MKS-05 “TERRA-P+”
DOSIMETER-RADIOMETER

Operating manual
BICT.412129.021-02 KE

Dear users,

You had chosen well if purchased a device of "ECOTEST" trademark manufactured by "Sparing-Vist Center". Your device is easy to use and can be applied for household purposes without special training of the user. Should any questions arise, please contact our managers by telephone **(+38 032) 242-15-15**, fax (+38 032) 242-20-15 or e-mail **sales@ecotest.ua.**

We would greatly appreciate to receive your comments and suggestions on its operation. The device is under 18-months (free of charge) warranty maintenance.

Best regards, International Sales Department.

CONTENTS

Ionizing radiation is a natural phenomenon permanently existing in the environment. Radiation background of the Earth and the space adversely affects us on the regular basis. We are constantly influenced by natural radioactive materials stored in soil and construction materials of the buildings we live and work in. It also happens that more and more frequently we are exposed to the radioactive influence of specific life activities, for example, certain medical procedures, smoking etc. To say nothing of the impact of radioactive sources of artificial origin produced by Chernobyl Fallout that caused contamination of the vast territories. Therefore not only natural ionizing radiation but also Chernobyl Atomic Power-Station Disaster component that gets into human organism with agricultural products, grown on the polluted territories, berries and mushrooms, makes a great impact on people.

Ionizing radiation is primarily X-ray, gamma, beta, alpha and neutron radiation.

X-ray and gamma radiation is transmitted as energy waves, similar to the transmission of sunlight and sun warmth. X-ray and gamma radiation have similar nature. They differ only in their origin and wavelength.

Normally, humans are influenced by X-rays emanated by electronic apparatuses used in hospitals.

Gamma rays are radiated by unstable radioactive isotopes.

X-ray and gamma radiation is characterized by deep permeability into human organism, which is dependent on the energy of the rays. Gamma radiation permeability is so high that it can be hindered only by the thick lead or concrete plates.

Alpha radiation is a flow of nucleuses of helium. It has small permeability and can be hindered, for example, simply by a piece of paper. Therefore it is not hazardous until radioactive materials emanating alpha particles get into human organism either through open wound, or with food and air.

Beta radiation is a flow of electrons. Beta radiation obtains higher permeability and penetrates organism tissues at the depth of 1-2 cm.

Neutron radiation is a flow of neutrons originating from the process of nuclear fission in the reactors, or as a result of spontaneous division in the nuclear materials. Since neutrons are electroneutral particles they deeply penetrate any substance, including living tissues.

However, because people are more often exposed to gamma and beta radiation in everyday life, the majority of radiation monitoring devices measure exactly these kinds of radiation. As a matter of fact, the MKS-05 “TERRA-P+” dosimeter-radiometer, designed on the base of the modern professional dosimeter-radiometer MKS-05 “TERRA” exported into different countries and remaining an equipment choice for the Ukrainian force structures, serves to prevent gamma and beta radiation hazard.

Preface

This operating manual (hereinafter referred to as the OM) is intended to inform the user about the principles of operation of the MKS-05 “TERRA-P+” dosimeter-radiometer and its operation procedure. The OM contains all information necessary for proper use of the dosimeter and full realization of its technical possibilities.

The MKS-05 “TERRA-P+” dosimeter-radiometer is a household device, and can not be used as an instrument for formal (professional) measurements.

The MKS-05 “TERRA-P+” dosimeter-radiometer is calibrated according to the standard sources of ionizing radiation after manufacture and is not subject to verification.

The OM contains the following abbreviations and symbols:

DE	- ambient dose equivalent;
DER	- ambient dose equivalent rate;
MODE	- on/off button and switch between the corresponding modes of indication (gamma radiation DER, gamma radiation DE, surface beta-particles flux density, DE accumulation time, and real time);
THRESHOLD	- button of threshold levels programming, correction of clock time and backlight switching-on.

Note. Ambient dose equivalent (expressed in "Sieverts" ("Sv")) characterizes the influence of ionizing gamma radiation on the biological object (human), as opposed to exposure dose (expressed in "Roentgens ("R")") that characterizes the capa city of gamma radiation to ionize the air. Generally, to make it simple, use the coefficient circa 100 to covert ambient dose equivalent units into exposure dose units: 1.0 μSv ≈ 100.0 μR.

Dose rate conversion, correspondingly: 1.0 μSv/h ≈ 100.0 μR /h.

Natural radiation background normally equals circa 0.1 μSv/h (≈10 μR /h).

1 Purpose of use

The MKS-05 “TERRA-P+” dosimeter-radiometer (hereinafter called the dosimeter) is designed to measure ambient dose equivalent (DE) and ambient dose equivalent rate (DER) of gamma radiation , and surface beta-particles flux density.

The dosimeter is used in everyday life for monitoring of apartments, buildings and constructions, household items, clothes, ground surface of infields and vehicles; for evaluation of radioactive contamination of wild berries and mushrooms, and as visual aids for educational establishments.

2 Technical specifications

2.1 Key specifications are presented in Table 2.1.

Table 2.1 – Key specifications

Name	Unit of measurement	Standardized value according to the technical specifications
1	2	3
1 Measurement range of gamma radiation DER	μSv/h	0.1 – 5000
2 Main relative permissible error limit of gamma radiation DER measurement with confidence probability of 0.95 (calibrated relative to ^{137}Cs)	%	$\pm(25+2/\dot{H}^{*}(10))$, where $\dot{H}^{*}(10)$ is a numeric value of the measured DER in μSv/h

Table 2.1 (continued)

1	2	3
3 Measurement range of gamma radiation DE	mSv	0.001 - 9999
4 Main relative permissible error limit of gamma radiation DE measurement with confidence probability of 0.95	%	±25
5 Energy range of registered gamma radiation	MeV	0.05 – 3.00
6 Energy dependence of the dosimeter readings at gamma radiation DER and DE measurement in the energy range from 0.05 to 1.25 MeV	%	±25
7 Measurement range of surface beta-particles flux density	part./($cm^2 \cdot min$)	10 - 10^5

Table 2.1 (continued)

1	2	3
8 Main relative permissible error limit of beta-particles flux density measurement with 0.95 confidence probability (calibrated relative to $^{90}Sr+^{90}Y$)	%	$20+\frac{200}{\phi_\beta}$, φ_β is a numeric value of the measured surface flux density in part./(cm^2·min)
9 Energy range of registered beta-particles	MeV	0.5 – 3.0
10 Measurement range of DE accumulation time with measurement resolution of 1 min	h	100

Table 2.1 (continued)

1	2	3
11 Battery life (ENERGIZER AAAx2 of 1280 mA·h capacity) under natural background radiation, not less than	hour	2000
12 General operating supply voltage of the dosimeter from two AAA size batteries	V	3.0
13 Mean time to failure, not less than	hour	6000
14 Average service life, not less than	year	6
15 Average shelf life, not less than	year	6
16 Dimensions, not more than	mm	55×26×120
17 Weight, not more than	kg	0.15

2.2 Threshold level values of gamma radiation DER in the range from 0 to 5000 μSv/h with discreetness of 0.01 μSv/h are programmed in the dosimeter.

Threshold level value is set automatically after the dosimeter is switched on and equals 0.30 μSv/h. It corresponds to the maximum permissible level of gamma background for premises in compliance with the regulatory documents of Ukraine.

2.3 Threshold level values of gamma radiation DE in the range from 0 to 9999 mSv with discreteness of 0.001 mSv are programmed in the dosimeter.

2.4 Threshold level values of surface beta-particles flux density in the range from 0 to $9999 \cdot 10^3$ part./(cm^2·min) with discreteness of $0.01 \cdot 10^3$ part./(cm^2·min) are programmed in the dosimeter.

2.5 The dosimeter sends a one-tone audio signal if gamma quantum or beta-particle gets to the detector, and a two-tone audio signal if the programmed DER, DE or surface beta-particles flux density threshold levels have been exceeded.

2.6 Low battery status is indicated by the dosimeter.

2.7 DER, DE and surface beta-particles flux density values as well as DER, DE and surface beta-particles flux density threshold level values appear on the digital LCD indicating the correspondence of information. The values of DER and DER threshold level are expressed in μSv/h, the values of surface beta-particles flux density and surface beta-particles flux density threshold level are expressed in 10^3 part./(cm^2·min), and the values of DE and DE threshold level are expressed in mSv.

2.8 The dosimeter performs measurements under the following conditions:
- temperature from – 20 to + 50 °C;
- relative humidity up to (95±3) % at + 35 °C;
- atmospheric pressure from 84 to 106.7 kPa.

3 Delivery kit

3.1 The delivery kit consists of the items and maintenance documentation presented in Table 3.1.

Table 3.1 – Delivery kit of the dosimeter

Type	Item	Quantity	Note
BICT.412129.021-02	MKS-05 “TERRA-P+” dosimeter-radiometer	1 pc.	
BICT.412129.021-02 KE	Operating manual	1 copy	
BICT.412915.001	Package	1 pc.	
ENERGIZER	AAA size battery of 1.5 V	2 pcs.	Other AAA batteries of 1.5 V voltage are permissible. Supplied at customer’s request.

4 Design and principle of operation

4.1 General information

The dosimeter is a mono block construction with a built-in detector of gamma and beta radiation (Geiger-Muller counter), a printed-circuit board equipped with electronic components, and batteries.

The operation principle of the dosimeter is based on transformation of radiation by Geiger-Muller counter into the sequence of voltage pulses; the number of pulses is proportional to the registered radiation intensity.

The power for operation is supplied by two AAA batteries.

4.2 Design description

The dosimeter is designed as a flat square plastic body with rounded corners (Figure 1).

Figure 1 - Main view of the dosimeter

The body consists of the upper (1) and the lower (2) covers. The indication panel (3) is located in the middle of the upper cover (1); two keys (4) of control are located to the left and to the right above the panel, and a loudspeaker (5) in the upper part of the cover (1).

The battery compartment (1) and the window (3) for registration of surface contamination by beta radionuclides are located in the lower cover (2) of the dosimeter (Figure 2). The battery compartment (1) and the window (3) have covers (2) and (4) correspondingly, fixed due to the elastic capacities of the material.

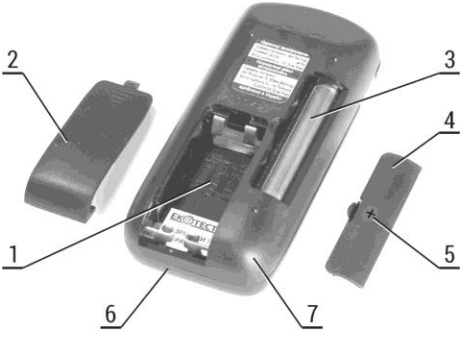

Figure 2 – Rear view with the removed lid

The filter cover (4) contains the metrological mark (5) showing the mechanical center of the detector.

Control and indication keys of the dosimeter contain the corresponding inscriptions. The information table is drawn on the lower cover (7) of the device. The polarity signs are indicated at the bottom of the battery compartment (1) for proper insertion of batteries.

5 Preparation for operation and testing

5.1 Operating limitations

Operating limitations are presented in Table 5.1.

Table 5.1 – Operating limitations

Operating limitations	Limitation parameters
1 Ambient air temperature	from - 20 to + 50 °C
2 Relative humidity	up to (95±3) % at + 35 °C, non-condensing
3 Gamma radiation influence	DER up to 1.0 Sv/h during 5 minutes

Note. If operating in dusty environment or during atmospheric precipitations, the dosimeter should be placed into a plastic bag or a special case used to wear the device on a waist-belt.

5.2 Preparation for operation and guidelines on switching on and testing the dosimeter

5.2.1 Examine the location and purpose of use of the controls before using the dosimeter.

5.2.2 Prepare the dosimeter for operation by doing the following:

- unpack the dosimeter;
- open the battery compartment and make sure the batteries are inserted;
- insert two AAA type batteries, observing the polarity, if there are none.

Note. The dosimeter turns on automatically if the batteries are inserted for the first time.

5.2.3 Press shortly the MODE button if the batteries are already inserted into the battery compartment. The dosimeter should enter the mode of gamma radiation DER measurement at once, which is shown by the blinking light-emitting diode opposite the appropriate mnemonic symbol below the LCD, and by audio signals following the detection of every gamma quantum. All the digits of the LCD will be blinking until the completion of measurement interval.

The readings of gamma background measurement will appear on the LCD after the measurement interval is completed.

5.2.4 Press shortly the MODE button and make sure the dosimeter has entered the mode of operator's DE indication, which is shown by the second blinking light-emitting diode below the LCD opposite the appropriate mnemonic symbol.

5.2.5 Press shortly the MODE button and make sure the dosimeter has entered the mode of surface beta-particles flux density measurement, which is indicated by the blinking light-emitting diode opposite the appropriate mnemonic symbol below the LCD, and by audio signals following the detection of every beta-particle or gamma quantum.

5.2.6 Press shortly the MODE button and make sure the dosimeter has entered the mode of operator's DE accumulation time indication, which is shown by blinking of all digits and a non-blinking comma between the two pairs of digits. The last right digit changes every minute per one unit.

5.2.7 Press shortly the MODE button and make sure the dosimeter has entered the mode of real time indication, which is indicated by a one-second blinking comma between the two pairs of digits.

5.2.8 Hold the MODE button pressed for six seconds to switch the dosimeter off/

Note. The batteries should be replaced if the dosimeter is switched on, and irrespective of the chosen mode, the batteries discharge is observed (blinking of "PO3P" discharge symbol on the LCD, and periodic brief two tone audio signals).

5.3 List of possible troubles and troubleshooting

5.3.1 The list of possible troubles and troubleshooting is presented in Table 5.2.

Table 5.2 – List of possible troubles and troubleshooting

Trouble	Probable cause	Troubleshooting
1 The dosimeter does not switch on after the MODE button is pressed	1 The battery is discharged 2 No contact between the batteries and the battery compartment clamps 3 One of the batteries is out of order	1 Replace the batteries 2 Restore the contact between the batteries and the clamps 3 Replace the defected battery

Table 5.2 (continued)

Trouble	Probable cause	Troubleshooting
2 Low battery symbol is displayed after the batteries have been replaced when the dosimeter is switched on	1 Poor contact between the batteries and the battery compartment clamps 2 One of the batteries is out of order	1 Clean out the contacts on the clamps and the batteries 2 Replace the defected battery

5.3.2 At failure to eliminate the troubles presented in Table 5.2, or at detection of more complicated troubles, the dosimeter should be sent for repair to the repair services or to the manufacturer (see Repair section).

6 Use of the dosimeter

6.1 Safety measures during use of the dosimeter

The dosimeter contains no external parts exposed to voltages hazardous for life.

Direct use of the dosimeter is not dangerous for the service personnel, and is environmentally friendly.

A special protective jacket is used to prevent accidental contact with conductive parts.

Ingress protection rating is IP20.

The dosimeter belongs to fire safety equipment.

Note. Caution! Do not open or charge the batteries!

6.2 List of operating modes

The dosimeter uses the following indications and operates within the following modes:

- switching the dosimeter on/off;
- gamma radiation DER measurement;
- programming of audio alarm threshold levels of gamma radiation DER;
- indication of gamma radiation DE measurement value;
- programming of audio alarm threshold levels of gamma radiation DE;
- surface beta-particles flux density measurement;
- programming of audio alarm threshold levels of surface beta-particles flux density;
- indication of operator's DE accumulation time;
- indication and correction of real time;
- switching audio signaling of registered gamma quanta and beta-particles on/off;
- switching display backlight on/off.

6.3 Operation procedure of the dosimeter

6.3.1 **Switching the dosimeter on/off**

Press shortly the MODE button to switch the dosimeter on. The information displayed on the LCD, blinking of the light-emitting diode below the LCD and audio signaling of the registered gamma quanta show that the dosimeter is on.

Press the MODE button once again and hold it pressed for six seconds to switch the dosimeter off.

6.3.2 **Measurement of gamma radiation DER**

The mode of gamma radiation DER measurement is entered automatically after the dosimeter is switched on. The mode is indicated by the blinking light-emitting diode opposite the appropriate mnemonic symbol below the LCD. The results of measurement will appear on the LCD during the first few seconds, enabling efficient evaluation of radiation level.

The LCD will blink until the statistically processed reliable information is gained. The statistical processing period will depend on the radiation intensity. Units of measurement are expressed in μSv/h.

To measure gamma radiation DER, direct the dosimeter with its metrological mark "+" towards an examined object. A filter cover should cover the window with the detector located behind it (hereinafter the window of the detector).

Consider the arithmetic mean of five last measurements after the LCD stops blinking as the DER measurement result. Every registered gamma quantum will be followed by an audio signal. Measurement intervals will be set automatically, depending on the measured radiation intensity.

Note. The statistical processing of data can be rerun forcibly to perform effective evaluation of the radiation level. To do this, press the THRESHOLD button and hold it pressed during two seconds. Rough evaluation of gamma background level can be performed within 10 s.

6.3.3 **Programming of audio alarm threshold levels of gamma radiation DER**

Programming of audio alarm threshold levels of DER is performed in the mode of gamma radiation DER measurement.

To start programming, press the THRESHOLD button and hold it pressed (circa six seconds) until the low-order digit starts blinking on the LCD. Set the necessary value of the low-order digit by successive pressing and releasing the THRESHOLD button. Press shortly the MODE button to program the next digit, which will start blinking at that. Other digits are programmed likewise.

The value of the preset threshold level is fixed after all digits are programmed by short pressing of the MODE button. To fix a new value of the threshold level, set all digits on the LCD by pressing the MODE button, even if the values of the high-order digits are not changed. Double extinction of the LCD will indicate that the programmed level is fixed.

Press the THRESHOLD button and hold it pressed to check the value of the fixed DER threshold level. The threshold level value will appear on the LCD in two seconds.

When the THRESHOLD button is pressed for more than four seconds, the low-order digit starts blinking, indicating that a new threshold level value can be programmed. A two-tone audio signal indicates that the programmed DER threshold level has been exceeded.

Note. The DER threshold level value of 0.30 μSv/h is set automatically when the dosimeter is switched on.

6.3.4 **Indication of gamma radiation DE measurement value**

Press shortly the MODE button to switch on the mode of DE measurement value indication. This mode follows the mode of gamma radiation DER measurement (switched on automatically as soon as the dosimeter is on). Gamma radiation DE measurement starts right after the dosimeter is switched on, and is performed in all operating modes, except for surface beta-particles flux density measurement.

A blinking light-emitting diode opposite the appropriate mnemonic symbol below the LCD indicates that the DE measurement indication mode has been entered. Measurement units are expressed in mSv. A comma after the first left digit will appear on the LCD when the dosimeter is switched on. The comma will automatically shift to the right until full completion of the DE scale of the dosimeter as the gamma radiation DE value increases.

6.3.5 **Programming of audio alarm threshold level of gamma radiation DE**

Programming of audio alarm threshold level of gamma radiation DE is performed in the mode of gamma radiation DE measurement indication.

To start programming, press the THRESHOLD button and hold it pressed (circa six seconds) until the low-order digit starts blinking on the LCD. Set the appropriate value of the low-order digit by successive pressing and releasing the THRESHOLD button. Press shortly the MODE button to program the next digit, which will start blinking at that. Other digits are programmed likewise.

The value of the preset threshold level is fixed after all digits are programmed by short pressing of the MODE button. To fix a new value of the threshold level, set all digits on the LCD by pressing the MODE button, even if the values of the high-order digits are not changed. Double extinction of the LCD will indicate that the programmed level is fixed.

Press and hold the THRESHOLD button to check the value of the fixed DE threshold level. The threshold level value will appear on the LCD in two seconds. When the THRESHOLD button is pressed for more than four seconds, the low-order digit starts blinking, indicating that a new threshold level value can be programmed. A two-tone audio signal indicates that the programmed DE threshold level has been exceeded.

Note. A zero value of the threshold level is set automatically when the dosimeter is switched on indicating that the DE threshold alarm system is off.

6.3.6 **Surface beta-particles flux density measurement**

This mode follows the mode of gamma radiation DE measurement. It is indicated by the blinking light-emitting diode opposite the appropriate mnemonic symbol below the LCD. Measurement units are expressed in 10^3 part./($cm^2 \cdot min$). At first measure gamma background (for further automatic subtraction), and then measure surface beta-particles flux density. To do this, wait until the digital LCD stops blinking in the mode of DER measurement (filter cover covers the window of the detector). Press shortly the MODE button twice. This will store the DER measurement value as gamma background and switch the dosimeter from DER measurement mode to surface beta-particles flux density measurement mode. Remove the filter cover from the window, located opposite the detector, direct the dosimeter with the window in parallel to the examined surface and place it as close as possible.

Consider the arithmetic mean of five measurements after the LCD stops blinking as a result of the surface beta-particles flux density measurement. Every registered beta-particle and gamma-quantum will be followed by an audio signal.

Measurement intervals will be set automatically, depending on the measured radiation intensity.

6.3.7 **Programming of audio alarm threshold level of surface beta-particles flux density**

Programming of audio alarm threshold level of surface beta-particles flux density is performed in the mode of surface beta-particles flux density measurement and indication.

To start programming, press the THRESHOLD button and hold it pressed (circa six seconds) until the low-order digit starts blinking on the LCD. Set the appropriate value of the low-order digit by successive pressing and releasing the THRESHOLD button. Press shortly the MODE button to program the next digit, which will start blinking at that. Other digits are programmed likewise.

The value of the preset threshold level is fixed after all digits are programmed by short pressing of the MODE button. To fix a new value of the threshold level, set all digits on the LCD by pressing the MODE button, even if the values of the high-order digits are not changed. Double extinction of the LCD will indicate that the programmed level is fixed.

Press and hold the THRESHOLD button to check the value of the fixed threshold level of surface beta-particles flux density. The threshold level value will appear on the digital LCD in two seconds. When the THRESHOLD button is pressed for more than four seconds, the low-order digit starts blinking, indicating that a new threshold level value can be programmed. A two-tone audio signal indicates that the programmed threshold level during measurement has been exceeded.

Note. The threshold level value of surface beta-particles flux density of $0.04 \cdot 10^3$ part./(cm^2·min) is set automatically after the dosimeter is switched on.

6.3.8 **Indication of operator's DE accumulation time**

Press shortly the MODE button to initiate the mode of operator's DE accumulation time indication. This mode follows the mode of surface beta-particles flux density measurement and value indication.

It is indicated by blinking of all digits and a non-blinking comma between the two pairs of digits. The digits from the right to the left will indicate the following: the first digit indicates minutes; the second one - tens of minutes; the third one - hours; the fourth one - tens of hours.

6.3.9 **Indication and correction of real time**

Press shortly the MODE button to initiate the mode of real time indication. This mode follows the mode of indication of operator's DE accumulation time.

It is indicated by a one second blinking comma between the two pairs of the LCD digits.

The digits from the right to the left show the following: the first digit indicates minutes; the second one - tens of minutes; the third one - hours; the fourth one - tens of hours.

Press the THRESHOLD button and hold it pressed until two digits to the right from comma start blinking to correct the value of real time, and then release the button. The proper values of units and tens of minutes are fixed by further pressing and holding the THRESHOLD button. Press shortly the THRESHOLD button to correct the value of minutes. Each pressing will change the value per unit. Press shortly the MODE button to correct the value of hours. Two digits on the left of comma start blinking at that. The hour value correction is performed likewise. Press shortly the MODE button once again to exit the mode of real time correction.

6.3.10 **Switching audio signaling of registered gamma quanta and beta-particles on/off**

Simultaneously press and release the MODE and THRESHOLD buttons to switch audio signaling off. A "----" symbol that briefly appears on the digital LCD indicates that audio signaling is switched off.

Simultaneously press and release the MODE and THRESHOLD buttons once again to switch audio signaling on. An “Aud” symbol that briefly appears on the digital LCD indicates that audio signaling is switched on.

Audio signaling is switched on automatically along with the dosimeter.

Note. Audio alarm of exceeded programmed threshold levels is independent of the system condition of audio signaling of registered gamma quanta or beta-particles.

6.3.11 **Switching display backlight on/off**

At pressing any button of the dosimeter or changing the operating mode the display backlight is switched on for 5 seconds. Press shortly the THRESHOLD button to switch the dosimeter display backlight on without changing the operating mode. The display backlight will switch off automatically in 5 seconds.

7 **Technical maintenance**

7.1 General instructions

Technical maintenance includes the following operations:

- external examination;
- operability check of the dosimeter;
- power supply switch off.

7.1.1 Safety measures

Safety measures during technical maintenance fully comply with safety measures stated in item 6.1 of the present OM.

7.1.2 External examination

External examination of the dosimeter should be performed in the following order:

a) check the technical condition of surface, inspect for integrity of seals, absence of scratches, traces of corrosion, surface damages of the dosimeter;

b) check the condition of clamps in the battery compartment.

7.1.3 Operability check of the dosimeter

Operability check of the dosimeter is performed according to item 5.2 of the present OM.

7.1.4 Power supply switch off

Power supply should be switched off each time the dosimeter is not in use for a long time. Do the following:

- switch the dosimeter off;
- open the lid of the battery compartment;
- remove the batteries;
- examine the battery compartment, check the contact clamps accuracy, clean the battery compartment from contamination and contact clamps from oxides;
- make sure there is no humidity, no salt spots on the surface of the batteries, and no damages of the insulated coating.

8 Certificate of acceptance

The MKS-05 “TERRA-P+” dosimeter-radiometer of BICT.412129.021-02 type with _____ serial number meets the ТУ У 33.2-22362867-006-2001 BICT.412129.006 ТУ technical requirements, is calibrated and accepted for use.

Manufacture date _____

Stamp here QCD representative:_____

(signature)

9 Packing certificate

The MKS-05 “TERRA-P+” dosimeter-radiometer of BICT.412129.021-02 type with _____ serial number is packed by the enterprise PE “SPPE “Sparing-Vist Center” in accordance with the requirements specified in ТУ У 33.2-22362867-006-2001 BICT.412129.006 ТУ.

Date of packing _____

Stamp here

Packed by _____ (signature)

Packed product accepted by _____ (signature)

10 Warranty

10.1 The warranty period of the dosimeter use shall terminate and be of no further effect in 24 months after the date of putting it into operation or after the warranty period of storage terminates.

10.2 The warranty period of storage of the dosimeter is 6 months after its manufacture date.

10.3 Free of charge repair or replacement during the warranty period of use is performed by the producer enterprise provided that:

10.3.1 The customer observed the guidelines on its use, shipping and storage;

10.3.2 The customer encloses a warranty certificate filled out accurately and clearly;

10.3.3 The customer encloses the failed dosimeter.

10.4 If the defect (according to the claim) is eliminated, the warranty period is prolonged for the time when the dosimeter was not used because of the detected defects.

10.5 The batteries failure is not a reason for claim, after their warranty period is finished.

10.6 Warranty is void in case of:

10.6.1 Any mechanical or thermal damage;

10.6.2 Any liquid remains;

10.6.3 Foreign objects detected inside the dosimeter;

10.6.4 The warranty stamps are violated, the body opened, repairs or any internal changes made;

10.6.5 The serial number of the dosimeter deleted or changed;

10.6.6 The accessories used other than allowed by the manufacturer.

11 Repair

11.1 In case of failure or troubles during the warranty period of the dosimeter, the user should contact the enterprise producer by e-mail (see below) to receive the address of the nearest service center:

PE "SPPE "Sparing-Vist Center"
Tel.: (+380 32) 242 15 15; Fax: (+380 32) 242 20 15
E-mail: sales@ecotest.ua

11.2 Warranty and post warranty repair is performed if only the warranty certificate is available.

12 Storage

12.1 The dosimeters should be stored in a packing box in heated and ventilated storehouses with air-conditioning at the ambient temperature from + 5 to + 40 °C and relative humidity up to 80 % at + 25 °C temperature, non-condensing. The storehouse should be free of acids, gas, and alkali that may cause corrosion, and vapors of organic solvents.

12.2 The location of the dosimeters in storehouses should ensure their free movement and access to them.

12.3 The dosimeters should be stored on the shelves.

12.4 The distance between the walls, the floor and the dosimeters should not be less than 100 mm.

12.5 The distance between the heating gadgets of the storehouse and the dosimeters should not be less than 0.5 m.

13 Shipping

13.1 The packed dosimeters may be shipped by any kind of closed transport vehicles under the conditions with temperature limitation in the range from - 25 to + 55 °C, and according to rules and standards effective for each means of transport.

13.2 The dosimeters in shipping container should be placed and fixed in the vehicle to ensure their stable position and to avoid shocks (with each other and the sidewalls of the vehicle).

13.3 The dosimeters in shipping container endure:

- temperature from - 25 to + 55 °C;
- relative humidity of (95±3) % at + 35 °C temperature;
- shocks with acceleration of 98 m/s^2, a shock pulse duration of 16 ms (number of shocks - 1000 ± 10 in each direction).

13.4 Canting is forbidden.

WARRANTY CERTIFICATE

for MKS-05 “TERRA-P+” dosimeter-radiometer

ТУ У 33.2-22362867-006-2001 ВІСТ.412129.006 ТУ

Serial number _____

Manufacture date _____

Primary calibration performed _____

Hereby I confirm the acceptance of the packed device applicable for use and the acceptance of the warranty terms

Sales date _____

Salesperson signature _____

Stamp here

Note. If any controversy arises, the parties should act in accordance with the Art. 14 of the Law of Ukraine on the Protection of Consumer Rights