

From the Telecommunications Authority;

Regulation on Determination, Measurement Methods and Supervision of the Limit Values of the Electromagnetic Field Force from the Fixed Telecommunication Devices Operating within the Frequency Range of 10 kHz – 60 GHz

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**PART ONE
Aim, Scope, Legal Basis and Definitions**

Aim

Article 1- Aim of this Regulation is to set out;

- a) Points for place of establishment, installation and supervision of the fixed telecommunication devices which constitute electromagnetic field,
- b) Limit values of the electromagnetic field force which are accepted in order to eliminate the possible negative effects on the environment and human health against involuntary continuous subjection to the electromagnetic field,
- c) Measurement methods and organizations which shall conduct the measurements,
- d) Principles and procedures to make the fixed telecommunication devices which are not in compliance with the limit values of the electromagnetic field force as a result of the measurements, conform to these limit values and the sanctions to be applied to the operators/administrators when these limit values are violated,

Scope

Article 2- (Amended; Official Gazette dated 15.02.2002 and numbered 24672) This Regulation covers the principles regarding the determination, measurement methods and supervision of the limit values of the electromagnetic field force which shall be created in the environment during the establishment and operation of the transmitter and transceiver devices of the cellular mobile systems among the fixed telecommunications devices which operate in a frequency range of 10 kHz and 60 GHz and are used in residential areas where to be commissioned in this band in future and the mobile transmitter, transmitter/receiver devices which are temporarily used to provide the telecommunications service in an area and the fixed telecommunications devices whose output power is over 5 Watt which is provided in the system establishment permit issued by the Authority.

Legal Basis

Article 3- This Regulation was prepared on the basis of the Radio Law No: 2813 which was amended by the Law No: 4502, and the Telegram and Telephone Law No: 406.

Definitions

Article 4- For the purposes of this Regulation;

The Authority shall mean the Telecommunications Authority,

The Board shall mean the Telecommunications Board,

The Law shall mean the Radio Law No: 2813 which was amended by the Law No: 4502

Telecommunications shall mean the transmission, emission and reception through cable, wireless, optical, electric, magnetic, electromagnetic, electro chemical, electro mechanic and other transmission systems of all kinds of sign, symbol, voice and image and all kinds of data which can be converted into electric signals,

Fixed Telecommunications Device shall mean the transmitter and the transceiver devices which are established and operated in the frequency band of 10kHz and 60 GHz on a fixed basis and the mobile transmitter and transceiver devices which are used to temporarily provide the telecommunications service in an area,

Antenna shall mean the component which emit the signal it receives from a system to the environment as electromagnetic waves and transfers the electromagnetic waves which it receives from the environment, to the system,

Antenna Broadcast Pattern shall mean broadcast beam of the electromagnetic wave which is emitted from the antenna,

Measurement Certificate shall mean the certificate which the person to conduct the measurement shall receive as a consequence of the training to be offered by one of the organizations which are authorized by the Authority, in the organization authorized to conduct the measurement,

Measurement Authorization Certificate shall mean the document to be issued by Authority to the organizations which it finds appropriate to conduct the measurements in the scope of the Regulation,

Approved Investment Plan shall mean investment plans which are submitted to the Authority by the operators regarding their investments for the coming years within the framework of the authorization and concession agreements or the Telecommunications licenses and provisions of general authorization, and approved by the Authority,

Electromagnetic Field means the medium which is created by the waves which are the components of the electrical and magnetic fields,

Electromagnetic Field Force (E) shall mean the vector magnitude of the force which affects the one unit positive electric load in any point in space,

Electromagnetic Field Force (H) shall mean the rate of the magnetic flux density to the permeability of the medium,

Power Flux Density shall mean the power for unit area, vertical to the movement direction of the electromagnetic wave (W/m^2),

Security Distance shall mean the distance whereby the limit values of electromagnetic field force are not violated in order to minimize the effects of the electromagnetic wave which is emitted from the fixed telecommunication devices which are in the scope of this Regulation, on the environment and human health,

Security Certificate shall mean the document which is issued to the operator/administrator for each fixed telecommunications device which is established according to the security distance,

Mean Time shall mean each measurement period which passes in order to calculate the average value of the electric field force in the medium (6 minutes),

Continuous subjection shall mean the subjection for a period longer than the mean time,

Proximate field shall mean the distance of $2D^2/\lambda$ (D stands for the antenna height) to the source of broadcasting,

Remote field shall mean the distance whereby the electromagnetic wave shows plane wave characteristic and it is more than $2D^2/\lambda$ from the antenna,

Operator shall mean any capital stock company providing telecommunications services and/or operating telecommunications infrastructure under an authorization agreement, a concession agreement signed with the Authority, a telecommunication license or a general authorization granted by the Authority,

Administrator shall mean the organizations and the natural and legal persons which providing the telecommunication services, which are not covered by the definition of operator.

PART TWO

Place of establishment, principles of installation of the fixed telecommunication devices and system notification

Place of establishment

Article 5- The fixed telecommunications devices in the scope of this Regulation shall be established in the regions and numbers which are provided in the system establishment plans and/or investment plans which are issued by the Radio Television Supreme Council for the Radio – TV transmitter devices and Telecommunications Authority for the other devices. Place of establishment shall be selected in accordance with the security distance which is calculated and provided in article 6 and apart from the places such as balcony and terrace which are easily accessible by the unauthorized persons not under the control of the operators.

However, while selecting the place of establishment, the Authority shall consult the Provincial Local Environmental Boards. These boards shall submit their views about the issue upon the request of the Authority within a week with their rationale.

Calculation of the security distance

Article 6- Considering the broadcast direction of the antennas, the security distance shall be calculated with the formula below:

$$d = \frac{\sqrt{30.P 10^{G/10}}}{E} \text{ (metre)}$$

- In this formula
- P stands for the output power of the device (Watt),
- G stands for the antenna gain (dBi),
- E stands for the limit value of the electrical field (It shall be the limit value for a single device in Table-1) (volt/metre),
- d stands for the security distance (metre).

Security certificate

Article 7- Operator/administrator shall make the Authority approve the project which covers all of the equipment pertaining to the system it shall establish as from the date this Regulation enters into force. Security certificate which means the preliminary authorization for the project which is approved by the Authority shall be issued in accordance with the security distance calculation. This certificate shall be approved by the Authority as a result of the supervision to be conducted.

Installation Principles

Article 8 – For the installation of the fixed telecommunication devices within the residential areas in the scope of this Regulation, the security distance which is calculated and provided in article 6 as a minimum requirement shall be taken as a basis. However for the rear surface of the directional antennas, calculation of security distance shall not be made.

Reflecting boards in minimum size equal to the antenna dimensions shall be installed to the wall corresponding to the rear sides of the antennas to be established to the surface of the buildings.

During the installation, the said device shall be connected to the earthing system of its establishment place. Where such systems do not exist or the earthing resistance of the current system is over 5 Ω , also it shall be earthed with the copper bars. This earthing shall be isolated from the lighting conductor earthing. Measured earth resistance shall not exceed 5 Ω .

When it is installed to a high place or on a building, it shall be in the coverage area of a lighting conductor installation.

Following the installation of the devices, test and measurements shall be conducted with the measurement devices with the characteristics which are provided in the Regulation, by the organization which established them and it shall be ensured that the installed device does not violate the limit values of the electromagnetic field force which are provided in article 16 of the Regulation.

It is compulsory to take necessary actions such as lighting in the towers where the antennas shall be installed in accordance with the civil aviation rules.

System Notification

Article 9- (Amended, Official Gazette dated 15.02.2002 and numbered 24672) – Application shall be made with evaluation form for application to the fixed telecommunication devices which are given in Annex B for the fixed telecommunication devices to be installed in the scope of the Regulation. Following the commissioning of the device, it is compulsory to send the form of measurement values in Appendix–A as filled showing the results of the conducted measurements to the Authority in the 30 days at the latest. Otherwise, a monetary penalty which is 50 time the license fee shall be applied.

PART THREE

Principles of Measurement Authorization Certificate

Organizations Authorized to Conduct Measurements

Article 10- The measurements which are provided in this Regulation shall be conducted by the Authority and the organizations and the universities which are authorized by the Authority within the framework of this Regulation.

Devices to be used for the measurements and their specifications

Article 11- Spectrum analyzer and broadband measurement devices shall be used for the measurements. Minimum technical specifications belonging to these devices are listed below.

- a) The frequency band which is provided in this Regulation shall be covered with one or more measurement devices.
- b) The measurement device to be used shall be capable of measuring mean power density (W/m^2 , mW/m^2) mean E field (V/m) or square field of the E field or mean H field (A/m) or square field of the H or showing one or several of these parameters.
- c) Probe dimensions shall ideally display consistent frequency reaction curve and weak reaction against the frequencies not within the range of the frequency.

d) Devices shall be capable of averaging according to the time.

Moreover, the measurement devices to be used shall be calibrated in accordance with the calibration ranges which are recommended in the technical documents and where no calibration time is provided in the said documents, calibration shall be conducted for each two years and the calibration document shall be submitted to the Authority. Authorization certificates of the organizations which do not conduct the relevant calibrations in this period shall be revoked.

Qualifications of the Personnel to Conduct the Measurements

Article 12- Measurements shall be conducted by the graduates or personnel who graduated from the undergraduate departments of electrical-electronics, communication or physics engineering or physics the universities and the repairman and technicians who graduated from the electrical, electronics and communication departments of the vocational high schools and have the test and measurement certificate.

Application to the Authorization Certificate

Article 13- The organizations which want to obtain authorization certificate in order to conduct measurements which are provided in this Regulation shall apply to the Authority with the following documents:

a) Accreditation certificate for the independent electromagnetic field measurement laboratories which are natural or legal persons possessing international accreditation certificate or,

b) Documents evidencing that they possess the devices provided in article 11 and the personnel in article 12 for the other organizations and laboratories which request authorization certificate.

The Authority shall publish the list of the organizations which it granted the authorization certificate and the data concerning the cancels and modifications in that list, in its own website.

Authorization Cancellation

Article 14- Where different organizations which received authorization certificates from the Authority have inconsistent measurements in the same location, the Authority renews the measurement with the officials of the authorized organizations in cooperation under the same circumstances. When a contradictory situation is found for the measurements of the authorized organizations, against the Regulation, the organization is first warned. If this contradiction is repeated, its authorization shall be revoked and this shall be published in the website of the Authority and no authorization shall be given to the same organization.

PART FOUR

Measurement Methods and Limit Values

Articles 15- The measurements to be conducted are basically composed of the electromagnetic field force and power flux density;

When the measurements are conducted for the broadband devices, since the electrical field and magnetic field in proximate field displays a complex structure, measurements shall be conducted by individually using the electrical field and magnetic field probes. In the remote field, measurements shall be conducted using the electrical field probe only.

Where more than one transmitter is available at a point, effective value of the whole electrical field force shall be measured with a broadband measuring device. In case the electromagnetic field force appears to be higher than the limit which is specified for a single device, for individual measurement of electrical field force of all of the transmitters in the medium, spectrum analyzer and unidirectional antenna shall be used. X, y and x components of the vertical and horizontal polarization values of the electrical field force value shall be individually measured and the rms resultant electrical field value which is to be calculated by

taking the square roots of the total of squared amounts of these is to be calculated with the formula below,

$$E = \sqrt{E_r^2 + E_y^2 + E_z^2}$$

Following points shall be taken into account for this measurement.

- a) Measurement personnel shall turn off any kind of electronic devices with them to prevent them from affecting the measurement results.
- b) The device shall be kept in standby position for the period provided in its technical document after its first operation.
- c) Before starting any measurement, "reset" button of the measurement devices shall be pressed on if any.
- d) The measurements shall be conducted by considering the broadcast pattern of the transmitter antenna by approaching to the security distance from far to near.

Limit Values of Electromagnetic Field Force

Article 16- In the residential area, electrical field force, magnetic field force, magnetic flux density and equivalent plane wave density, total limit values and limit value for a single device shall not exceed the values which are given in Table-1.

Limit values which are provided in this article shall not be exceeded for the borders of the yards of the preschool and basic study organizations.

Frequency range	E-field force (V/m)		H-field force (A/m)		B-magnetic flux density (μT)		Equivalent plane wave power density (V/m ²)	
	Limit value for a single device	Total limit value of the medium	Limit value for a single device	Total limit value of the medium	Limit value for a single device	Total limit value of the medium	Limit value for a single device	Total limit value of the medium
0.010-0.15	22	87	1.3	5	1.5	6.25	-	-
0.15	22	87	0.18 / f	0.73 / f	0.23 / f	0.92 / f	-	-
1-10	22 / f ^{1/2}	87 / f ^{1/2}	0.18 / f	0.73 / f	0.23 / f	0.92 / f	-	-
10-400	7	28	0.02	0.073	0.023	0.092	0.125	2
400-2000	0.341. / f ^{1/2}	1.375 / f ^{1/2}	0.0009 / f ^{1/2}	0.0037 / f ^{1/2}	0.001 / f ^{1/2}	0.0046 / f ^{1/2}	f / 3200	f / 200
2000-60000	15	61	0.04	0.16	0.05	0.2	0.625	10

f = frequency

Table-1 Limit Values for the Medium and a Single Device

PART FIVE

Evaluation of the Results of Supervision and Measurements

Request of Supervision and Measurement

Article 17- Compliance with the provisions which are provided in the Regulation during the installation, operation and use of the fixed telecommunication devices which are in the scope of this Regulation shall be supervised by the Authority.

Measurement requests by the third persons regarding the operation of the system shall be made to the Authority or the organizations which are granted an authorization certificate within the framework of the principles which are provided in Part Three of this Regulation, with a petition. Where measurement is conducted by the organizations except the Authority, Table in Appendix-A and one copy of the measurement reports shall be submitted to the

Authority, one copy to the applicant and one copy to the operator/administrator in five workdays at the latest. Also, measurement reports shall be sent to the Authority in the electronic format.

Evaluation of the measurement results

Article 18- In the evaluation of the measurement results to be conducted by the Authority and the authorized organizations, where the limits are not exceeded, the applicant shall be informed and where they are exceeded, article 19 shall be applied.

Procedure to be Applied when the Limits are Exceeded

Article 19- Where it is found that the electromagnetic field force of fixed telecommunications device which is measured by the Authority or the authorized organizations does not conform to the limit value for a single device which is provided in the Regulation, a monetary penalty which is 50 times the license fee which is provided in the radio tariff shall be applied and a period of 5 workdays from the date of notification shall be granted to be organization operating the said fixed telecommunications device in order for it to set its device's electromagnetic field force below the limit value. When it is found that the non-conformance still remains during the supervisions and measurements to be conducted at the end of this period, activation of the fixed telecommunications devices shall be suspended by the Authority or the civilian authorities upon the notification of the Authority, until the appropriate values are obeyed. In case the limit value of the medium pursuant to the frequency bands which are provided in article 16 during the measurements, no period shall be granted for correction and the activation of the fixed telecommunications device causing the violation of the limit value shall be suspended.

In order not to victimize those who benefit from the service of the said fixed telecommunications device, the operator may be authorized to establish a new system not exceeding the values in the Regulation, in the same location upon its request.

PART SIX

Miscellaneous Provisions

Measurement Method of the Cellular Base Stations

Article 20- Following points shall be taken into account as an addition to the measurement methods which are provided in article 15 for the cellular base stations.

- a) Measurements shall be conducted by considering the hours when the base station where the measurement is to be conducted is in operable conditions and the conversation traffic is congested.
- b) The measurements shall be conducted at three different points as a minimum requirement at 20° angles towards right and left in a horizontal position to be started from the direction of the broadcast of the antenna.
- c) Each measurement for the cellular base stations shall be conducted by averaging 6 minutes.
- d) For the measurements to be conducted on the streets, broadcast pattern of the antenna shall be taken into account and the measurements shall be started from both the open area opposite to the antenna and the building which is directly subject to the broadcast.

Operation of the Fixed Telecommunication Devices around the Health Organizations

Article 21- Where the fixed telecommunication devices which are in the scope of this Regulation are established around the health organizations which execute the diagnosis and treatment services, in order for the medical devices not to be affected, total electrical field force of them to be created within the building shall not exceed 3 V/m. The measurements in this area shall be carried out by turning off the other electronic devices which may affect the measurement.

Principles and Procedures of the Measurement Fee Collection

Article 22- The fees to be collected in consideration of the measurements which are conducted in the scope of this Regulation and the principles and procedures for their collection shall be determined by the Authority.

Standards of the Devices to be Used

Article 23- Manufacture and import of any kind of fixed telecommunication devices and equipment to be used in the scope of this Regulation shall be composed of the devices and equipment which are authorized to be manufactured and imported within the framework of the general legislation pursuant to the Law and relevant Regulations.

Article 24- Points which are not provided and clarified in this Regulation shall be set out by the communiqués to be enacted by the Authority.

Provisional Article 1- (Amended, Official Gazette dated 15.02.2002 and numbered 24672) Fixed telecommunication devices which were established before the issue date of the this Regulation have to comply with the limit values which are provided in this Regulation and the non-conforming devices have to be made comply until 30/6/2002 and system notification shall be made with Appendix B. Provisions of article 9 of the Regulation shall be applied to those who do not carry out system notification until this date and provisions of article 19 to those who exceed the limit value.

Entry into Force

Article 25- This Regulation shall enter into force at its date of publication.

Execution

Article 26- Provisions of this Regulation shall be executed by the President of Board.

Appendix-A MEASUREMENT VALUES

Antenna (Sector)	Distance to Antenna (metre)	Measured Magnetic Field Force (A/m)	Measured Electrical Field Force (V/m)		Measured Power Density	Hour of measurement	Antenna Type	Antenna Gain
			For a Single Device	Total of the Medium				

Of the Measurement Device

Brand
 Model
 Frequency Range
 Date of Last Calibration

Measured by

Name, Surname
 Title
 Signature

Name of the Authorized Organization

Seal
 Date
 Authorized Signatories

APPENDIX-B (front page)

EVALUATION FORM FOR APPLICATION TO THE FIXED TELECOMMUNICATION DEVICES										
							EXPLANATIONS			
	H	T	R	H	T	R				
NAME/TITLE OF THE ADMINISTRATOR/OPERATOR	X	X	X	X	X	X				
NAME AND BROADCAST LOGO OF THE COMPANY				X		X				
FULL ADDRESS OF THE INSTALLED DEVICE	X	X	X	X	X	X				
COORDINATES	X	X	X	X	X	X				
SITE NO	X					X				
BRAND	X	X	X	X		X				
MODEL	X	X	X	X		X				
USED FREQUENCY	X	X	X	X	X	X				
CATALOGUE OUTPUT POWER	X	X	X	X		X				
							SECTOR1	SECTOR2	SECTOR3	SECTOR4
MAXIMUM OUTPUT POWER USED	X	X	X	X	X	X				
ANTENNA GAIN	X	X	X	X	X	X				
ANTENNA NUMBER	X		X	X		X				
ANTENNA TYPE	X	X	X	X	X	X				
*ANTENNA BROADCAST PATTERN	X	X	X	X	X	X				
HEIGHT OF THE ANTENNA FROM GROUND	X	X	X	X	X	X				
UNAUTHORIZED ACCESS (Balcony- Terrace)	X	X	X	X	X	X				
REFLECTING BOARD ON THE BUILDING SURFACE	X		X	X		X				
SECURITY DISTANCE	X	X	X	X	X	X				
*RELATIVE TO THE BUILDING OF HEALTH ORGANIZATION	X	X	X	X	X	X				
*RELATIVE TO THE SCHOOL YARD BORDER	X	X	X	X	X	X				
*RATIONALE REPORT						X				
*RADIO USE SCHEME						X				
*REF. TK FORMS						X				
*CAPACITY REPORT						X				
*CERTIFICATE OF SIGNATURE	X	X	X	X	X	X				
*TAX TABLE						X				
*INSURANCE STATEMENT OF THE EMPLOYEES						X				
*TRADE REGISTRY GAZETTE						X				
*CONTRACT PHOTOCOPY						X				
*VEHICLE LICENSE PHOTOCOPY	X	X		X	X					
*SETTLEMENT PLAN WITH SCALE	X	X	X	X	X	X				
*ANTENNA INSTALLATION PLAN	X	X	X	X	X	X				
*EARTHING SYSTEM	X	X	X	X	X	X				
LIGHTNING CONDUCTOR	X	X	X	X	X	X				
*CIVIL AVIATION PRECAUTIONS	X	X	X	X	X	X				
OPERATOR/ADMINISTRATOR: Date-Seal-Signature							CONTROL: (Relevant TK Units)			
H: Cellular System T: Radio System R: Radio, TV Transmitters *Those to be sent as documents										

**EVALUATION FORM FOR APPLICATION TO THE
FIXED TELECOMMUNICATION DEVICES**

Name/Title of Administrator/Operator	Name and title of the operator/administrator person or organization which legally operate the fixed telecommunications device
Company Name and Broadcast Logo	Company Name and Broadcast Logo of the Radio and Television
FULL ADDRESS OF THE INSTALLED DEVICE	Full address with the province, district, quarter, street and number
COORDINATES	Location of the installed system, as degree-minute-second
SITE NO	Numbering of the base station
BRAND	Brand of the used device
MODEL	Model of the used device
USED FREQUENCY	Used frequency shall be individually indicated for each antenna For Radio Systems: HF MHz, VHF 150 MHz, UHF 450 MHz For Cellular Systems: 425 MHz, 900 MHz, 1800 MHz For Radio Systems: Allocated frequencies
MAXIMUM OUTPUT POWER	Different from the catalogue output power, except for the antennas losses, technical maximum output power to be used for the calculation of the security distance by the operator/administrator
CATALOGUE OUTPUT POWER	Maximum output power which is indicated in the device catalogue
ANTENNA GAIN	*Its rated gain shall be notified as dB to be used for the calculation of the security distance.
ANTENNA NUMBER	Every used antenna even if they belong to the same system shall be individually evaluated.
ANTENNA TYPE	Antenna type to be used: yagi, omni, parabolic, dipole, etc
*ANTENNA BROADCAST PATTERN	Antenna pattern (as horizontal or vertical) shall be drawn on the scale plan
HEIGHT OF THE ANTENNA FROM GROUND	Height of active component of each antenna on building or post/tower
UNAUTHORIZED ACCESS (Balcony-Terrace)	Whether the access of the unauthorized people is prevented or not
REFLECTING BOARD ON THE BUILDING SURFACE	Whether reflecting metallic board is used or not provided its dimensions are not smaller than the dimensions of antenna
SECURITY DISTANCE	Compliance of the Security Distance shall be checked which is calculated and shown on the scale layout plan
*RELATIVE TO THE BUILDING OF HEALTH ORGANIZATION	Total electrical field force which is created within the health organization building shall not exceed 3 V/m.
*RELATIVE TO THE SCHOOL YARD BORDER	School yard borders shall be taken into account for the calculation of the security distance
*RATIONALE REPORT	Rationale for the aim of the using the system (2 pieces)
*RADIO USE SCHEME	Radio system scheme which is drawn on a map or on a scale layout
*REF. TK FORMS	Relevant TK Form on whose front page the signature are affixed (2 pieces)
*CAPACITY REPORT	Official documents evidencing the employees and the work capacity of the company except the public institutions and organizations
*CERTIFICATE OF SIGNATURE	It is enough to send once the notarized certificate of signature of the authorized signatories from the Administrator/Operators except the public institutions and organizations
*TAX TABLE	Tax table of the Administrator/Operators except the public institutions and organizations
*INSURANCE STATEMENT OF THE EMPLOYEES	Social Security Institution documents of the employees except the public institutions and organizations
*TRADE REGISTRY GAZETTE	Trade Registry received from the Chamber of Commerce, except the public institutions and organizations
*CONTRACT PHOTOCOPY	Notarized copy of the contract showing the duration of the work carried out. Public institutions and organizations are excluded.
*VEHICLE LICENSE PHOTOCOPY	License copy of the vehicle which contains the mobile transmitter, and transceiver devices which are used to provide the telecommunications service in a location for a temporary period
*SETTLEMENT PLAN WITH SCALE	Scale plan on which drawn antenna pattern security distance, distance to the hospital and school and installation of the lightning conductor (2 pieces)
*ANTENNA INSTALLATION PLAN	Installation plan giving the slope of the antennas, their distance to wall, roof, etc and the dimensions of the reflecting board
*EARTHING SYSTEM	Device earthing shall definitely be conducted. Device earthing shall be isolated from the earthing of the lightning conductor.
LIGHTNING CONDUCTOR	It shall be in the coverage area of a lightning conductor belonging to the system or a lightning conductor installation in the immediate vicinity.
*CIVIL AVIATION PRECAUTIONS	Required lighting in the high towers where the antennas shall be installed in accordance with the civil aviation rules.