

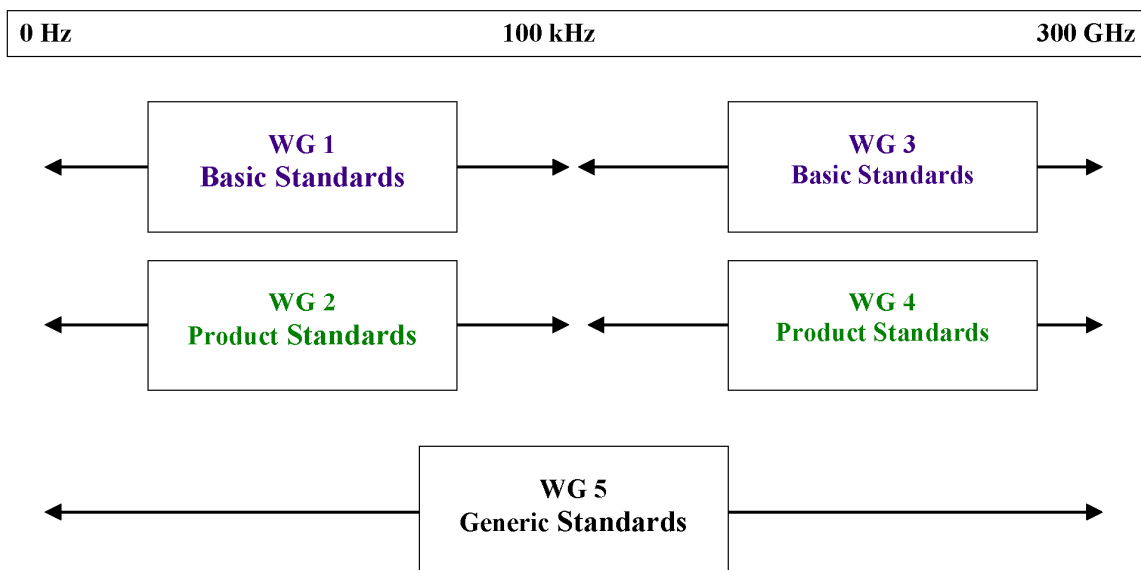


11<sup>th</sup> International Advisory Committee Meeting on Electromagnetic Fields  
7 – 9 June 2006 – World Health Organization  
Report on the activities of IEC TC 106

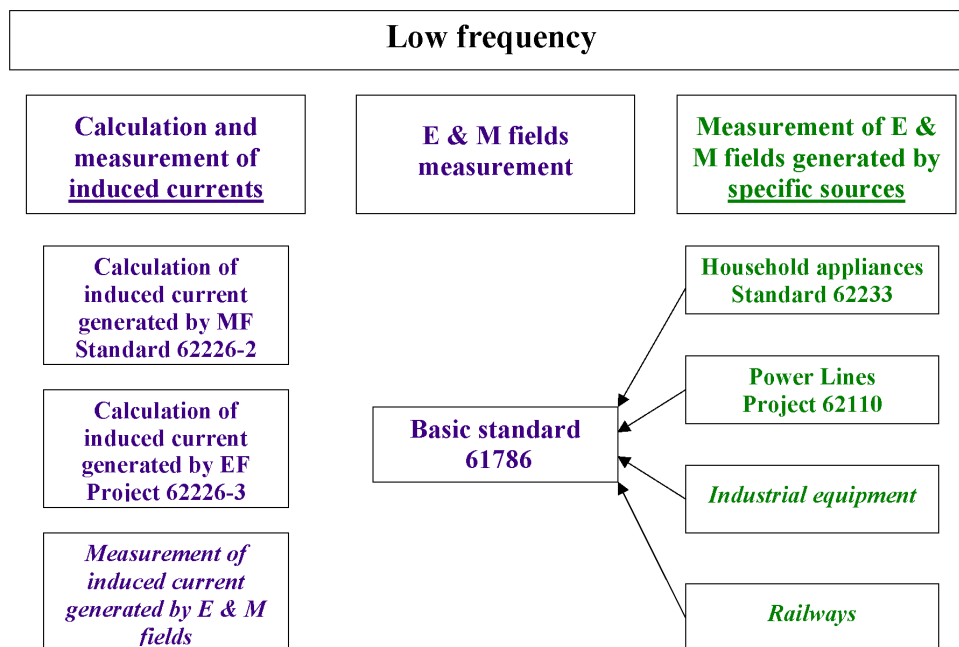
## Technical Committee 106: Methods for the assessment of electric, magnetic and electromagnetic fields associated with human exposure

The work of IEC Technical Committee (TC) 106 is focused on measurement and calculation methods to assess human exposure to electric, magnetic and electromagnetic fields in the frequency range from 0 Hz to 300 GHz. TC 106 has not the mandate to establish exposure limits or to include specific exposure limits in its standards. Contemporary EMF safety standards and guidelines, which are expressed in terms of basic restrictions and exposure limits (e.g., reference levels, maximum permissible exposure ‘MPE’ values, derived from the basic restrictions), are set to protect against established adverse biological effects in humans. The basic restrictions, such as induced current density, induced electric field, specific absorption rate (SAR) and incident power density (at frequencies above a few GHz) are not directly measurable (with the exception of incident power density). The exposure limits, (reference levels, MPEs) are derived from the basic restrictions by means of analytical or numerical models. They are given for a uniform field exposure and for partial-body exposure under the condition of maximum coupling of the fields to the exposed individual. TC 106 is developing standards on measurement and calculation methods of physical quantities specified in exposure standards (electric field strength, magnetic flux density, SAR and power density) for purposes of compliance. Compliance with exposure limits ensures compliance with basic restrictions. However, lack of compliance with the exposure limits does not necessarily imply lack of compliance with basic restrictions, particularly when the field is non-uniform. If an exposure limit is exceeded it is necessary to test compliance with the relevant basic restriction. Testing compliance with a specific basic restriction can be done by means of analytical or numerical models of the human body or by experimental measurement using a phantom filled with a liquid simulating tissue (SAR measurement). The normalisation of these two procedures is part of the work of TC 106.

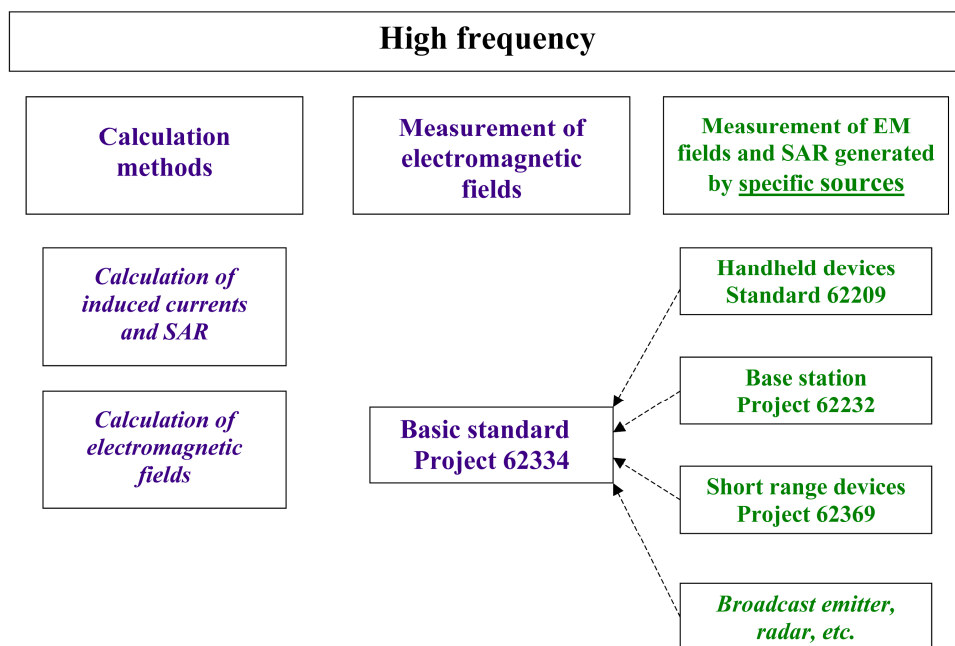
The TC 106 is organized into five Working Groups (WG). Each WG has oversight over one or more Project Teams. The diagram below shows the frequency range covered by each of these WGs. WG1 and WG3 develop basic standards covering respectively the low (0 Hz to approximately 100 kHz) and high (100 kHz to 300 GHz) frequency range, respectively. Similarly, WG2 and WG4 cover the low and high frequency range but develop product standards. WG5 covers the whole frequency range (0 Hz to 300 GHz) and develops generic standards that can be used to demonstrate the compliance of a product when no dedicated product standard exists.



In the low frequency range, the work is divided in two main subjects: 1- the measurement of electric and magnetic fields and 2- the calculation and measurement of currents induced in the human body by these fields. Standard 62233 (household appliances) and project 62110 (power lines) describe measurement procedures for specific sources. (Industrial equipment and railways are not covered by existing projects.) Product standards make reference to basic standard 61786 as a normative reference. Standard 62226-2 and project 62226-3 cover the calculation of induced currents generated by electric and magnetic fields. The measurement of induced currents will also be covered by a specific standard.



In the high frequency range, the work is also divided in two main subjects: 1- the measurement of electromagnetic fields and SAR and 2- the calculation methods of EMF, induced currents and SAR. Standard 62209 (handheld wireless devices), project 62232 (mobile radio base stations) and project 62369 (short range devices) describe and specify measurement procedures for specific sources.



*Note: the items in italics are part of the scope of TC 106 but are not covered by existing standards or projects.*

WG 1: Measurement and calculation methods for low frequency (0 Hz to approximately 100 kHz) electric and magnetic fields and induced currents (basic standards)

- *Standard 62226: Exposure to electric or magnetic fields in the low and intermediate frequency range – Methods for calculating the current density and internal electric field induced in the human body:*
  - Part 1: General*
  - Part 2: Exposure to magnetic fields*
  - Part 3: Exposure to electric fields*
  - Part 4: Electrical parameters of human tissues*

This standard defines 2D and 3D analytical and numerical models of the human body in order to be able to calculate for a specific situation, compliance with the basic restriction (induced current or electric field). The standard deals with complex exposure situations, such as non-uniform magnetic field or perturbed electric field. These complex situations are not covered by the ICNIRP guidelines or IEEE exposure standards.

Part 1 and Part 2.1 of the standard have been published in November 2004. The development of Part 3 on electric fields is in progress.

- *Standard 61786: Measurement of low-frequency magnetic and electric fields with regard to exposure of human beings – Special requirements for instruments and guidance for measurements*

WG 2: Characterization of low-frequency electric and magnetic fields produced by specific sources (product and product family standards)

- *Standard 62233: Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure*

This standard defines methods for evaluating the electric field strength and magnetic flux density around household electrical appliances, electric tools, electric toys, etc. It includes the operating conditions during testing as well as measuring distances and positions of the field probe. This standard has been published in October 2005.

- *Project 62110: Measurement procedures for electric and magnetic fields generated by AC power lines with regard to human exposure*

This standard will define measurement procedures for overhead and underground transmission and distribution lines related to the exposure of the general public. It will not cover professional (occupational) exposure. The project has started in December 2004.

WG 3: Measurement and calculation methods for high frequency (approximately 100 kHz to 300 GHz) electromagnetic fields and specific absorption rate (SAR) (basic standards)

- *Project 62334: Measurement and Assessment of Human Exposure to High Frequency Electromagnetic Fields (9 kHz to 300 GHz)*

This standard will cover the measurement and estimation of quantities associated with the assessment of exposure to electric, magnetic and electromagnetic fields in the frequency range from 9 kHz to 300 GHz.

WG 4: Characterization of high-frequency electromagnetic fields and SAR produced by specific sources (product and product family standards)

- *Standard 62209: Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation and procedures – Part 1: Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity of the ear (frequency range of 300 MHz to 3 GHz)*

This standard specifies the experimental method (phantom specifications, measurement equipment, scanning system, etc.) for demonstration of compliance with the specific absorption rate (SAR) limits for hand-held devices such mobile phones, cordless phones, etc. This standard has been published in March 2005.

Part 2 of the standard will cover two-way radios, wireless palmtop terminals, wireless desktop terminals, and wireless body-mounted devices including accessories and multiple transmitters in the frequency range of 30 MHz to 6 GHz.

- *Project 62232: Determination of RF fields in the vicinity of mobile communication base stations used for the purpose of evaluating human exposure*

The standard will describe measurement and calculation methods used to evaluate RF fields from mobile communication base stations with the objectives of evaluating compliance of these stations with appropriate international standards and guidelines and national regulations on limiting human exposure to RF fields.

- *Project 62369: Evaluation of human exposure to electromagnetic fields from Short Range Devices in various applications in the frequency range 0-300 GHz*  
*Part 1: Fields produced by devices used for Electronic Article Surveillance, Radio Frequency Identification and similar systems.*  
*Part 2: Fields produced by devices used for Alarms; Alert; Asset tracking, monitoring and protection; Detection; Security; Telecommand and control; Telemetry and similar Short Range and/or Low Power Radio Devices.*

The devices covered by this standard normally have non-uniform field patterns. Often these devices have a very rapid reduction of field strength with distance and operate under near-field conditions where the relationship between electric and magnetic fields is complex. This standard will define specific measurement techniques to assess human exposure to these devices.

#### WG 5: Generic standards: general application and common practices

- *Project 62311: Assessment criteria to permit evaluation of compatibility of electrical and electronic apparatus with standards for human exposure to electromagnetic fields (0 Hz - 300 GHz)*

This generic standard will provide assessment methods and criteria to evaluate the compliance of electronic and electrical apparatus to basic restrictions or reference levels. It can be used when no dedicated standard exists for a specific apparatus.

- *Project 62479: Demonstration of conformity of low power electronic and electrical apparatus with the basic restrictions related to human exposure to electromagnetic fields (10 MHz - 300 GHz) - General public*

This generic standard will apply to low power electronic and electrical apparatus for which no dedicated product or product family standard regarding human exposure to electromagnetic fields applies. The frequency range covered is 10 MHz to 300 GHz.

Additional information can be found on the IEC Internet site: [www.iec.ch](http://www.iec.ch)