Order no. 144/2004

of 05/05/2004
Published in the Official Law Bulletin, Part I no. 534 of 15/06/2004

Approving the Norms on Radiological Safety- Measurement Systems with Radiation Sources

According to the provisions of:
• the Urgency Government Ordinance **no. 11/2004** establishing some reoraganisation measures of the central public administration ;
• Government Decision **no. 1.627**/2003 approving the Internal Rules of the National Commission for Nuclear Activities Control;
• Law **no. 111/1996** on the safe deployment of nuclear activities, republished, with subsequent modifications,

The President of the National Commission for Nuclear Activities Control issues the following Order:

Art. 1. - The Norms on Radiological Safety – Measurement Sytems with Radiation Sources, resented in the annex which is integral part of this order, are approved.
Art. 2. – This Order shall be published in the Official Law Bulletin of Romania, Part I.
Art. 3. – Norms mentioned in art. 1 enter into force on publishing date.
Art. 4. – The National Commission for Nuclear Activities Control, through the Division Ionising Radiations, shall fulfil the provisions of this order.

The President of the National Commission for Nuclear Activities Control,
Lucian Biro,
State Secretary

Bucharest, 5 May 2004.
No. 144.

Annex to Norms

Norm

of 05/05/2004
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on Radiological Safety –Measurement Systems with Radioactive Source

CHAPTER I
General Provisions

Subject Matter
Art. 1. - (1) These norms set the radiological safety requirements applicable to the detection and measurement systems using sealed sources or radiation generators, like: level indicators, densimeters, continuous weighting systems, etc.
(2) The requirements of these norms complete the requirements for measurement devices that use sealed sources or radiation generators, stipulated in the Fundamental Norms on Radiological Safety, approved by the Order of the President of the National Commission for Nuclear Activities Control no. 14/2000, with subsequent completions, and in the Norms on Radiological Safety – Authorization Procedures, approved by the Order of the President of the National Commission for Nuclear Activities Control no. 366/2001.
(3) These norms are applicable also to the measurement installations of certain physical parameters that incorporate or use sealed sources or radiation generators for calibration.
Definitions:
Art. 2. - (1) The definitions and abbreviations used in these norms are the ones stipulated in Law no.

111/1996 on safe deployment of nuclear activities, republished, with subsequent modifications and completions, in the Fundamental Norms of Radiological Safety, and in annex no.1 of these norms.

(2) The provisions of paragraph (1) are completed with the specific definitions and abbreviations of STAS 9989/1-86, the ISO 7205 standard and of the CEI/IEC 1336/1996 and CEI/IEC 60692/1999 norms.

Regulatory Authority

Art. 3. - (1) In compliance with the provisions of Law no. 111/1996, republished, with its subsequent changes and completions, the National Commission for the Control of Nuclear Activities, hereafter called CNCAN, is the national authority competent in the national field that exerts the attributions of regulation, authorization and control.

(2) CNCAN authorizes the measurement systems stipulated under art. 1, in compliance with the provisions of Law no. 111/1996, republished, with its subsequent modifications and completions, of the Fundamental Norms on Radiological Safety and of the Norms on Radiological Safety – Authorization Procedures.

(3) CNCAN authorizes and controls the activities of production, import, export, supply, transfer, possession, storage, handling, transport and use of the measurement systems stipulated under art. 1.

Chapter II
Classification

Art. 4. - The measurement systems stipulated under art. 1 can be classified into:

1. Based on the radiation source that it contains:

a) with sealed radioactive sources
b) with radiation generators

2. Based on the type of measured physical size or of the apprehended product:

a) densimeters
b) thickness meters
c) level indicators
d) moister meter
e) concentration measurement systems
f) smoke detectors
g) poison gas detectors
h) X radiation fluorescence spectometers
i) X ray diffractometers

j) radiation field meters with incorporated radiation sources for calibration
k) radiocontamination meters with incorporated radiation sources for calibration

3. Based on the system position:

a) fixed
b) portable
c) mobile, that can be moved, installed on a transportation means

4. Based on the functioning principle.

a) attenuation of the ionising radiation transmission
b) backscattering of the ionising radiation
c) X fluorescence radiation or neutron activation
d) X radiation diffraction
e) measuring the emitted ionising radiation

CHAPTER III
Technical Requirements

SECTION 1
General Technical Requirements

Art. 5. - (1) The general requirements regarding the measurement systems that use ionising radiation sources are based on the provisions of the ISO 7205/1986, STAS 9989/1-86, SR ISO 2919/1996, SR ISO 9978/1996, CEI/IEC 1336/1996 standards and of the CEI/IEC 60692/1996 standard, valid both for the fixed systems, and for the mobile ones.

(2) The classification of the measurement systems according to the beam of radiation shall be performed in compliance with the provisions under point 3 of the STAS 9989/1-86 standard and point 4 of the ISO 7205/1986 standard.
Requirements regarding the measurement system construction.

Art. 6. - (1) By their construction, the measurement systems shall ensure the protection (mechanical and physico - chemical) of the radiation source or of the radiation generator and the adequate radioprotection of the operating personnel both for the operation period, and for the period of inspection and maintenance.

(2) The measurement systems must be built of materials that shall resist to the environment conditions of the place where they are located and to the long effect of the radiation filed.
(3) Their construction must ensure the source protection in case of fire. The system shall be built in such a way, that the source remains in the container in case of fire, and the protection capacity of the container is not significantly diminished in case of fire.
(4) The container of the emitter unit must be equipped with a shutter that obstructs the beam of radiation in the closed position, and ensures values of the dose equivalent discharge under the maximum values allowed by the regulations in force, for the obstructed beam.
(5) The safety of the source must be ensured by means of a closing device with key that should block the shutter in the closed position and not allow the emission of the beam of radiation and the source ejection.
(6) The emitter unit must be conceived and performed in such a way, that by means of the collimating system the beam of radiation should have the minimum dimensions required by the measurement system type and by its technical conditions for work.
(7) The detecting block must be conceived and performed in such a way, that it should comply with the technical requirements for each measurement system type, and the detector must be chosen thus, so that the activity of the source should be at the lowest reasonably possible levels.
(8) The motions of the measurement system building block must be performed under conditions of radiological safety.
(9) The radiation field meters and the radiocontamination meters with incorporated radiation sources for calibration must also fulfil the provisions of the regulations of the Romanian Office for Legal Metrology.

Requirements for the construction and of the shutter

Art. 7. - (1) The mechanism of the shutter must prove constructive and operating reliability.
It must function safely under any conditions.

(2) The open or closed position of the shutter shall be signalled by light and / or by a colour coding. A text or a colour coding that indicates the position of the shutter shall be inscribed on the container, on a visible place.
(3) The surface layer of the shutter, as well as other of its components and of the actuator mechanism must not be made of metals that functioning melt easily.
(4) The actuator mechanism must be conceived in such a way, that the shutter should not open/close by accident. The opening/closing must be performed without any other interventions than the ones stipulated in the project.
(5) In case a measurement system is equipped with several shutters, each of them must have its own actuator and location mark systems.
(6) The shutters that are electrically or pneumatically operated and controlled must close automatically if the voltage or the compressed air is cut out.
(7) On the return of the voltage or of the air pressure of the pneumatic system, the shutter must not be opened automatically, but only after the operator's intervention.
(8) The measurement systems equipped with an actuator device with remote control for the shutter, shall be also equipped with a light indicator in order to indicate the position of the shutter. The light indicator shall be controlled by the motion of the shutter and it is conceived in such a way, that the indication for the closed shutter appears only if it is completely closed. If it is partially closed, the indication that the shutter is opened must appear.

Requirements for the sealed sources used by the measurement systems

Art. 8. - (1) The sealed sources used by the measurement systems must comply with the requirements of the SR ISO 9978/1996 standards referring to tightness and of the SR ISO 2919/1996 standards referring to the tests that allow the evaluation of the safety and protection against leakage. At the same time, the sources must meet the following requirements:
a) the radionuclide used must correspond both regarding the activity, and regarding the radiation type, radiation energy and the half-life
b) the half-life must be the shortest possible period of time
c) the activity of the source must be greater than the necessary one, in order to work under proper conditions in the planned life time of the measurement system.
(2) If the source activity exceeds the values stipulated by the fundamental Norms for the safe transport of

the radioactive materials, approved by the Order of the president of the National Commission for Nuclear Activities Control, no. 373/2001, the authorization of its transport is necessary.

SECTION 2

Type and Performance Tests for the Measurement Systems with Radioactive Sources and Ionising Radiation Generators

Art. 9. - The tests for type and performance are executed in compliance with the provisions of IEC 60692/1999, IEC 1336/1996, ISO 7205 and STAS 9989/1-86; the test requirements and procedures are presented in annexes no. 2 and 3 and the acceptance criteria are the ones stipulated by the standards on the basis of which the tests for type and product are performed.

Art. 10. - The tests for type and performance must be performed by test laboratories designated by CNCAN, in compliance with the Norms regarding the designation of the bodies for the nuclear field, approved by the Order of the president of the National Commission for Nuclear Activities Control no. 219/1999.

Art. 11. - The periodical technical control can be performed both by the laboratories designated by CNCAN, and by companies authorized by CNCAN for the activity of handling these measurement systems.
Art. 12. - (1) Test reports shall be issued both for the tests for type and performance, and for the periodical technical controls; these reports shall contain all the data stipulated in Annex. 3

2) The reports stipulated under paragraph (1) shall be kept by the issuer and the beneficiary for the entire life time of the respective measurement system.

SECTION 3

Dose Discharge in the Vicinity of the Measurement System

Art. 13. - The measurement systems that contain sealed sources must be installed and shielded in such way that the level of exposure for any person, including the persons that perform the assembling or maintain the source or any other devices or installations in the close vicinity of the source, should not exceed the maximum level of exposure stipulated by the fundamental Norms of radiological safety.
Art. 14. - The measurement of the discharge of the dose equivalent is usually performed in compliance with the provisions of chapter 7 of STAS 9989/1-86.
Art. 15. - **(1)** In case of systems exempted from authorization, the equivalent of the ambiental dose discharge H (10) and the directional dose equivalent H' (0,07 Ohm), whatever the direction may be, must not exceed 1 µSv/h for a distance of 0,10 m from any accessible area of the installation.

(2) In case of systems that require registration and authorization, but without any further arrangements, when they are functioning (the shutter is closed) the maximum discharges of the dose equivalent must fall within the following limits:

a) maximum 500 µSv/h at the distance of 5 cm from the system surface;
b) maximum 7,5 µSv/h at the distance of 1 m from the system surface;

(3) In case of systems that require special arrangements with the purpose of the authorization, the protection shields must ensure a limit of the effective dose of 20 mSv/an for the occupational exposed workers and of 1 mSv/an for the population.

SECTION 4

Requirements for Coding and Marking

Art. 16. - Each measurement system shall be equipped with permanent, easily visible labels, in order to warn the personnel on the existence of radioactive materials and on the necessity to avoid any futile irradiation, and it shall be identified by means of a code that indicates the class, sub-class and performance class. The code shall comply with the provisions of pct. 8.1. of table no. 3 of the ISO 7205/1996 standard and of chapter 3 of STAS 9989/1-86.
Art. 17. - **(**1) Each system shall be provided with proper labels and markings.

(2) The marking shall provide clear information on the container of the source, the source and the

used detector:

(a) the type, series, year of fabrication and producer of the measurement system

(b) reference to the international standard according to which the identification code has been assigned

(c) the sources included in the measurement system shall be identified by means of a distinct label that should contain: the chemical sign, the mass number of the nuclide, the type and activity of the source shall be marked by engraving/impression or duplicated in such way, that it could be read during the entire period for use of the measurement system.

(3) The type and the identification number of the source must be legible on the source rod or support.

Art. 18. - (1) The marking plate stipulated under art. 17 paragraph (2) shall contain the maximum and minimum activities of the used nuclides for which the installation functions properly.

(2) The marking should be legible for all the life time of the source or system.

Art. 19. - Each measurement system shall have individual identification labels in compliance with the provisions of point 10.2 of the ISO 7205/1996 standard.

CHAPTER IV
Obligations of the Authorization Holder

Art. 20. - The holder of an authorization or registration certificate or the holder of a radiation source measurement system exempted from authorization, as appropriate, has the following obligations:

a) to ensure that the nuclear activities he performs observe the legal norms and the applicable standards in force and the service and operating instructions applicable to the respective system.

b) to pay attention to the fact that for all steps of design, manufacture, supply, procurement, or use of the radiation source measurement systems, the norms on the radiological installation safety, the personnel, population, environment and protection of the material goods, are foreseen and applied.

c) to ensure the necessary arrangements, adequate equipment, and the proper control for the radiation source measurement systems, as appropriate;

(d) to have knowledge of the conditions and limits of the authorization issued by CNCAN under the law;

(e) to ensure the operating personnel with adequate knowledge of the field where the nuclear activities are carried out

(f) to appoint by decision the person responsible for the radiological safety

(g) to grant the authority of stopping the operations that do not prove radiological safety to the respective responsible person;

(h) to order the assistance of an expert authorized by CNCAN for the activities of procurement and drawing out of the authorization documentation, of the quality management system and of the radiological safety program, including the necessary dosimetry measurements;

(i) to assign sufficient time and money resources in order to ensure the radiation protection, the physical protection, the training of the personnel, the periodical medical control and to authorize the system in compliance with law;

(j) to assign the sufficient time and money resources in order to ensure the maintenance, the service and the periodical technical inspection of the installations, by unities authorized by CNCAN for the type of used installation;

(k) to ensure, if necessary, the adequate individual equipment for radiation protection;

(l) to notify immediately CNCAN and the nuclear radiation laboratories the within the Public Health Directorates (DSP) on any radiological incident or accident occurred at the radiation source measurement system:

(m) in case of loss or roberry of the radioactive sources, both the holders of the authorization and registration certificates and the owners of the installations exempted from the authorization are compelled to immediately notify CNCAN, the nuclear radiation laboratories within the territorial Public Health Directorates, and the territorial police.

CHAPTER V
Attributions of the Person Responsible for the Radiological Safety

Art. 21. - The person responsible for the radiological safety has the following attributions and responsibilities:

1. to have knowledge of and observe the limits and conditions specified in the authorization or in the registration certificate and to ensure that the carrying out of the activities observe these limits and conditions, as well as the provisions of the operation and service manual;
2. to apply the work methods and techniques that lead to the reducing of the overexposure and contamination risk to minimum, while performing the activities with radiation sources;
3. to keep systematically the records on the radiation sources, as well as on the effectiveness of the measures of protection against their degradation, spreading or robbery.
4. to control periodically, s appropriate, the radiation, concentration, contamination levels existing in the controlled and/or monitored area, as well as the integrity of the measures concerning the security of the installations and keeping record of the results of the measurements concerning the radiation levels, concentration and the contamination levels of the controlled/monitored area, obtained during the inspections performed;
5. to survey the performing of the medical control when employing the personnel and periodically for the entire occupational exposed workers;
6. to ensure the metrological check of the existing measurement and dosimetry control devices, in compliance with the provisions of legal metrology and with the producer's specifications;
7. to organize the intervention teams and propose their endowment for emergency cases;
8. to check periodically the intervention teams' level of training;
9. to train periodically the entire personnel that work with radiation sources;
10. to check the way in which the occupational exposed workers observe the safety measurements against the ionising radiation stipulated by the norms, the issued authorization (including their annexes) and the ones stipulated in the orders of CNCAN, as well as of other control bodies;
11. to check that the visits are performed with the observance of the radioprotection measures, ensuring the use of the adequate radioprotection equipment;
12. to ensure the individual dosimetry monitoring and the records of the results of the individual dosimetry for the category A occupational exposed workers, in compliance with the specific regulations issued by CNCAN; to control the correct use of the individual dosimetry system by all the occupational exposed workers,
13. to control and ensure that any change of the work methods, equipment and installation in the framework of the authorized nuclear activity which might trigger a risk of overexposure or contamination is not be performed prior to take all the necessary safety and authorization measures, in compliance with the legal provisions;
14. to ensure and control the positioning of the warning means and survey their appropriate functioning;
15. to notify immediately the authorization holder on any cases (including failures of the installation) that might trigger any risk of overexposure or contamination, with the purpose of ensuring the prevention measures; in case of emergency, it shall take all the preliminary measures necessary to the avoidance of the overexposure of the occupational exposed workers and of the rest of the population;
16. to notify immediately the authorization holder, and under his authorization, CNCAN and the other authorities specified under art. 134 paragraph 2 of the Fundamental Norms on Radiological Safety, on any loss or robbery of radiation sources, nuclear installations and radioactive materials; taking all the necessary preventive measures in order to avoid any possible overexposure or contamination of the personnel in the areas where the missing source might be;
17. to notify immediately the authorization holder, and under his authorization, CNCAN and the other authorities specified under art. 134 paragraph 2 of the Fundamental Norms on Radiological Safety, on any radiological emergency that occurred and to take immediately the measures for the limitation and mitigation of the generated consequences, for ensuring the first aid and the appropriate medical care; to forbid the access in the contaminated area or to the area where the radiation level exceeds the allowed limits to any person, apart from the persons designated for the intervention, that shall use the appropriate protection equipment;
18. to register the entry of the sealed sources, unsealed sources or radiation generators in a special register, as follows:

    a) the sealed and unsealed sources shall be registered in the register mentioned above, with the following data: denomination of the radioactive material, the activity of any radionuclide that it contains, the date of the radioactivity measurement, the producer's name, in compliance with the data registered in the reception documents of the concerned installation:

    b) the installations, equipment or devices that use sealed sources shall be registered with the

following data: denomination of the radioactive material, the activity of any radionuclide that it contains, the date of the radioactivity measurement, the number of radioactive materials that are a part of the installation, equipment or device, the producer's name, in compliance with the data registered in the reception documents of the concerned installation

c) the radiation generators shall be registered by giving the following data: denomination and type of the generated radiation, radiant intensity and energy, the serial number and the producer's name, in compliance with the data registered in the reception documents of the concerned generator;

19. to register in the register mentioned under point 18 the sources that he lets off the unity deposit (or the storing place), the name of the persons that receive and are to use them at the authorized work places or outside them; the date and hour when the sources were let off shall be specified;
20. to register in the register mentioned under point 18 the re-entrance in the storage (storing place) of the sources that were used at the authorized places or outside them; the date and hour when the source re-enters in the deposit shall be specified;
21. to keep records of the radioactive waste delivered with the purpose of their treatment by the specialized unities, discharged in the sewerage, air, water or soil, specifying the aggregation status as well as the status of the radioactivity of the radionuclides.

CHAPTER VI
The Obligations of the Operating Personnel that Use, Handle, or Transport the Installations

SECTION 1
Requirements for the Training of the Operating, Service and Maintenance Personnel

Requirements for the training of the operating personnel

Art. 22. - The operating personnel shall:

1. be trained in the radioprotection field and own a practice permit in compliance with art. 9 of Law no. 111/1996, republished, with subsequent modifications and completions,
2. know the limits and conditions of the authorizations issued by CNCAN
3. be trained concerning the functioning and use of the measurements systems with incorporated radioactive sources;
4. be trained regarding the way the source shutter works;
5. be trained properly in order to intervene in case of a radiological incident;
6. have at their disposal the operating manual with the instructions and work, check and maintenance procedures that they shall apply

Requirements for the activity and training of the service and maintenance personnel

Art. 23. - (1) The persons involved in the service and maintenance activity must have graduated a radioprotection course authorized by CNCAN

(2) The persons involved in the service and maintenance activity must prove their having graduated a specialty course, preferably at the installation producer for whom they perform this activity.

(3) The persons involved in the service and maintenance activity must hold valid practice permits, issued by CNCAN.

Attributions and obligations of the operating personnel

Art. 24. - The operating personnel has the following attributions and obligations:

1. to acquire sound knowledge necessary to the carrying out of their activity, the provisions of the norms, regulations, the procedures and instructions applicable to the activity they carry out, as well as of the way of using the individual equipment for protection and the individual dosimetry system;
2. to observe the instructions and orders of the person responsible with the radiological safety under whose surveillance he develops his activity;
3. to work carefully in order to prevent the occurrence of any incident;
4. to observe the individual protection measurements, the safety measures of the installation and to use the individual protection equipment in compliance with the provisions of the norms, regulations and training performed;
5. to not change from their place or not bring changes to the means intended for safety and protection, without the preliminary consent of the person responsible with the radiological safety;
6. to not perform on his own initiative operations or handlings that might affect his own safety, the

safety of the remaining occupational exposed workers within the unity, the safety of the population and of the environment;

7. to notify immediately the person responsible with the radiological safety on any disturbance or incident he noticed and that might trigger his own overexposure/contamination or of the remaining personnel, with the purpose of applying the mitigation measures.
8. to notify immediately the person responsible with the radiological safety on the loss or robbery of any sources from his work place or from other places;
9. to notify immediately the person responsible with the radiological safety on the incident that occurred at his work place or on the incident noticed at other work place, and to participate immediately in its localisation or mitigation, in compliance with the tasks incumbent on him under the intervention plan.

CHAPTER VII
Requirements for the Quality Assurance

Art. 25. - **(1)** In compliance with the provisions of art. 18 paragraph (1) point k) of Law no. 111/1996, republished, with subsequent modifications and completions, when performing nuclear activity, the authorization or registration certificate holder shall institute and maintain a controlled Quality Management System in compliance with the specific quality assurance regulations issued by CNCAN and shall ensure t that both the product and service suppliers and their sub-suppliers, in a chain, institute and maintain their own controlled Quality Management System.

(2) All activities of procurement, use, check, control, and calibration of the radiation source systems, as well as the ones of intervention, service, decommissioning, packing, transport, management, records, notifications, reports, stipulated by the norms in force, shall have procedures and shall be implemented together with the Quality Management System mentioned under paragraph 1.

(3) The setting up and maintenance of a program of inspections and of service and maintenance works that must observe the recommendations of the producers and of the supplier of sources and measurement system are binding. This program shall contain at least the following:

a) the routine inspection that shall be performed at the beginning of the work program. These tests shall be performed by the operators in compliance with the procedures and instructions mentioned under paragraph (2). Any failure regarding the operation of the measurement system shall be immediately notified to the person responsible with the radiological safety;

b) periodical inspections performed in compliance with the requirements of the operating manual, in compliance with the procedures of the specific regulations or with the conditions of the authorization issued by CNCAN. The test reports issued by these units are permanent registrations of the quality system and shall be kept in the technical book of the system, that shall be placed under the care of the person responsible with the radiological safety.

c) any system stated to be undue at the routine checks or at the periodical checks, shall be immediately put out of operation, labelled as “undue” and shall not be used until after it has been repaired and tested again by the unites authorized by CNCAN, in compliance with the provisions of the Law no. 111/1996, republished, with subsequent modifications and completions.

(4) For each radiation source measurement system mentioned under art. 1, a technical book shall be drawn up and maintained, consisting of a permanent registration that shall be kept during the entire life-time of the system. The technical book shall be kept by the person responsible with the radiological safety and shall comprise, as appropriate:

a) the documents for the system origin

b) the operating manual

c) the service and maintenance manual

d) the official report of its installing/assembly and the test reports after its putting into operation;

e) the records of all the maintenance, service or capital repair interventions performed.

f) all the changes or adjustments performed

g) changes to the site, re-installation, mounting, etc.

h) the periodical inspections and test reports sent

i) the entire inventory of the system.

CHAPTER VIII
Use and Operating Conditions

SECTION 1
Dose Discharges in the Operating Area of the Measurement System
and Radiation Protection Measures

Measurement of the dose discharge

Art. 26. - (1) In case the sources that emit photon radiation with the energy higher than 20 KeV or neutrons are used, the dose discharge shall be determined as environmental discharge.

(2) In case the energy of the photon radiation does not exceed 20 KeV , or the source emits beta radiation, the dose discharge shall be determined as directional discharge.

The maximum permitted dose discharge

Art. 27. - (1**)** In case of systems exempted from the authorization, the equivalent of the environmental dose discharge H*(10) and the equivalent of the directional dose H'(0,07 Ohm), whatever might be the direction, shall not exceed 1 µSv/h for a distance of 0,10 m of any accessible area of the installation.

(2) In case of systems that require registration and authorization without any special arrangements, the shield of the device shall be thus designed or the device shall be thus installed, so that the equivalent of the dose discharge in the points accessible to the non-occupational exposed workers shall not exceed the following values:

a) 2,5 µSv/h at the permanent work places;
b) 7,5 µSv/h at other accessible places;
c) 25 µSv/h for those points of the permanent work places, that can be reached by hand (where the hands can reach);

d) the stipulated protection shields or separators must ensure the proper limitation of the dose discharge at the operator's place;

e) in the cases mentioned above, the protection shields are not necessary when the distance between the external area of the detecting source assembly and the point where the dose equivalent discharge is enough in order to meet the limitation requirements (point a) and b) above) is less or equivalent to 0,5 m, so that the possibility of the entire body exposure is excluded;

f) the separators necessary in order to meet the limitation requirements of the dose specified under point b) must be marked additionally with the symbol of danger of ionising radiation, in compliance with ISO 361.

(3) In case of systems that require special arrangements in order to obtain the authorization, the protection shield must ensure a limit of the effective dose of 20 mSv/year for the occupational exposed workers and of 1 mSv/year for the rest of the population.

(4) In case of mobile and portable systems, the value of the dose equivalent shall not exceed the value of 100 µSv/h, and within the distance of 1m from it the value of 3 µSv/h.

Radiation Protection Measures

Art. 28. - (1**)** In case of systems exempted from authorization, for which the radioprotection is ensured by the system construction, the user is compelled to take all the necessary measures, so that the system is used at the parameters stipulated in the technical book of the device, and to ensure the performing of the periodical technical inspections by an authorized company, so that to ensure that this one works under pre-established conditions.

(2) In case of systems that require registration or authorization without any further special arrangements than the measures taken by their construction, the radioprotection must be ensured by these binding measures as well:

a) forbidding the permanent work in the area where the discharge exceeds 5 µSv/h;
b) forbidding the parking for a longer period than an hour per day in the area where the source generates a dose discharge higher than 5 µSv/h;
c) drawing up adequate procedures for the operating and maintenance personnel, provided that there are any operation or maintenance requirements in the area where the dose discharge exceeds 5 µSv/h, so that the dose discharges does not lead to exposures that exceed the authorized limits; the operating and maintenance personnel shall be properly trained and wear individual digital dosimeters with alarm threshold;
(3) In case of systems that require special arrangements in order to obtain the authorization, the protection shield must ensure a limit of the effective dose of 20 mSv/year for the occupational exposed workers and of 1 mSv/year for the rest of the population.
(4) Measures shall be taken in compliance with the stipulations of art. 25, and the dose limits must fall within the limits stipulated under art. 26 of these norms.

SECTION 2
Checking Tightness

Art. 29. - (1) Testing the tightness of the sealed sources that equip the measurement systems shall be performed in compliance with the provisions of SR ISO 9978/1996.

(2) The testing method of wiping out by dabbing and the acceptance criteria are complying with the provisions of chapter 5.3 of SR ISO 9978/1996.

(3) The testing by moping up the sealed sources shall be performed:

a) prior the installation of the measurement system;
b) each time the source or other components are dismounted for maintenance or repairing operations;
c)each time one suspects that the environment he works in may corrode the hulls of the source, as there may occur leakages, including radioactive contamination
d) periodically, at intervals of at least 6 months or in compliance with the requirements established by CNCAN in the authorization process;
e) each time the source is placed in a new place or substituted

(4)Testing the tightness by moping up must be performed on the surface of the sealed source or on surfaces of its vicinity. The test shall be performed by measurement laboratories designated by CNCAN, specialty units authorized by CNCAN to handle radiation sources.

(5) In case it is noticed a dose discharge higher than the one under normal conditions, the tests shall be performed on the close parts that might be contaminated, in case that radioactive leakages may occur;

(6) The radiation sources that contain radioactive gas are exempted from the tightness test by moping up.

Art. 30. - In case radioactive leakages of a source are higher than 185 Bq, which might lead to contaminations exceeding the acceptance limits stipulated by SR ISO 9978/1996, the authorization holder:

1. shall replace the source and shall notify CNCAN on the source replacement;
2. shall deliver the deteriorated source as radioactive waste to an unity authorized to take over the radioactive waste and shall notify CNCAN on this delivery, within 24 hours.

CHAPTER IX

SECŢIUNEA 1
Prior Requirements

Art. 31. - The exemption of the measurement systems that use radioactive sources or ionising radiation generators from the authorization of use is performed under the provisions of art. 8 and 9 of the Fundamental Norms on Radiological Safety. This is specified in the radiological safety authorization of the related product, issued by CNCAN.

Art. 32. – The authorization of the measurement systems which use radioactive sources or ionising radiation generators is performed under the provisions of the Law 111/1996, republished, with subsequent modifications and completions and of the Norms on Radiological Safety – Authorization Procedures.

Art. 33. - The authorization system is achieved by means of:

a) registration
b) authorization that does not require special arrangements
c)authorization that requires special arrangements

Art. 34. - (1) Each measurement system with radiation source shall have a radiological safety authorization for the product (ASR)

(2) The request for and the obtainment of the authorization of radiological safety for the product shall be performed in compliance with the art. 14-18, 47-57, 59-61 of the Norms on Radiological Safety – Authorization Procedures.

(3) By means of the radiological safety authorization, CNCAN establishes the subsequent authorization conditions for the measurement system stipulated under paragraph 1, that can be:

a) exemption from the ownership and use authorization
b) authorization by registration when no special arrangements are required, and the activity of the used sources falls under the limits established by regulations
c)authorization, with or without special arrangements, depending on the radiological risk associated to the measurement system;

Art. 35. - The activities of manufacturing, import, export, transport and handling of the measurement systems with radiation sources require the obtainment of an authorization issued by CNCAN, even if the use and ownership of the measurement systems with radiation sources are exempted from the authorization, due to the radiological safety authorization obtained in compliance with the provisions of art. 31.

SECTION 2
Registration and Technical Documentation Necessary to the Registration

Art. 36. - The systems subject to the authorization by registration with the purpose of use are the measurement systems that use radiation sources or ionising radiation generators that cannot be exempted from the authorization conditions and that meet one of the following conditions:
a) they contain active alpha or beta radiation sources that do not require the permanent presence of an operator;
b) they contain active gamma sources, whose activity does not exceed 3,7 Gbq and that do not require the presence of an operator;
c)they contain radiation generators that do not require the permanent presence of an operator, and in case his presence is necessary, he does not have access to the direct radiation beam and his access to the direct radiation beam is not necessary during the usual work process;
d) they are thus classified by means of the radiological safety authorization for the product;
Art. 37. - The application for registration shall contain the information stipulated under art 57 of the Norms on Radiological Safety – Authorization Procedures.
Art. 38. - (1) In case of the systems subject to registration, the documentation drawn up in compliance with the provisions of art. 58 of the Norms on Radiological Safety – Authorization Procedures.

(2) The technical documentation for authorization by registration shall specify, as appropriate, the type of the measurement system, of the source or ionising radiation generator, the system number, construction variant, components, maximum parameters, identification data, year of fabrication, manufacturer, supplier, the purchase date, the specific use that is to be assigned to it, localisation, work regulation, radioprotection measures.

(3) The documentation must be accompanied by a copy of the documents that prove the origin, and, as necessary, a copy of the acceptance tests performed by the manufacturer and/or the fitter.

(4) The documentation shall also contain the data of the person responsible for the radiological safety, mentioning the number and level of the practice permit issued by CNCAN, general training and specific training in the nuclear field.

Art. 39. - The issuing of the registration certificate shall precede the carrying out of the use activity of the measurement systems.

SECTION 3
Authorization and Technical Documentation Necessary to the Authorization

Art. 40. - The systems subject to the authorization with the purpose of use are the systems that use radioactive sources or ionising radiation generators that exceed the exemption and registration limits stipulated under art. 36.
Art. 41. - The application for authorization to use the measurement systems that use radiation sources or ionising radiation generators shall contain the information stipulated under art. 57 of the Norms on Radiological Safety – Authorization Procedures.
Art. 42. - (1) The technical documentation necessary to the authorization to use the measurement systems that use radiation sources or ionising radiation generators shall be drawn up in compliance with the provisions of art. 62 of the Norms on Radiological Safety – Authorization Procedures.
(2) The technical authorization necessary to the authorization, on several steps, to use measurement systems that use radiation sources or ionising radiation generators shall be drawn up in compliance with the provisions of art. 63 and 63 of the Norms on Radiological Safety – Authorization Procedures.
Art. 43. - The technical documentation shall contain the declaration of expertise and its acceptance signed by the expert authorized mentioned in the application, and the statements included in the technical documentation shall be supported by copies of the justifying documents.

CHAPTER X
Putting out of Operation, Ceasing the Activity and Decommissioning of the Measurement Systems with Sealed Radioactive Sources and Radiation Generators

SECŢIUNEA 1
General Requirements

Art. 44. – When putting out of operation and ceasing the activity, the authorization holder is compelled to

conceive and put into practice a decommissioning plan and to request CNCAN, as appropriate, to issue the authorization for the decommissioning, under the terms and conditions of art. 41 and 73 of the Norms on Radiological Safety – Authorization Procedures.

Art. 45. – The operation of putting out of service the measurement systems with radiation sources shall be performed only by unities authorized by CNCAN, in compliance with the provisions of Law no.111/1996 republished, with subsequent modifications and completions, and with the Norms on Radiological Safety – Authorization Procedures.

SECTION 2
Temporary Storage

Art. 46. – When putting out of operation a measurement system with radiation sources, it is necessary to:

1. block the radiation source shutter in the closed position, before starting the works of putting out of operation;
2. the radiation source must be maintained in its own container, closed under storage conditions, labelled with adequate warning signs;
3. the dismantling and the inspection of the measurement system after dismantling must be performed by an unit authorized by CNCAN to handle it, in compliance with the provisions of Law no.111/1996, republished, with subsequent modifications and completions.
4. the storage place must be thus shielded, so that the effective dose given by the radiation sources for the population does not exceed 1mSv/year.
5. the dose outside the source storage shall not exceed 2,5 μSv/h;
6. the radiation sources that can no longer be used shall be delivered as radioactive waste to an authorized unit and CNCAN shall be informed on their delivery.

SECTION 3
Renouncing to the Radiation Source

Art. 47. – The radioactive materials, the equipment and the goods that have been contaminated and that cannot be decontaminated, shall be considered radioactive waste.

Art. 48. – In case the measurement systems are put out of operation and are no longer used, the radioactive sources shall be either returned to the supplier, or shall be quashed and delivered to a specially authorized unit.

Art. 49. – If the radioactive source life time foreseen by the manufacturer has not expired, this one can be used for other applications or transferred to other authorized users only on the basis of an adequate authorization issued by CNCAN in compliance with the provisions of the law.

Art. 50. – Before transferring the sources, the tightness test for the sealed sources shall be performed by the moping up method, in compliance with the provisions of SR ISO 9987/1996, by an unit authorized by CNCAN in compliance with the law.

Art. 51. – Any renunciation to the radioactive sources, either by transfer with the purpose of use, or by delivery to a specially authorized unit shall be performed after notifying CNCAN and obtaining the authorization stipulated by law.

SECTION 4
Ceasing the Activity

Art. 52. – When ceasing the activity, the authorization holder shall conceive and put into practice an authorized decommissioning plan, as appropriate.

Art. 53. - (1) The authorization holder shall transfer the sources to the users from nearby, on the basis of a special authorization, or deliver them to a specially authorized unit.

(2) The radioactive waste resulted from the decontamination shall be delivered to a specially authorized unit.

Art. 54. – The authorization holder shall decontaminate, as appropriate, the spaces that he has used until the limit of removal of the authorization system.

Art. 55. – In case that the measurement systems use ionising radiation generators, when decommissioning the installation, the authorization holder shall either retain the radiation generator tube, or deliver it to other users, under the terms and conditions of the law and in compliance with the regulations in force, or quash and destroy it.

Art. 56. – In order to remove it out of the CNCAN records, the authorization holder shall submit a letter, mentioning the data of the authorization holder and the identification data of the authorized system, accompanied by the following documents:

a) copy of the installation quashing official report
b) copy of the documents of the radiation source or generator transfer under the terms and conditions of art. 52 and 54

c) sanitary notification for the ceasing of the activity, issued by the local public health directorate – the nuclear radiation laboratory, only for the systems with sealed ionising radiation sources that have authorization of use and operation.

Art. 57. – The ceasing of the activity shall be notified in compliance with the forms no. 6 and 7, as appropriate, of annex no.1 of the Norms on Radiological Safety – Authorization Procedures.

SECTION 5
Decommissioning

Art. 58. – The decommissioning authorization shall be requested only for the measurement systems that use sealed gamma radiation sources with an activity higher than 37 GBq or neutron sources used for activation.

Art. 59. - **(1)** In case of measurement systems that do not fall within the provisions of art. 42 of the Norms on Radiological Safety – Authorization Procedures, the decommissioning authorization is not necessary.
(2) The decommissioning operation shall be performed by means of an adequate and authorized handling unit.

Art. 60. – The documentation necessary to the issuing of the decommissioning authorization shall be drawn up in compliance with the provisions of art. 73 of the Norms on Radiological Safety – Authorization Procedures.

CHAPTER XI
Final and Transitory Provisions

Art. 61. – These norms shall enter into force on the date of their publishing in the Official Law Bulletin of Romania, Part. I.

Art. 62. – The authorizations and registration certificates issued by CNCAN until the publishing of these norms shall remain in force until their expiry date, but no longer than the 1st of January, 2007.

Art. 63. – The failure to observe these norms lead to administrative, disciplinary, contravention or penal sanctions.

Art. 64. - Annexes no. 1, 2, 3 and 4 are an integrand part of the present norms.

ANNEX No. 1
to the Norms

DEFINITIONS

1. Measurement system with radiation sources – measurement, control and detection device that uses the radiation issued by one or several radioactive sources and radiation generators. The system usually contains an emitter unit and a receiving unit that can be either distinct and independent or they can form a single emitter – detecting unit.
2. Emitter unit – part of the system that contains the radiation source or the radiation generator and that ensures the requirements of radiological safety and radioprotection stipulated by the regulations in force.
3. Detector unit – part of the measurement system that contains the radiation detector and its annexes.
4. Collimating device – a device that delimits one or several useful beams, whose section in the detector plan does not exceed its section or the absorbing screen that are associated to it by construction.
5. Useful beam - the part of the radiation beam coming from the radiation source that passes through the window, aperture, cone, or other collimating devices of the detector unit.
6. Shutting device of the useful beam (shutter) – device that has to intercept the beam of radiation and to ensure a value of the dose equivalent discharge within the limits stipulated by the regulations in force when it is in the closed position.
7. Densitometer/thickness meter – measurement system intended for measuring the mean density/thickness of a homogenous material or mixture, in a defined configuration, using the attenuation variation, or the ionising radiation backscattering.
8. Probe – the subassembly that comprises the radiation sources of the emitter unit, the radiation detectors of the detector unit and the associated devices.

9. Electronic measurement subassembly – the part of the measurement system that, by means of electronic and electric devices takes over and processes the electric values supplied by the detecting system and supplies electric measures that are to be converted in values of the measured quantities.
10. Precision – the conformity degree of the value given by measurement with an admitted standard value or an ideal value.

NOTE:

1. It is usually expressed in the terms of the measured variable, percentage of the measurement interval, percentage of the superior limit of the measured value, percentage of the measured value.
2. It can also be expressed statistically, e.g.: ± 2 sigma

11. Repeatability – the conformity degree between the measured values for a number of measurements of the output signals, performed in the same interval, for the same values of the input quantity, under the same conditions of operation.
12. Resolution – the smallest change of the measured quantity value, likely to be noticed and detected. One must take into account the statistical nature of the signal and the influence of the used sampling techniques. It is recommended to standardize the sampling data in order to take into account the effects of the system filtering and the measuring time.
13. Mean operating time (time constant) – the period of time necessary for reaching for the first time 63,2% of the final mean value of the value specified to be measured, under stabilized conditions. The time necessary to produce a variation on the device scale must be 10 times smaller than the time necessary for reaching the stabilized conditions.
14. The mean time for reaching the stabilized conditions – the minimum necessary time, when the measured quantity reaches the specified mean value and oscillates around the mean value and the $\pm$ 2 sigma field.
15. Effective measurement range – that part of the nominal range where the measurement can be performed within the limits of known errors.
16. Measuring interval – the algebraic difference between the maximum and the minimum values of the measured values.
17. Use range – range of values that an actuating quantity may take, under the conditions of meeting the specifications referring to the operating errors.
18. True conventional value – the best value that can be obtained for the measured quantity and used as a standard for the proposed objective.
19. Linearity – degree of compatibility between the calibration curve and an arbitrary line. The linearity values qualify the output signal.
20. Instability – the variation of the final output signal, mentioning the constant reference conditions within the effective measurement range.

The following instability types can be distinguished:

a) statistical fluctuations of the final output signal; these must fall under the $\pm$ 2 sigma
b) electric instability (the variation of output signal when all the actuating quantities are constantly maintained)
c) drift (instability generated by other causes than the statistical ones due to the incidence radiation). The drift can be:
   - on long term (noticed for a period of time of one day or one year, excluding the effects of the source activity)
   - on short term (generated by external causes, e.g.: corrosion phenomena, wear of the recipient walls, material deposits on the recipient walls)
   - due to the decreasing of the source activity

ANNEX No. 2
to the Norms

TYPE AND PERFORMANCE TEST

1. Type tests

The type tests are performed for all the characteristics of the measurement systems that use radioactive sources or ionising radiation generators with the purpose of determining the performance and of quantifying the global uncertainty sources.

The type tests are executed when homologating the product and any time changes of the product occur. The results of the type test must be analyzed in terms of performance criteria that consist of the evaluation of the system global uncertainty. The system global uncertainty must fall either under the requirements of the ISO 7205/1986, IEC 60692/1999 and IEC 1336/1996 standards, or under the requirements approved

by the regulating body and the authorization process.
The type tests are performed by the producer in the test laboratories designated for the nuclear field for their performance by the regulating authority.

2. Performance tests

By means of the performance tests it is checked and certified that the precision criterion of the measurement system is met and maintained.

Usually 3 types o performance tests are performed, namely :

2.1. Acceptance tests

1. The performance acceptance tests must prove that the essential criteria referring to performance are met and maintained, and their results must confirm the data obtained at the type tests.
2. The results of the tests must meet the criterion of global precision of the measurement systems, recommended by the standards in force.
3. The performance acceptance tests shall be executed annually, under the conditions approved by the regulating body, by a unity authorized by CNCAN to handle the system types subject to the tests.

2.2 Routine tests

1. The routine tests represent the means of checking the precision and accuracy of the measurement system.
2. The tests must be executed regularly by the system user (daily, weekly or monthly)

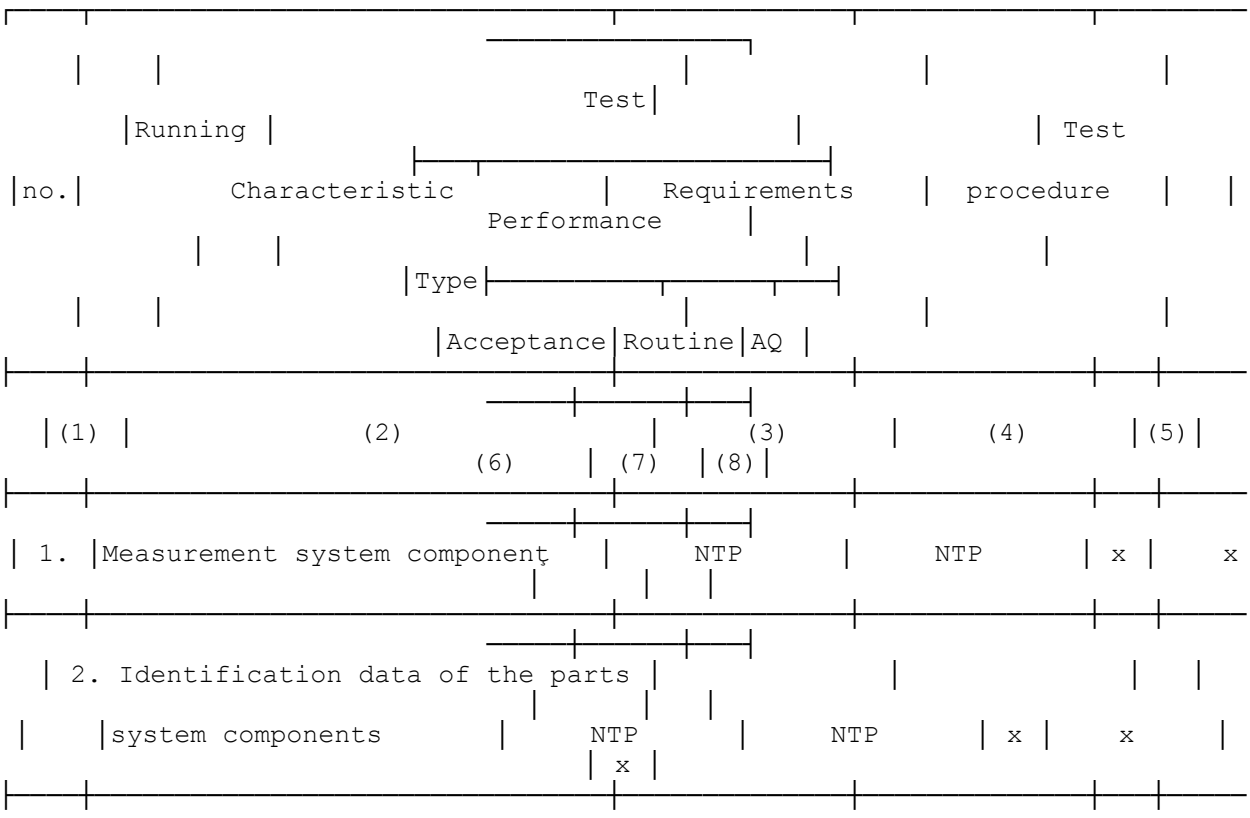
2.3 Quality Assurance tests

These tests refer to the tests within the user's implemented quality system and refer to the following:

1. technical inspections of the measurement system
2. routine inspections executed at the beginning of the work program
3. periodical inspections executed in compliance with the requirements of the operating manual, with the specific regulations and procedures, or with the authorization conditions.

ANNEX No. 3*)
to the Norms

TESTS
of the Measurement Systems with Radiation Sources in compliance with the Recommendations of IEC 60692/1999, IEC 1336, ISPO 7205, STAS 9989/1-86
and the Producer's Technical Specifications (NTP)



3.	Check of the individual marking	8 ISO 7205	9 ISO 7205	x	x	
4.	Classification of the installation	3.1 STAS 9989/1-86	3.1 STAS 9989/1-86	x	x	
5.	Functioning of the shutting system (shutter)	3.1 STAS 9989/1-86 and NTP	3.1 STAS 9989/1-86 and NTP	x	x	
6.	Protection shield	3.1 STAS 9989/1-86	7.1 STAS 9989/1-86	x	x	
7.	Source tightness	5.3 SR ISO 9978	5.3 SR ISO 9978	x	x	
8.	Measurement of the dose equivalent discharge	Table 3 ISO 7205 5.6 STAS 9989/1-86	7.2 ISO 7205 7.1 STAS 9989/1-86	x	x	
9.	Installation calibration	NTP	NTP	x	x	
10.	Response linearity and basic error	4.6 IEC 60692	4.6 IEC 60692	x	x	
11.	Measurement effective range	4.12 IEC 60692	4.12 IEC 60692	x	x	
12.	Linearity calibration	2.2.1.6.3.a IEC 1336	2.2.1.6.3.a IEC 1336	x	x	

13.	Mean stabilization time	4.4 IEC 60692 x	4.4 IEC 60692 x	x		x
14.	Operating time	4.4 IEC 60692 x	4.4 IEC 60692 x	x		x
15.	Endurancy	Table 4 ISO 7205	7.4 ISO 7205	x		
16.	Resistance to adverse conditions	6.4 ISO 7205	7.5 ISO 7205	x		
17.	Measurement repeatability	4.2.4 IEC 60692 x x	4.2.4 IEC 60692 x	x		x
18.	Influence of the supply voltage	4.2.2 IEC 60692 x	4.2.2 IEC 60692 x	x		x
19.	Vibration test	7.2.2 STAS 9989/1-86	7.2.2 STAS 9989/1-86	x		x
20.	Resistance to corrosion test	7.4 STAS 9989/1-86	7.4.1 şi 7.4.2 STAS 9989/1-86	x		

ANNEX No. 4*)
to the Norms

REGISTRATIONS
Performed at the First Control and/or Operational Control
for the Measurement Systems with Radiation Sources

***)** Annex no. 4 is copied in the facsimile.

I. IDENTIFICATION DATA

I-1. Name of the institution: _____

_____

I-2. Laboratory address: _____

_____

I-3. Telephone/facsimile/e-mail: _____

_____

I-4. Authorization number: _____

I-5. Name and qualification of the authorized person responsible for radioprotection:

Name: _____

_____

Degree: _____

Certification: _____

Experience: _____

_____

_____

I-6. Name and qualification of the authorized employed experts:

Name: _____

_____

Degree: _____

Certification: _____

Experience: _____

_____

_____

Name: _____

_____

Degree: _____

Certification: _____

Experience: _____

_____

_____

I-7. Name and title of the person mandated to represent the inspected legal person:

_____

_____

II. SAFETY INSPECTION

II-1. Equipments with incorporated sealed sources.

Description	Radio nuclide	Maximum activity	No.
Producer: _____ Radiation type (alpha, beta, gamma, neutron): _____ Device model no.: _____ Source: _____ Device serial no: _____ Source: _____			
Producer: _____ Radiation type (alpha, beta, gamma, neutron): _____ Device model no.: _____ Source: _____ Device serial no: _____ Source: _____ Producer: _____ Radiation type (alpha, beta, gamma, neutron): _____ Device model no.: _____ Source: _____ Device serial no: _____ Source: _____ Producer: _____ Radiation type (alpha, beta, gamma, neutron): _____ Device model no.: _____ Source: _____ Device serial no: _____ Source: _____ Producer: _____ Radiation type (alpha, beta, gamma, neutron): _____ Device model no.: _____ Source: _____			

Device serial no: _____ Source: _____
Producer: _____
Radiation type (alpha, beta, gamma, neutron): _____
Device model no.: _____ Source: _____
Device serial no: _____ Source: _____
Producer: _____
Radiation type (alpha, beta, gamma, neutron): _____
Device model no.: _____ Source: _____
Device serial no: _____ Source: _____
Producer: _____
Radiation type (alpha, beta, gamma, neutron): _____
Device model no.: _____ Source: _____
Device serial no: _____ Source: _____
Producer: _____
Radiation type (alpha, beta, gamma, neutron): _____
Device model no.: _____ Source: _____
Device serial no: _____ Source: _____

The equipments and sources shall be compared to the description of the request for authorization and the specifications of the project. (A.S.R.). The possible differences shall be written down and the standards on the basis of which the sources and/or devices have been built shall be specified: _____

II-2. Neutron generators - accelerators

Producer	Model number	Serial number	Target nucleus

The neutron generators shall be compared to the description of the authorization request and the specifications of the project (A.S.R.). The possible differences shall be written down and the standards on the basis of which the sources and/or devices have been built shall be specified_____

II-3. Source deposit

The differences or changes to the facts approved by the regulating authority (C.N.C.A.N.) that have been taken into account at the protection against fire, controls, etc., shall be described:
_____

a) Before performing the changes, has the safety been evaluated by an authorized expert?		Yes	No
b) The source and generator protection against the adverse conditions of the environment (heat, humidity, etc.)	Provided? Functioning?	Yes Yes	No No
c) Are there any detection and protection systems against fire in the source deposit?	Provided? Functioning?	Yes Yes	No No

II-4. Systems of safety control

a) Are the systems for he safety control of the operations of source radiography and storage the same with the ones described in the request for authorization, approved by the regulating authority CNCAN?		Yes	No
b) If not, has the safety been evaluated by an authorized expert before the changes?		Yes	No
c) Are the gamma devices and the neutron	Provided	Yes	No

generators labelled as radiation sources?	Legible In the local language	Yes Yes	No No
d) Is there any mechanical control (lock, shutters, fastening, etc.,) in order to prevent the un-intentioned exposure?	Provided? Functioning?	Yes Yes	No No
e) The fixed or portable radiation monitors are	Provided? Necessary? Functioning?	Yes Yes Yes	No No No
f) Is the adequate control regarding the radiation generation by the radiation generators (timer, voltage, current, etc.,)	Provided? Functioning?	Yes Yes	No No

II-5. Warning systems

a) Is there any adequate signalling (visible and/or sonorous) for:			
i) the moment when the sources exposes (the exposure to the source is executed)	Provided? Functioning?	Yes Yes	No No
ii) when the neutron generator is working	Provided? Functioning?	Yes Yes	No No
b) Distinguishing marks (written marks, posters)	Provided? Legible In the local language?	Yes Yes Yes	No No No

II-6. The management involvement regarding the safety operations

a) Does the management know the authorization limits and conditions?		Yes	No
b) Does the management ensure personnel with the required preparation level?		Yes	No
c) Is the person responsible for radioprotection (RRP) authorized by the management to stop the operations that are unfolded under conditions that do not ensure the safety?		Yes	No
d) Does the management ensure proper resources for the personnel training (time, money, courses at national and international level)		Yes	No
e) Does the management ensure the proper protection equipment?		Yes	No
f) Is the program of periodical inspections and recommendations stipulated by the management	Scheduled? Fulfilled?	Yes Yes	No No
i) Data regarding the last inspection program_____ _____ ii) The recommendation standing _____ _____			

II-7. Technical operation regarding operations

a) Has the RRP the proper (corresponding) experience and knowledge?	Yes	No
b) Has the RRP qualified experts at his disposal?	Yes	No
c) Does the RRP know the requirements of the regulating body (C.N.C.A.N.) and the authorization conditions?	Yes	No
d) Does the RRP grant enough time to this position (isn’t the expert to busy with other tasks or hasn’t he enough technical	Yes	No

or secretaryship support)?			
e) Does the RRP maintain the knowledge level of the workers that use radiation sources?		Yes	No
f) Does the RRP perform the audit referring to the workers' fulfilling of the tasks at the temporary work places?		Yes	No
g) Does the RRP lead (execute) the workers' initial and periodical training?		Yes	No
h) Does the RRP keep registrations by means of which he can demonstrate that the workers' and audience's protection is ensured? i) individual dosimetry ii) dosimetry in area		Yes Yes Yes	No No No
i) Are there any stipulations regarding the inventory or the source management?	Provided? Fulfilled?	Yes Yes	No No

II-8. Investigations and quality security

a) Have there occurred any accidents or incidents?		Yes	No
b) If there have, were there any investigations reports of the accidents or incidents prepared?		Yes	No
c) Were the safety evaluations reviewed or were they performed on the basis of the accidents or incidents of similar installations?		Yes	No
d) Is the written program of the quality security	Procedured? Implemented?	Yes Yes	No No
e) Are the maintenance and reparation works performed in compliance with the producer's recommendations?	Scheduled Fulfilled	Yes Yes	No No
f) Reparation / maintenance procedures	Developed? Functioning?	Yes Yes	No No

III. CHECKING THE WORKERS' PROTECTION

III-1. Area classification

a) Are the controlled areas marked?		Yes	No
b) Are the approved (authorized) signalling in the access points?	Provided? Legible? In the local language?	Yes Yes Yes	No No No
c) Is the radioactive source deposit localised under defined physical conditions?		Yes	No
i) is it closed / locked with keys that are under controlled access?		Yes	No
ii) is the written warning "danger of radiation"	Provided? Legible? In the local language?	Yes Yes Yes	No No No
iii) proper shields (individual containers, fences)		Yes	No
iv) reserved only for radioactive sources?		Yes	No
d) Is the neutron generator labelling as radioactive sources	Provided? Legible? In the local language?	Yes Yes Yes	No No No
e) Is the gamma source labelling as radioactive sources	Provided? Legible? In the local	Yes Yes Yes	No No No

	language?		
f) Are the marked areas monitored?		Yes	No
g) Are the warning panels with the basic symbol for ionising radiation sources in the access points	Provided? Legible? In the local language?	Yes Yes Yes	No No No

III-2 Local rules and monitoring

a) Are there any written rules drawn up in Romanian (specific procedures?)		Yes	No
b) Do the rules include investigation levels, authorized levels and procedures that must be followed when these level are exceeded?		Yes	No
c) Are the workers trained for the implementation of the procedures?		Yes	No
d) Is the equipment used in compliance with the descriptions and conditions of the work procedure?		Yes	no
e) Are the works properly controlled in order to ensure that the rules, procedures, protection measures and safety provisions are followed		Yes	No
f) Specific, operational and work procedures for:			
i) The controlled areas are well defined; including barriers and monitoring at the temporary work places	Provided Adequate Functioning?	Yes Yes Yes	No No No
ii) is the exposure adjustment	Provided? Adequate? Functioning?	Yes Yes Yes	No No No
iii) is the use of the portable dosimeters with alarm (warning) threshold and of the protection equipments	Provided? Adequate? Functioning?	Yes Yes Yes	No No No
iv) is the execution of the current maintenance	Provided? Adequate? Functioning?	Yes Yes Yes	No No No
v) is the monitoring maintenance	Provided? Adequate? In function?	Yes Yes Yes	No No No
vi) are the proper methods in case that the equipment is damaged or in case that the source cannot be retracted or when the shutter cannot be closed	Provided? Adequate? Functioning?	Yes Yes Yes	No No No
vii) is the source deposit safety	Provided? Adequate? Functioning?	Yes Yes Yes	No No No
viii) Is the periodical inspection of the installation performed by an authorized company? Its name_____		Yes	No

III-3. Monitoring

a) Is there any authorized body that should ensure the personnel dosimetry?	Yes	No
b) Are there any dosimeters? Type_____ Piece no._____		
i) adequate	Yes	No
ii) calibrated?	Yes	no

iii) replaced with the imposed frequency?	Yes	No
c) Do the personnel exposures fall within the authorized limits?	Yes	No
d) Personnel and area monitoring devices Type_____ Piece no._____		
i) adequate	Yes	No
ii) calibrated?	Yes	no
iii) operational?	Yes	No
iv) is the operational inspection performed before the use?	Yes	No
v) are the spare batteries adequate?	Yes	No
e) Does the monitoring performed by authorized organizations indicate that the shields are adequate and that the dose discharge around the work area corresponds to the authorized radiation level?	Yes	No
f) Do the authorized bodies perform periodically tests referring to the leakages of radioactive materials from the sealed sources?	Yes	no
g) Control devices for dose and radioactive contamination		
i) adequate	Yes	No
ii) calibrated?	Yes	No
iii) operational?	Yes	No
Registration of independent measurements during the control _____		
Type / model no. of the measurement device		
Date of the last calibration		
Do the independent measurements performed during the inspection correspond to the results of the measurements performed by the authorized body?	Yes	No
Documentation of the significant differences and proposal of a resolution plan _____ _____		

IV. CHECKING THE POPULATION RADIOPROTECTION

IV-1. The visitor control

a) Are the visitors accompanied in the controlled area?	Yes	No
b) Are there the proper information at the entrance of the controlled area?	Yes	no
c) Are there proper inspections performed at the monitored area entrance?	Yes	No

IV-2. Source exposure

a) Are there any protection shields and other optimized protection measurements in order to restrict the population's external exposure to the radiation sources?	Yes	No
b) Are there any proper warning equipments provided in the work areas close to the populated areas?	Yes	no
c) Are there any provisions referring to detecting and controlling the radiocontamination in case of source leakages?	Yes	No

IV-3. Radioactive waste and their discard

a) Are there any provisions referring to the source transfer to SDTR or to any other authorized bodies when they are no longer used?	Yes	No
b) If the sources are no longer used and they are stored,	Yes	No

has the authorization holder an adequate plan for transferring and discarding the sources?		
c) Are there any provisions regarding the control of the discard in the environment in case of a radiocontamination or leakages of the sealed sources?	Yes	No
d) Are there any provisions for the permanent warning in case that non-recoverable sources have been relinquished in lines?	Yes	No
e) Are there any provisions regarding the adequate notification on the non-recoverable sources relinquished in lines?	Yes	No

IV-4. Monitoring the population's exposure

a) Are the periodical measurements of the population's exposure discharge in the areas near the controlled areas and monitored by qualified experts or qualified personnel performed?	Yes	No
b) Do the measurements indicate that the shields are adequate and that the dose discharge outside the controlled and monitored area corresponds to the authorized radiation levels?	Yes	No
Registrations of the independent measurements executed during the control:		
Type model no. of the measurement device		
Date of the last calibration		
Are the measurements performed independently of the inspectors in compliance with the routine measurements performed by the holder's personnel?	Yes	No
Gather materials for the significant differences and propose a resolution plan		

V. PREPARING EMERGENCIES

V-1. Emergency plan

a) Is there a written emergency plan?	Yes	No
b) Is the plan periodically reviewed and updated?	Yes	No
c) Does the plan take into account the experience of the accidents occurred in similar installations?	Yes	No
d) Does the plan include the recovery of the radiation sources that cannot be normally recovered?	Yes	No
e) Is the equipment in emergency cases ensured?	Yes	No

V-2. Training and exercises

a) Are the workers involved in the implementation of the training plan?	Yes	No
b) Are there any provisions in the plan for repetitions (exercises) at proper time intervals conjugated with an emergency established by authorities?	Yes	No
Date of the last exercise:		