under the strict rules and oversight of the IEEE Standards Association Standards Board, the International Committee on Electromagnetic Safety (ICES) is responsible for *development of standards for the safe use of electromagnetic energy in the range of 0 Hz to 300 GHz relative to the potential hazards of exposure of humans, volatile materials, and explosive devices to such energy, standards for products that emit electromagnetic energy by design or as a by-product of their operation, and standards for environmental limits.* ICES follows an open consensus process, with a balance of disciplines and a balanced representation from the medical, scientific, engineering, industrial, government, and military communities. As of 31 August 2005, membership of the central governing and the technical committees (TC95 and TC34) stands at more than 150 professionals representing 26 countries. ICES strives to achieve consensus among all the stakeholders in the safe use of electromagnetic energy, thereby producing practical standards that are readily accepted and applied.

IEEE Standards C95.6-2002 and C95.1-2005

IEEE Standards C95.6-2002 and C95.1-2005 provide basic restrictions and maximum permissible exposure values to protect against established adverse effects in humans from exposure to electric, magnetic and electromagnetic fields at frequencies from 0 to 3 kHz (C95.6) and 3 kHz to 300 GHz (C95.1). The basic restrictions are based on thresholds for *established* effects and interaction mechanisms, with an adequate margin of safety, and include *in situ* electric field strength for the region where effects associated with electrostimulation predominate, specific absorption rate (SAR) for the region where tissue and whole-body heating predominate, and incident power density for the region where surface heating predominates. Maximum permissible exposure values derived from the basic restrictions, expressed in terms of incident electric and magnetic field strength, incident power density, and induced and contact current, are also provided. These recommendations are based on the results of a comprehensive review of the relevant scientific literature and evaluation of the weight of the scientific evidence. The basic restrictions and maximum permissible exposure values are intended to apply to all human exposures except for exposure of patients by, or under the direction of, physicians and medical professionals.

SERVICE



Other ICES Standards

TC95 Standards

C95.2-1999: "IEEE Standard for Radio-Frequency Energy and Current Flow Symbols" (Reaffirmed in 2005)

C95.3-2002: "IEEE Recommended Practice for Measurements & Computations of Radio Frequency Electromagnetic Fields with Respect to Human Exposure to such Fields, 100 kHz to 300 GHz"

C95.4-2002: "IEEE Recommended Practice for Determining Safe Distances from Radio Frequency Transmitting Antennas when Using Electric Blasting Caps"

C95.7-2005: "IEEE Recommended Practice for Radio Frequency Safety Programs."

TC34 Standards

1528-2003: "IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques"

ICES Subcommittees & Chairs:

Technical Committee 95

- SC1:** Techniques, Procedures, and Instrumentation
Howard I. Bassen
hib@cdrh.fda.gov
- SC2:** Terminology, Units of Measurements, and Hazard Communication
Richard A. Tell
rtell@radhaz.com
- SC3:** Safety Levels with Respect to Human Exposure, 0-3 kHz
Philip Chadwick
phil.chadwick@mcluk.org
Thanh Dovan
tdovan@spipowernet.com.au
- SC4:** Safety Levels with Respect to Human Exposure, 3 kHz-300 GHz
Dr. Art Thansandote
Art_Thansandote@hc-sc.gc.ca
Dr. Marv Ziskin
ziskin@temple.edu
- SC5:** Safety Levels with Respect to Electro-Explosive Devices
Robert Needy
jrobert.needy@navy.mill
G. Drew Koban
gtkoban@relay.nswc.navy.mil

Technical Committee 34

- SC1:** Small Boat Radar
Arthur G. Varanelli
a.g.varanelli@ieee.org
- SC2:** Wireless Handset Certification
Dr. Wolfgang Kainz
wolfgang.kainz@fda.hhs.gov
Dr. Mark Douglas
mark.douglas@motorola.com
- SC3:** RF Protective Garments
Richard A. Tell
rtell@radhaz.com

The ICES Administrative Committee:

Chairman: Dr. Ralf Bodemann
ralf.bodemann@siemens.com

Vice Chairman: Kenneth Gettman
ken_gettman@nema.org

Secretary: Ron Petersen
r.c.petersen@ieee.org

Treasurer: Arthur G. Varanelli
a.g.varanelli@ieee.org

Membership: Dr. Sheila Johnston
sajohnston@btclick.com

International Liaison: Dr. Michael R. Murphy
michael.murphy@brooks.af.mil

Chairman TC34: Dr. Wolfgang Kainz
wolfgang.kainz@fda.hhs.gov

Chairman TC 95: Dr. C-K Chou
ck.chou@motorola.com

IEEE Staff: William Ash
w.ash@ieee.org

At Large Members

Dr. Eleanor Adair
eadair@comcast.net

Dr. Tom McManus
mmanustom@eircom.net

Dr. John Osepchuk
jmosepchuk@comcast.net

How to Join ICES

All are welcome to participate in the meetings and deliberations of ICES and to vote and participate fully on the Subcommittees. To apply for voting membership on ICES, send a request with your resume to:

Dr. Sheila Johnston
ICES Membership Committee Chair
sajohnston@btclick.com

For further information about ICES, its activities and publications, contact any member of the Administrative Committee or Chair(s) of any subcommittee.

Visit our websites at:

<http://www.ices-emfsafety.org>

<http://grouper.ieee.org/groups/scc28>

<http://grouper.ieee.org/groups/scc34/sc2>



INTERNATIONAL COMMITTEE *on* ELECTROMAGNETIC SAFETY



ICES

Safety Standards

for

Electromagnetic Fields