DOSIMETER-RADIOMETER
MKS-05 “TERRA-P”

Operating manual

Ionizing radiation called often the radioactive emanation is a natural phenomenon existing in the environment. Radiation background of the Earth and the space adversely affects the humans on the regular basis. We are continually influenced by natural radioactive materials stored in soil and construction building materials we live and work in. It also happens that more and more frequently we undergo the 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 Fallout component that gets into human organism with agricultural products, grown on the polluted territories, makes a great impact on the environment.

Ionizing radiation is primarily roentgen, gamma, beta, alpha and neutron radiation.

Roentgen and gamma radiation is transmitted as energy waves, similar to the transmission of sunlight and sun warmth waves. Roentgen and gamma radiation have similar nature. They differ only in their origin and wavelength. Normally, humans are influenced by roentgen radiation emanated by electronic apparatuses used in hospitals.

Gamma rays are radiated by unstable radioactive isotopes.

Roentgen 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 nucleus fission in the reactors, or as a result of spontaneous division in the nuclear materials. Since neutrons are electro neutral particles they deeply permeate any substance, including living tissues.

However, because humans are more often exposed to gamma and beta radiation in everyday life, the majority of radiation monitoring devices controls exactly this kind of radiation. As a matter of fact, the dosimeter-radiometer MKS-05 “TERRA –P”, designed on the base of the modern professional dosimeter MKS-O5 “TERRA” exported into different countries and remaining an equipment choice by authorities for Ukraine, serves to prevent gamma and beta radiation hazard.

Preface

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

The dosimeter-radiometer MKS-05 “TERRA-P” is an everyday device, and can not be used as a device for official (professional) measurement.

The dosimeter-radiometer MKS-05 “TERRA-P” is calibrated primarily according to the standard sources of ionizing radiation at manufacture and does not undergo periodic testing.

The manual contains the following abbreviations and symbols:

ED - equivalent dose;
EDR - equivalent dose rate;
MODE - on/off button switch between the corresponding modes of measurement and indication (gamma radiation ED and EDR, clock and alarm clock);
THRESHOLD - button of threshold level programming, clock and alarm clock settings correction.

Notes. Equivalent dose (unit of measurement expressed in “microsievert” (“μSv/h”) characterizes the influence of gamma radiation on the biological object (human), unlike exposure dose (unit of measurement expressed in “microroentgen” (“μR”) that characterizes the

capacity of gamma radiation to ionize the air. Generally, to make it simple, use the coefficient circa 100 to convert the equivalent dose units into exposure dose units: 1.0 μSv ≈ 100.0 μR.

Correspondingly, dose rate conversion: 1.0 μSv/h ≈ 100.0 μR/h.

Natural background radiation level normally equals circa 0.1 μSv/h.

1 Purpose of use of the dosimeter

The dosimeter-radiometer MKS-05 "TERRA-P" (hereinafter called the dosimeter) is designed to measure equivalent dose (ED) and equivalent dose rate (EDR) of gamma radiation, and to evaluate surface contamination by beta radionuclides. Additionally, the dosimeter performs the functions of time indication and alarm clock.

The dosimeter is used in everyday life for housing constructions monitoring, for ground surface and vehicles radiation monitoring, for products monitoring, as well as visual equipment at educational institutions.

2 Technical description of the dosimeter

2.1 Main specifications are presented in the Table 2.1.

Table 2.1 – Main specifications and description

Name	Unit of measurement	Standardized value in compliance with TD
1	2	3
Equivalent dose rate measurement range of gamma radiation	μSv/h	0.1 – 999.9
Main relative permissible error limits of gamma radiation EDR measurement with possibility of 0.95 (calibrated relative to ^{137}Cs)	%	±(25+2/P), P is a numerical value of EDR measurement in μSv/h
Equivalent dose measurement range of gamma radiation	mSv	0.001 – 9999
Main relative permissible error limits of gamma radiation ED measurement with possibility of 0.95	%	±25
Energy range of registered gamma radiation	MeV	0.05 – 3.00
Energy response of the dosimeter readings at gamma radiation EDR and ED in the energy range from 0.05 до 1.25 MeV	%	±25
Beta-particles flux density range with possible evaluation of surface contamination by beta radionuclides	part./(cm^2·min)	10 - 10^5
Energy range of registered beta-particles	MeV	0.5 – 3.0
Battery lifetime ("Energizer" AAAx2 of 1280 mA·h capacity) under natural background radiation, not less than	hour	6000
General nominal voltage of power supply from two AAA type batteries	V	3.0
Average life length on failure, not less than	hour	6000
Average term of service, not less than	year	6
Average term of maintenance, not less than	year	6
Dimensions, not more than	mm	55x26x120
Weight, not more than	kg	0.2

2.2 EDR threshold level of gamma radiation with the discreteness of a programmed discharge in the range from 0.01 to 9.99 μSv/h is programmed in the dosimeter.

Threshold level value is set automatically after the dosimeter is switched on and equals 0.30 μSv/h, corresponding to maximum permissible level of gamma background for premises.

2.3 The dosimeter sends audible signals of different periodicity and tone if the programmed EDR level is exceeded, the alarm clock goes off, or the battery is discharged.

2.4 The dosimeter provides four level indication of battery discharge.

2.5 EDR and EDR threshold level values, real time and preset time of the alarm clock alternately appear on the digital liquid crystal indicator respectively of the chosen mode indicating the correspondence of information.

2.6 The dosimeter performs measurements under the following conditions:

- operating temperature from - 10 to + 50 °C;
- relative humidity up to (95 ±3) % at 35 °C;
- atmospheric pressure from 84 to 106.7 kPa.

3 Complete set of the dosimeter

3.1 The complete set consists of units and user documentation, presented in the Table 3.1.

Table 3.1 – Complete set of the dosimeter

Type	Item	Quantity	Notes
BICT.412129.012	Dosimeter-radiometer MKS-05 "TERRA-P"	1 piece	
BICT.412129.012 KE	Operating manual	1 piece	
BICT.412915.001	Package	1 piece	
ENERGIZER	AAA type battery of 1.5 V	2 pieces	Change for other AAA type batteries of 1.5 V is permissible. Completed at customer's demand.

4 Construction and principles of operation of the dosimeter

4.1 Description

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

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

Power for operation is provided by two batteries of AAA type.

4.2 Description of the dosimeter construction

The dosimeter is enclosed as a flat square plastic housing with rounded corners.

Figure 1 – Front view of the dosimeter

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

The battery compartment and the aperture (7) for the registration of surface contamination by beta radionuclides is located in the lower cover (2). The battery compartment (6) and the aperture (7) correspondingly have covers (8) and (9), fixed due to the elastic capacities of the materials.

The printed board (10) is located in the middle part of the unit, where all elements of the electric scheme, with an exception of a loudspeaker, are located (5). The loudspeaker is connected to the upper cover (1) with the help of spring contacts and electrically connected with the printed board (10). The latter (10) is screwed to the upper cover (1) of the unit.

Figure 2 – Rear panel with a removed lower cover

The lower and the upper covers are connected with the help of a special clipping of constructive elements and two screws. The screws are used to fix the contacts (11) to insert the batteries.

Control & indication keys of the dosimeter contain the corresponding inscriptions. The information table is drawn at the lower cover (2) of the unit. The polarity signs are indicated at the bottom of the battery compartment in order to insert the batteries correctly.

5 Preparation for operation and testing of the dosimeter

5.1 Use limitations

Use limitations are presented in the Table 5.1

Table 5.1 - Use limitations

Use limitations	Limitation parameters
Ambient air temperature	from - 10 to +50 ^{o}C
Relative humidity	up to (95±3) % at 35 ^{o}C without humidity condensation
Photon-ionizing radiation influence	EDR up to 100.0 mSv/h during 5 min

Notes. If operating in dusty environment or during atmospheric precipitations, the dosimeter should be placed into a plastic bag or a special case for wearing the device on the waist-belt that can be bought at extra cost.

5.2 Preparation for operation and instructions on switching on and checking the operational mode of the dosimeter

5.2.1 Examine the control buttons before switching the dosimeter on.

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.

Notes. The dosimeter sets on automatically after the batteries are inserted.

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 EDR measurement which is indicated by EDR measurement units expressed in "μSv/h" that appear on the digital indicator and by short-term audio signals following the registration of every gamma-quantum. All the digits of the indicator will blink until the completion of measurement interval. The readings of gamma background measurement will appear on the LCD after the measurement period is completed.

5.2.4 Press shortly the MODE button and make sure the dosimeter has entered the mode of gamma radiation ED indication. ED units of measurement expressed in "mSv" should appear on the digital indicator.

5.2.5 Press shortly the MODE button and make sure the dosimeter has entered the mode of real time indication. Two one-second blinking periods between the two pairs of digits should appear on the indicator.

5.2.6 Press shortly the MODE button and make sure the dosimeter has entered the mode of the alarm clock setting which is indicated by two unblinking periods between the two pairs of digits on the digital indicator.

5.2.7 Hold the MODE button pressed for four seconds to set the dosimeter off.

Notes. Replace the discharged batteries; the discharge is indicated by the blinking of four segments of the battery symbol on the indicator, and periodic short-term two tone audio signals sounding at switching the dosimeter on, irrespective of the chosen mode.

5.3 List of possible fault conditions and methods of their elimination

5.3.1 List of possible fault conditions and methods of their elimination are presented in the Table 5.2.

Table 5.2 - List of possible defects and methods of their elimination

Type of defect & its manifestation	Possible cause of defect	Method of defect elimination
1 The dosimeter is not set on at pressing the MODE button	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 unit
2 The discharge signal ("PO3P") appears on the LCD at setting the dosimeter on after the batteries were replaced	Poor contact between the batteries and the battery compartment clamps	1 Clean the clamps and the batteries contacts 2 Replace the defected unit

5.3.2 At failure to eliminate fault conditions presented in the Table 5.2 or at the detection of more complicated defects, the dosimeter should be dispatched for repair to the corresponding repair workshop or to the manufacturer (see Repairs).

6 Use of the dosimeter

6.1 Safety measures

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

The dosimeter is not dangerous for the users. The dosimeter is ecologically safe.

A special protection jacket is used to prevent an occasional contact with current-conducting units.

Protection jacket – IP20.

6.2 List of operational modes

The dosimeter obtains the following modes of operation and indication:

- gamma radiation EDR measurement and indication;

- programming of audio alarm threshold level relative to gamma radiation EDR and setting on/off audio signaling of registered gamma-quantums;
- photon-ionizing radiation ED measurement indication;
- evaluation of surface contamination by beta radionuclides;
- indication and correction of real time;
- indication and correction of the alarm clock setting, switching the alarm clock on/off.

6.3 Use procedure

6.3.1 **Setting ON/OFF.**

Press shortly the MODE button to set the dosimeter on. The information displayed on the LCD indicates the dosimeter is on.

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

6.3.2 **Measurement of gamma radiation EDR.**

The mode of gamma radiation EDR measurement sets on automatically after the dosimeter is switched on. It is indicated by the "μSv/h" symbol that appears on the LCD and short-term audio signals following the registered gamma quantums. The LCD will show the results of measurement during the first seconds, making it possible to instantly evaluate the radiation level.

Since the dosimeter provides constant averaging of measurement results, every next renewal of the values on the digital indicator is followed by a process of their averaging. Therefore it is possible to receive the readings approximately in a minute with a precision within the error limits of the device, defined in the OM. The statistical processing period depends on the radiation intensity and will not exceed 70 seconds, whereas the digits on the indicator will be blinking.

To measure gamma radiation EDR, direct the dosimeter with its metrological mark "+" to the examined object.

Consider the arithmetic average of five last measurements in 10 seconds after the beginning of measurement, or each single reading received in 70 seconds after the beginning of measurement, in case of unmovable placement of the dosimeter towards the examined object, as gamma radiation EDR measurement result. The units of measurement are expressed in μSv/h.

Measurement of gamma radiation EDR and comparative analysis of the results with the programmed audio alarm threshold level is performed continually and irrespective of the chosen mode of indication and operation after the dosimeter is switched on.

Notes 1. The process of data averaging can be stopped intently for effective radiation evaluation. To do this, change the examined object and press shortly the THRESHOLD button. Rough evaluation of gamma background of every new object may be performed within 10 seconds.

Notes 2. The dosimeter automatically sets the LCD and audio signaling of registered gamma-quantum off to economize energy resources. The LCD is set off in 5 minutes after last pressing of any control button and if EDR measurement does not exceed the preset threshold level, and the alarm clock does not go off. The digital liquid crystal indicator and audio signaling of registered gamma quantum is set on immediately after pressing any control button or at audio alarming (of the threshold device or the alarm clock).

Do not forget to switch off the power supply after you finished working with the dosimeter, since the turned off indication does not mean the dosimeter is off.

6.3.3 **Programming of audio alarm threshold level relative to gamma radiation EDR and setting audio signaling of registered gamma quantum on/off.**

Threshold level value of gamma radiation EDR equal to 0.30 μSv/h, that is the maximum permissible level for premises in compliance with the "Standards of Radiation Safety of Ukraine", is set automatically after the dosimeter is switched on.

Programming (alteration) of audio alarm threshold level relative to EDR is performed in the mode of gamma radiation EDR measurement, if necessary. Press and hold down the THRESHOLD button to start programming. The low-order discharge will start blinking on the LCD. Set the appropriate value of the low-order discharge by consecutive pressing and releasing the THRESHOLD button. Press shortly the MODE button to proceed to the programming of another discharge, the latter will start blinking.

The programming of other discharges is performed likewise.

To fix a new value of the threshold level, complete the setting of all the discharges on the LCD by pressing the MODE button, even if the values of the high-order discharges are not modified.

Press shortly the MODE button after programming the last discharge. The blinking sound symbol ")))" will appear on the digital indicator. Press shortly the THRESHOLD button to set audio signaling of registered gamma quantum off, the sound symbol will extinct. Press the THRESHOLD button once again, to set audio signaling of registered gamma quantum on, the audio symbol will appear on the LCD. To fix a new value of the threshold level and audio signaling of registered gamma quantums press shortly the MODE button once again. The fourfold extinction of the LCD will indicate the fixing of new settings.

Press the THRESHOLD button and hold it down not longer than two seconds after a new threshold level value appears to check the value of the fixed EDR threshold level. Hold the THRESHOLD button down longer than two seconds and the low-order discharge will start blinking, indicating that a new threshold level value can be programmed.

A two tone audio alarm indicates that the programmed EDR threshold level has been exceeded.

Notes 1. The audio signaling of the registered gamma quantums turns on/off automatically after the dosimeter is switched on/off.

Notes 2. The alarming of the exceeded EDR threshold level is performed number one priority irrespective of the system of audio signaling of the registered gamma quantums.

6.3.4 **Indication of gamma radiation ED measurement.**

Press shortly the MODE button to enter the mode of gamma radiation ED measurement indication.

This mode follows the mode of gamma radiation EDR measurement (set on automatically after switching the dosimeter on).

The "mSv" symbol appearing on the LCD indicates you have entered the appropriate mode. The unit of photon-ionizing radiation ED measurement is mSv. The comma after the first left discharge will appear on the LCD after the dosimeter is set on. The comma will automatically shift to the right until the full completion of the ED scale of the dosimeter as the photon-ionizing radiation ED measurement value increases. .

Notes. Under the existing natural (c 0.1 μSv/h) background gamma radiation a change by one low-order discharge of the ED scale will take place app in 10 hours and the LCD will indicate the result of 0.001 mSv equal to 1.0 μSv.

6.3.5 **Evaluation of surface contamination by beta radio nuclides.**

Enter the mode of gamma radiation EDR measurement to evaluate surface contamination by beta radio nuclides. Direct the dosimeter with its aperture, disposed opposite the detector (hereinafter the aperture of the detector), parallel to the examined surface and place it as close as possible.

To evaluate surface contamination by beta radio nuclides perform two measurements: firstly, perform the measurement with open aperture; secondly, with closed by a filter-cover aperture of the detector.

The difference between first and second measurement will be taken as the result of measurement. The difference between the first and the second measurement will indicate the surface contamination of the examined object by beta radio nuclides.

Consider the arithmetic average of five measurements in 10 seconds after the beginning of measurement or any measurement received after the LCD stops blinking as an evaluation result of surface contamination by beta radio nuclides. The result will be expressed in μSv/h.

6.3.6 **Indication and correction of real time measurement.**

Press shortly the MODE button to enter the mode of real time indication. This mode follows the mode of gamma radiation measurement.

It is indicated by a two one-second blinking periods between two pairs of the LCD discharges.

In this case the discharges from the right to the left will be the following: the first discharge 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 down until two discharges to the right from two periods start blinking to correct the value of real time. Release the button afterwards. The necessary values of units and tens of minutes are fixed with the help of further pressing and holding down the THRESHOLD button. Press shortly the THRESHOLD button to correct the minutes. Each pressing will change the value by one step. Press shortly the MODE button to correct the value of hours. The two discharges to the left from 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 indication.

6.3.7 **Indication and correction of the alarm clock setting, switching the alarm clock on/off.**

Press shortly the MODE button to enter the mode of indication of the alarm clock setting. This mode follows the mode of real time indication. Two non-blinking periods between two pairs of digits on the LCD indicate you have entered the appropriate mode.

Press the THRESHOLD button and hold it down until two discharges to the right from two periods start blinking, to correct the alarm clock setting and to set the alarm clock on/off. Release the button afterwards. Set the necessary units (in a unit of time) and tens of minutes values by further pressing and holding down the THRESHOLD button. Minute correction can be performed by short pressing of the THRESHOLD button. The value will change each time by one step in this case. Press shortly the MODE batton to correct the value of hours. Two dischargesto the left from two periods start blinking. Hour values correction is performed likewise.

Press shortly the MODE button to set the alarm clock on/off after the correction of hour values of the alarm clock. The blinking audio symbol ")))" should appear on the LCD. Press shortly the THRESHOLD button to set the alarm clock off, the audio symbol will extinct. Press the THRESHOLD button once again, to set audio signaling of registered gamma quantum on, the audio symbol will appear on the LCD. Fix the alarm clock setting by further short pressing of the MODE button. If the alarm clock is on, the audio symbol will appear on the LCD irrespective of the chosen operational mode.

Notes. The alarm clock will continue to work even after the power supply of the dosimeter is off. The dosimeter will automatically enter the mode of real time indication when the alarm clock goes off. Press any control button to set off audio signaling of the alarm clock. Audio signaling will be set off automatically within a minute after the alarm clock rings.

7 Technical maintenance of the dosimeter

7.1 Description

Technical maintenance includes the following operations:

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

7.1.1 Safety measures.

Safety measures for TM fully correspond to safety measures, stated in provision 6.1 of the present OM.

7.1.2 External examination.

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

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

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

7.1.3 Checking the work ability of the dosimeter.

Checking procedure of the work ability of the dosimeter is performed according to the provision 5.2 of the present OM.

7.1.4 Setting off the power supply.

Set off the power supply each time after turning the dosimeter off. Do the following:

- set off the dosimeter;
- open the lid of the battery compartment;
- remove the batteries;
- examine the battery compartment, check for contact clamps accuracy, clean the battery compartment from contamination and contact clamps from oxidation;
- make sure there is no humidity, no salt spots on the surface of the batteries and no damages on the isolating coverings.

8 Certificate of acceptance

The dosimeter-radiometer MKS-05 “TERRA-P” serial number _____ is manufactured to meet the technical requirements TY Y 33.2-22362867-006-2001 BICT.4I2I29.006 TY and is accepted for operation.

Date of issue _____

Stamp place

Representative of Technical Control Department: _____
(signature)

9 Packing certificate

The dosimeter-radiometer MKS-05 “TERRA-P” serial number _____ is packed by the enterprise in accordance _____ with the requirements specified in TY Y 33.2-22362867-006-2001 BICT.412129.006 TY.

Date of packing _____

Stamp place

Packing was made by _____
(signature)

The product after packing was accepted by _____
(signature)

10 Warranty

10.1 The warranty period of the dosimeter shall terminate and be of no further effect 18 months after the date of putting it into operation and 24 months after the issue date.

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 the dosimeter use is performed by the factory-manufacturer provided that:

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

10.3.2 the customer encloses a warranty sheet filled out accurately and clearly;

10.3.3 the customer encloses the broken dosimeter.

10.4 If the production default (according to the claim) is eliminated, the warranty period is prolonged for the time length when the dosimeter was not used because of undetected defaults.

10.5 The battery default is not a reason for reclamation, after the warranty period of the battery is completed.

10.6 Warranty is not valid in case of:

10.6.1 any mechanical damages;
10.6.2 damages under force majeur;
10.6.3 any liquid remains;
10.6.4 the dosimeter includes strange items;
10.6.5 the warranty stamps are violated, the housing opened, repaired or replaced by the third parties;
10.6.6 the factory number of the device is deleted or changed;
10.6.7 the accessories not foreseen by the manufacturer are used.

11 Repair

11.1 In case of failure or default conditions during the warranty period of the dosimeter the consumer should draw up a Statement about the necessity of repair and delivery of the dosimeter to the factory-manufacturer
11.2 Warranty and post warranty repair is performed only by the factory-manufacturer if the warranty coupon is enclosed.

12 Storage

12.1 The dosimeters should be stored in heated and ventilated storehouses with air-conditioners at the ambient temperature from +5 to +40 °C and relative humidity up to 80 % at the temperature of + 25 °C without humidity condensation. The storehouse should be free of acids, gas, alkali that may cause corrosion, and vapors of organic solvents.
12.2 The location of the devices in the storehouse should ensure their free transfer 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 devices should not be less than 100 mm.
12.5 The distance between the heating gadgets of the storehouse and the devices should not be less than 0.5 m.
12.6 The average term of storage is not less than 6 years.

13 Shipping

13.1 Packed dosimeters may be shipped by any kinds of closed transport vehicles under the conditions (specified in item 4) (with temperature limitation range from - 25 to + 55 °C) and in conformance with rules and standards effective for any kind of transport.
13.2 The dosimeters in transport container should be placed and fixed in the vehicle to ensure their stable position and to avoid shocks.
13.3 The dosimeters in transport container endure:
- influence of temperature from - 25 to +55 °C:
- influence of relative humidity (95 ± 3) % at temperature 35 °C;
- shocks with acceleration of 98 m/s^2, with a shock pulse duration of 16 ms (number of shocks - 1000 ± 10 in each direction).
13.4 Manipulation is forbidden.

GUARANTEE SHEET

for MKS-05 “TERRA-P” dosimeter-radiometer
TY Y 33.2-22362867-006-2001 BICT.4I2I29.006 TY

Serial number _____
Date of issue _____
Primary calibration performed _____
Hereby I confirm the acceptance of the packed device applicable for usage and the acceptance of the guarantee conditions

Sales date _____

Salesperson signature _____

Customer signature _____
(the guarantee sheet is not valid without customer signature)