

15 Annex - Energy

76. RULEBOOK ON REQUIREMENTS FOR TRADING IN AND USE OF RADIOACTIVE MATERIALS, X-RAY DEVICES AND OTHER DEVICES THAT GENERATE IONISING RADIATION

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RULEBOOK

ON REQUIREMENTS FOR TRADING IN AND USE OF RADIOACTIVE MATERIALS, X-RAY DEVICES AND OTHER DEVICES THAT GENERATE IONISING RADIATION

(Official Gazette of the Federal Republic of Yugoslavia 32/98)

I BASIC PROVISIONS

Article 1

The present Rulebook shall prescribe the requirements for trading in and use of radioactive materials, x-ray devices and other devices that generate ionising radiation (hereinafter referred to as the "sources of ionising radiation").

Article 2

For the purposes of this Rulebook, the meaning of the terms and expressions used herein shall be as follows:

- 1) radioactive material refers to a material containing one or more radionuclides with specific activity (Bq/g) and total activity (Bq) exceeding prescribed limits set out in Annex 1, which accompanies this Rulebook and constitutes an integral part thereof;
- 2) trading in ionising radiation sources refers to import, export, sales, procurement, storing and other methods of trading in ionising radiation sources;
- 3) closed source of ionising radiation refers to a radioactive material that is hermetically sealed up in a capsule the construction of which is such that, under normal conditions, it prevents spreading of radioactive material in the environment;
- 4) open source of ionising radiation refers to a radioactive material in liquid, gaseous or powder condition, which is not hermetically sealed up and which can cause contamination of the environment;
- 5) devices with closed sources of ionising radiation refer to devices that contain a closed source of radiation and serve for obtaining and use of defined radiation beams (radiographic, calibration, sterilisation, therapeutic and others), as well as devices for measuring processes (width meters, density meters, level meters, static electricity eliminators, etc.);
- 6) generators of ionising radiation refer to electrical devices used for generation of x-ray radiation, as well as of ionic, neutron or electron beams;
- 7) accelerator refers to a device or a facility used to accelerate electrically charged particles in order to generate ionising radiation with the energy exceeding 1MeV;
- 8) other devices that generate ionising radiation refer to electrical devices that emit ionising radiation and contain a part that operates on the basis of difference between potential higher than 5 kV.

II REQUIREMENTS FOR TRADING IN AND USE OF IONISING RADIATION SOURCES

Article 3

Legal entities and entrepreneurs trading in ionising radiation sources shall have:

- 1) an employee who has acquired at least IV (secondary school) degree of professional education and has been trained for carrying out measures for protection against ionising radiation;

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2) appropriate premises for safe storing and keeping of radioactive sources of ionising radiation, unless the import, i.e. procurement of ionising radiation sources is carried out following the order of the user and there is a direct delivery to the user without previous storing;

3) instructions on measures for protection against ionising radiation and on procedures in case of an accident, visibly displayed in premises where radioactive sources of ionising radiation are stored and safe-kept.

Before trading in ionising radiation sources, legal entities and entrepreneurs referred to in paragraph 1 of this Article must obtain an opinion from the authorised legal entity that they meet the measures for protection against ionising radiation required for trading in those sources.

Article 4

Legal entities and entrepreneurs who use ionising radiation sources other than those referred to in Article 5 of this Rulebook (hereinafter referred to as the "users"), shall have:

1) appropriate premises as prescribed by the acting standards for safe work with ionising radiation sources and for their safekeeping;

2) employees who meet the prescribed requirements for work with particular type of ionising radiation sources;

3) an employee trained for carrying out measures for protection against ionising radiation and who has acquired at least VII (university) degree of professional education to use ionising radiation sources for medical and scientific research purposes, i.e. at least IV degree (secondary school) of professional education to use ionising radiation sources for other purposes;

4) instructions on measures for protection against ionising radiation and procedures in case of an accident, visibly displayed in premises where ionising radiation sources are placed;

5) radiation and contamination monitor, except for sources used in x-ray diagnostics, which corresponds to the type of ionising radiation sources and meets the prescribed metrological requirements for use in protection against ionising radiation.

The user shall provide regular annual dosimetric control for each source of ionising radiation, and six-month dosimetric control for open sources of ionising radiation.

X-ray devices, accelerators and other devices that generate ionising radiation may not be used in advertising or other purposes if during such use persons and the population could get exposed to ionising radiation above the prescribed limits.

Article 5

Every two years, the user shall provide dosimetric control of condition for use of the following ionising radiation sources:

1) machines and devices containing radioactive substances with which it is not possible to be in direct contact or whose uncontrolled release is disabled and which at a distance of 0.1 m from any point on the external surface do not emit the intensity of the equivalent radiation dose greater than 1 mSv/h;

2) ionising radiation generators and devices that in the course of normal work do not cause the value of intensity of the equivalent radiation dose in the air to be greater than 1 mSv/h at the distance of 0.1 m from any accessible point on the external surface;

3) devices which generate ionising radiation when operational, if during normal operation the intensity of the equivalent radiation dose in the air does not exceed 1 mSv/h at the distance of 0.1 m from any accessible point on the external surface;

4) ionising radiation generators with the energy of generated radiation not exceeding 5 keV;

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5) verified working standards of radioactive sources of ionising radiation used for calibration of measuring equipment.

The user referred to in paragraph 1 of this Article shall have an employee trained to carry out measures for protection against ionising radiation.

Article 6

When not used, closed and open sources of ionising radiation, as well as devices with installed ionising radiation sources shall be kept in a repository.

Location and construction of the repository must be such as to provide protection from fire and meet requirements of the acting standards.

If radioactive gases, vapours and aerosols are released while safekeeping ionising radiation sources, the repository must have a ventilation system with adequate filters.

Article 7

A repository, containers, glass-made and other type of vessels for safekeeping of ionising radiation sources should be easy to open and close. Opening of vessels containing easily flammable and vapourable radioactive substances should be done with special precaution measures.

Article 8

Glass vessels containing liquid radioactive solutions must be placed in metal or plastic vessels the cubic capacity of which is sufficient to take in the entire amount of liquid in case of glass vessel breaking.

Article 9

Individual vessels for safekeeping of ionising radiation sources, as well as doors of certain lockers in the repository, must be properly marked with a sign indicating the type and activity of ionising radiation sources.

Article 10

Total activity of ionising radiation sources in a repository must not exceed the activity set out in the use permit, while the total activity of long-life open radiation sources must not exceed the annual consumption.

Article 11

Ionising radiation sources should be kept in such a way as to minimise exposure to radiation from other radiation sources when putting them in or taking them out of the repository.

Access and staying in the repository shall be allowed only to those persons who have been appointed by the user and trained for carrying out measures for protection against ionising radiation.

Article 12

Ionising radiation sources may be carried and transported within the user's premises and yard only in containers which reduce radiation to the prescribed level and prevent their release or loss.

There shall be instructions of the authorised legal entity on use of ionising radiation sources and procedure in case of an accident placed in a visible location in working premises where ionising radiation sources are being used.

Article 13

If users of ionising radiation sources do not plan their further use, they shall inform the Federal Ministry of Labour, Health and Social Policy thereof.

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A user shall be permitted to keep the ionising radiation sources referred to in paragraph 1 of this Article in their repository for a maximum period of 3 years.

After expiry of the period referred to in paragraph 2 of this Article the sources shall be deemed as radioactive waste.

III CLOSED SOURCES OF IONISING RADIATION

Article 14

A device with a closed source of ionising radiation must be resistant to mechanical, thermal and other impacts and must meet the technical requirements for use.

Devices with closed sources of ionising radiation shall be used in conditions provided for in the technical documentation.

Closed sources of ionising radiation may not be used if they are mechanically damaged or if there is a possibility of radiation leakage.

Article 15

A device with a closed source of ionising radiation must contain a safety mechanism which enables transfer of the source from operational to non-operational position.

Article 16

When using devices with closed sources of ionising radiation outside specially envisaged premises, the following precaution measures shall be carried out:

- 1) prohibition of presence for persons who do not work with ionising radiation sources in the vicinity of those sources where the level of radiation is such that the prescribed limit of effective dose of radiation for individuals from the population could be exceeded;
- 2) posting of warning signs reading RADIATION DANGER and sound and light alarm devices to warn about radiation danger;
- 3) use of portable and other covers;
- 4) use of ionising radiation sources in conditions of furthest possible distance of the source from the personnel who operate the device and other persons;
- 5) radiation beam should be directed towards the floor or aside where there are no people present.

Article 17

The intensity of the equivalent dose of radiation on external surface of stationary devices with closed sources of ionising radiation must not exceed 1 mSv/h, and at the distance of 1 m, it must not exceed 0.02 mSv/h.

The intensity of the equivalent dose of gamma radiation on external surface of portable devices with closed sources of ionising radiation must not exceed 0.5 mSv/h, and at the distance of 1 m, it must not exceed 0.01 mSv/h.

Article 18

Ionising radiation sources used for industrial radiography shall be stored and used in a defectoscope container which shall be locked when the radiation source is in it.

Only persons who meet the prescribed requirements for work with ionising radiation sources in industrial radiography may have at their disposal the keys of the defectoscope container and the repository for their storage.

Article 19

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A defectoscope with an ionising radiation source may be taken out of the repository and the user's yard only by a person in charge of carrying out a specific task, with the signed receipt on taking over a defectoscope with an ionising radiation source.

The person referred to in paragraph 1 of this Article shall be responsible for protection measures envisaged during carrying, transport and use of defectoscope.

Irradiation in industrial radiography shall be carried out by at least two persons who meet the requirements for work with those sources and who must be present during the entire time the defectoscope's operation.

After completion of work with a defectoscope, it is necessary to check whether the source is in the defectoscope, using the instruments for radiation measuring, and then the defectoscope needs to be locked.

Article 20

Devices with closed sources of ionising radiation used in measuring processes (techniques and automatics) must be constructed in such a way as to be able to resist any influence from the external environment and maintain their integrity in any conditions of use.

Position of an ionising radiation source in a device and position of the device in a technological process and derived measures for protection against ionising radiation must ensure that the intensity of the absorbed doses at the surface of those devices does not exceed 0.1 mSv/h, and that at the distance of 1 m it does not exceed 0.02 mSv/h.

The space around the device with a closed source of ionising radiation (radiation zone) referred to in paragraph 1 of this Article shall be marked with a sign reading RADIATION DANGER.

Article 21

Devices with closed sources of ionising radiation which are used in measuring processes (techniques and automatics) may be repaired only persons specially trained for that line of work and in special premises. Presence of persons other than those responsible for carrying out measures for protection against ionising radiation shall not be allowed during repair of the devices.

IV OPEN SOURCES OF IONISING RADIATION

Article 22

All procedures with open sources of ionising radiation, depending on the class of the work they perform, shall be carried out in laboratories which meet the prescribed requirements with regard to the number, arrangement, size and equipment of the premises in which this work is carried out.

Work class referred to in paragraph 1 of this Article shall be determined with regard to the radionuclide type and its activity in the working place, as follows:

Radionuclide activity A(i) is displayed in the Annex 1 to this Rulebook.

Limits of admissible values of activity for work		
Work class	_____	
	On the working surface	In digester
I	1-100 A(i)	1-1000 A(i)
II	100-1000 A(i)	1000-10000 A(i)
III	> 1000 A(i)	> 10 000 A(i)

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Article 23

Buildings and premises in which open sources of ionising radiation are used shall be constructed in accordance with the acting standards and meet the prescribed requirements for safe work with those sources and for carrying out measures for protection against ionising radiation.

Article 24

During work with open sources of ionising radiation, a monitor of levels of radioactive contamination of surfaces, adequate for the ionising radiation type and intensity, shall be provided, as well as a dosimeter for measuring the radiation level, both of which must meet the prescribed metrological requirements.

Article 25

Premises for work with open sources of ionising radiation must be concentrated in one part of the building.

An authorised legal entity must determine whether the premises not envisaged for further safekeeping or using of the open sources of ionising radiation are safe to be used for other purposes and, if necessary, decontamination should be carried out.

Article 26

Works with open sources of ionising radiation of the class I shall be conducted in special premises, and if release of radioactive aerosols is expected, these works shall be conducted in digesters equipped with a ventilation system.

Article 27

Premises envisaged for works with open sources of ionising radiation of the class II must be located in a separate part of the building so that they are isolated from other premises and have a sanitary block and a contamination monitor.

Article 28

Premises envisaged for work with open sources of ionising radiation of the class III must be located in a separate building or in an isolated part of the building with a separate entrance and with a sanitary block.

Premises referred to in paragraph 1 of this Article shall be divided into several radiation zones between which a sanitary block shall be placed.

Article 29

Ventilation system should be designed in such a manner as to ensure that the air cannot circulate in the premises where radionuclides are used and that it cannot pass into the premises where open sources of ionising radiation are not used.

If there are several premises where work is conducted with open sources of ionising radiation of different levels of activity, the ventilation system should ensure that the flow of air is directed from the premises with a lower level of activity towards the premises with a higher level of activity.

Article 30

The sewage system from the premises for work with open sources of ionising radiation should be designed as a separate sewage system with a separate tank for reception of liquid radioactive waste. The pipeline should be marked with a standard radioactivity sign placed on every three metres.

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Premises for work with open sources of ionising radiation must have the floor area of at least 3 sqm per employee in the premises. If conducted work is work with radionuclides of high activity, the number of persons in working premises shall be as small as possible, but not less than two persons.

Article 32

Generators of short-life radionuclides should be lined with an appropriate shield and designed in such manner that the intensity of the equivalent dose at the external surface of the lining does not exceed the value of 0.5 mSv/h.

V X-RAY DEVICES AND ACCELERATORS

Article 33

Buildings and premises in which x-ray devices and accelerators are placed and used shall be designed in accordance with the acting standards and meet all the prescribed requirements for safe work with the said devices and for carrying out measures for protection against ionising radiation.

A room in which a diagnostic x-ray device with one x-ray tube or an accelerator is placed must have the floor area of at least 20 sqm.

If there is a diagnostic x-ray device with two or more x-ray tubes in one room, which are simultaneously switched on, the floor area of that room per one x-ray tube must not be less than 15 sqm.

A room where an x-ray device for breast imaging is used must have the floor area of at least 12 sqm.

A room where an x-ray device for therapeutic purposes is used must have the floor area of at least 16 sqm.

A room where an x-ray device for teeth imaging with a high voltage of its x-ray tube not exceeding 60 kV is used, must have the floor area of at least 4 sqm.

A room where an x-ray device for teeth imaging with a high voltage of its x-ray tube exceeding 60 kV is used, as well as an x-ray device for imaging of teeth and jaw condition assessment, must have the floor area of at least 10 sqm.

Dentistry x-ray device may also be used in a surgery on condition that only the dentist and the patient are present in the surgery at the time of imaging.

Article 34

There can be only one x-ray device with several x-ray tubes in one room, depending on its purpose, providing that the high voltage of the x-ray tube does not exceed 150 kV.

The x-ray devices where the high voltage of the x-ray tube exceeds 150 kV, x-ray devices used for treatments and accelerators shall be placed in at least two rooms. A prop for patients on which the illumination, imaging or irradiation is performed and an x-ray tube, i.e. accelerator, are placed in one room, while the control device and other parts of an x-ray device or an accelerator are placed in the other room.

By way of exception, there may be two x-ray devices placed in one room, providing that there is an electric switch which prevents simultaneous use of more than one x-ray device.

Article 35

X-ray devices for illumination must have a switch for electric power supply of the x-ray tube which enables power supply only while it is pressed against.

X-ray devices referred to in paragraph 1 of this Article must have an exposure time indicator or a monitor of the input dose at the surface of the patient's skin.

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Article 36

X-ray devices used for mammography and systematic lung imaging must be equipped with a device for automatic dosing of radiation.

X-ray devices installed in vehicles used for systematic lung imaging must have a closed cabin for patients. Doors on the cabin must be equipped with an automatic switch for switching off the high voltage of the x-ray tube when the door is opened.

Between the imaging cabin and the x-ray tube there must be a protective tube which prevents penetration of x-ray radiation into the area outside the cabin.

Time switch used with portable x-ray devices and x-ray devices for teeth imaging must enable switching on of radiation sources from the location behind the protective screen or from the adjoining room.

Article 37

Tubes of X-ray devices used for teeth imaging must ensure a minimum distance between the focus and the patient's skin in accordance with the acting standards, as well as protection from parasite radiation.

There shall be data on the maximum width of the irradiated area at the patient's skin surface, on distance made between the focus and the patient's skin, as well as on the protective power of the tube, marked on the tubes referred to in paragraph 1 of this Article. The tube's protective power from parasite radiation must be at the level of at least 0.30 mm of lead.

Article 38

The size of the irradiated area at the contact of the tube of x-ray devices used for intra-oral imaging of teeth with the patient's skin must not exceed 60 mm in diameter for a round area, i.e. 30x40 mm for a rectangular area.

Article 39

X-ray devices used for panoramic imaging of the jaw must have a slit for passage of the beam on the casing as well as portable mechanisms and cassette holders set in such a way that the size of the irradiated area does not exceed the cassette edges by more than 10 mm.

Article 40

Radiators used for imaging of patients must contain a device for limiting the size of the irradiated area, as well as the light viewfinder.

Article 41

X-ray devices used for illumination of patients which do not have an image amplifier or a TV chain must have a screen protected by lead-glass, an apron underneath and to the left from the screen, and if the x-ray device is used in a downward position, then there also must be an apron on the side where the operator is standing.

Protective power of the x-ray device screen referred to in paragraph 1 of this Article, at the nominal voltage not exceeding 75 kV, must be at least 1.8 mm of lead, and at the voltages between 75 kV and 100 kV it must be at least 2 mm of lead. Protective power of the screen at the voltages exceeding 100 kV must be increased for at least 0.01 mm of lead per every kV.

Article 42

An image amplifier must be used during illumination with portable x-ray devices, and additional tubes which limit the radiation beam must be placed on the device's radiator.

Article 43

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Protective apron which is placed under the screen must have either the same width or be wider than the screen and at least 40 cm long. The apron must be composed of at least three segments which must overlap for at least 1 cm.

When the device is used in a downward position, the protective apron placed on the side of the screen and of the x-ray device must be made in one part.

Protective power of the protective apron referred to in paragraph 1 of this Article must be at the level of at least 0.25 mm of lead for high voltages of the x-ray tube up to 75 kV, and at least 0.5 mm of lead for high voltages between 75 and 125 kV.

Protective power of the protective apron which is placed on the left side of a device for targeted imaging and on the side of an x-ray device must not be less than 0.5 mm of lead.

Article 44

The users of dentistry x-ray devices shall replace the current tubes which do not provide protection from parasite radiation with appropriate tubes referred to in Article 37 hereof within a year after the date of the entry into force of this Rulebook.

Article 45

Dentistry x-ray devices with the high voltage of the x-ray tube lower than 50 kV may not be used for intra-oral teeth imaging.

The users shall discontinue the use of the x-ray devices referred to in paragraph 1 of this Article within one year after the date of the entry into force of this Rulebook.

Article 46

The power switch for electric power supply of the ionising radiation generator must be easily accessible by the persons working with an x-ray device or an accelerator.

Article 47

High voltage supply lines and other electric conductors leading to adequate parts of the stationary x-ray device must be placed in special canals in the floor, but in such a way that the canals do not affect the protective power of the floor with respect to the premises located below the x-ray device.

Article 48

The floor in the room where the x-ray device is used or a part thereof must be made out of electro-insulating material (rubber, PVC, linoleum, etc.).

Provision from paragraph 1 of this Article shall not pertain to portable x-ray devices.

Article 49

Leaking radiation in conditions under load and in condition with no load for all types of radiators must conform with the acting standards, which shall be established by an authorised legal entity through measurements carried out at least once a year.

Manufacturer of radiators shall, in addition to other documentation on the x-ray device, provide the end user of an x-ray machine also with a diagram on leaking radiation of the radiator.

Requirements referred to in paragraph 1 of this Article must also be met by tubes and shutters for limitation of the radiation beams.

Article 50

With regard to filtration, radiators and radiators equipped with shutters must meet the requirements prescribed by the acting standard.

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Protection of operators and personnel against parasite radiation shall be included in protection measures in accordance with the acting standards, and in particular through the following measures: protection by distance, operating from protected zones, defining of important retention zones, application of protective means, limiting the radiation level at places where devices are switched on, etc.

Article 52

X-ray devices for industrial radiography shall be placed in at least two rooms. X-ray tube and a desk for examination of materials with a device for automatic moving of objects which are being irradiated shall be placed in one room, and the control panel and other parts of the device shall be placed in the other room.

A window protected by a lead glass shall be installed in the wall between the rooms referred to in paragraph 1 of this Article or the operation control shall be carried out via closed-circuit television.

By way of exception, x-ray devices referred to in paragraph 1 of this Article may also be used in production halls. Operating conditions for these x-ray devices shall be determined by a legal entity authorised for designing of protection against ionising radiation.

Article 53

X-ray devices used for control of goods, mail, luggage and personal belongings (hereinafter referred to as the "x-ray devices for control of goods") which are located in public places must have a protective casing. At the distance of 10 cm from any point at the external surface of the casing there may not be registered intensity of the equivalent radiation dose exceeding 1 mSv/h, if emission of x-ray radiation is carried out in a continuous regime, i.e. 1 nSv/imp, if emission of x-ray radiation is carried out in the impulse mode.

Article 54

If there is a door on a protective casing through which objects are introduced for examination, this door must be equipped with micro-switches that prevent high voltage of the x-ray tube being turned on while the door is opened.

Article 55

If there are lead rubber curtains at the entrance of the irradiation tunnel of the x-ray device whose dimensions exceed 100 x 50 cm, referred to in Article 53 of this Rulebook, and if the entrance is at the level lower than 50 cm, then there must be a switch for immediate switching-off of the device on the operator's control panel from which the entrance is visible. If the tunnel entrance is not visible from the operator's location, then the said switch must be located at the entrance into irradiation tunnel.

Article 56

If the requirements referred to in Article 53 hereof are not fulfilled, the x-ray devices for control of goods must be placed in a separate room with a visible sign on the door reading "RADIATION DANGER", and the intensity of the equivalent radiation dose on the surface of the external walls of such room may not exceed the value which can cause overshooting of the prescribed limit of the effective dose for an individual from the population.

The intensity of the equivalent radiation dose at the external surface of these devices may not exceed the value which can cause overshooting of the prescribed limit of the effective dose for professionally exposed persons.

Article 59

Portable x-ray devices for control of goods without the protective chamber may be used if the prescribed technical requirements have been met and if appropriate measures for protection against radiation prescribed for closed sources of ionising radiation have been taken. If there are

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no warning measures referred to in Article 16 hereof, measures which will prevent persons who do not work with ionising radiation sources from entering into the radiation area shall be taken.

Article 60

Switching on and switching off of portable x-ray devices for control of goods shall be carried out in such a way that the person working with the said device is not exposed to radiation doses larger than those prescribed for professionally exposed persons.

Article 61

Users of portable x-ray devices for control of goods shall have an adequate, functional and verified monitor of radiation.

Article 62

X-ray devices for control of goods which are installed in a vehicle or a trailer may not at the distance of 10 cm from any point at the external surface of the vehicle or trailer generate the intensity of the equivalent radiation dose exceeding 1 mSv/h for irradiation carried out in a continuous mode, i.e. 1 nSv/imp for irradiation in an impulse mode.

If the requirements from paragraph 1 of this Article are not met, protection measures prescribed for portable x-ray devices shall be taken.

If there is a door on a vehicle or a trailer through which the objects are introduced for examination, this door must be equipped with micro-switches which prevent high voltage of the x-ray tube being turned on while the door is opened.

If there is a separate working cabin for an operator in a vehicle or a trailer, during their work they may not be exposed to radiation doses higher than those prescribed for professionally exposed persons.

Article 63

Control of vehicles, containers and other objects with x-ray tubes and accelerators may be carried out in facilities built for those purposes in accordance with prescribed technical requirements. Complete control installation shall be placed in at least two rooms. Control panel and necessary systems for execution of the control process must be placed in a separate room.

At the entrance to and exit from the space where control is carried out, there must be a protective door equipped with protection switches which prevent x-ray radiation being switched on while the door is open.

The limit of the effective radiation dose prescribed for an individual from the population may not be exceeded at the surface of external walls of the premises in which a device referred to in paragraph 1 of this Article is placed.

VI IONISING SMOKE DETECTORS AND RADIOACTIVE LIGHTNING-CONDUCTORS

Article 64

Only those ionising radiation sources whose activity is less than 185 kBq and for which it has been established that, during one-off wiping, the wiping of the radioactive material from the holder surface does not exceed 0.5% of the total radiation source activity may be installed in ionising smoke detectors.

Radiation sources in gaseous condition or which have descendants in gaseous condition may not be used or installed in ionising smoke detectors.

The intensity of the equivalent radiation dose measured at a distance of 10 cm from any point on the external surface of the ionising smoke detector insert may not exceed 1.0 mSv/h.

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Cleaning of the radiation sources used in ionising smoke detectors and their maintenance shall be carried out in a way and with means prescribed in technical documentation.

Ionising smoke detectors which are not used shall be kept in a locked space with provided measures for protection against ionising radiation.

A person in charge of implementation of measures for protection against ionising radiation shall be responsible for storing and safekeeping of ionising smoke detectors.

Article 66

In the case of disappearance of ionising smoke detectors or in the case of fire or other accidents due to natural causes, the user of ionising smoke detectors shall notify thereof the Federal Ministry of Labour, Health and Social Policy and the authorised legal entity that performs dosimetric control.

Article 67

Removal of radioactive lightning-conductors may be carried out only by a legal entity authorised for tasks of collecting and disposal of radioactive waste materials.

After removal of a radioactive lightning-conductor, the legal entity referred to in the paragraph 1 of this Article shall issue to the user a certificate confirming that the radiation source is properly stored and to notify thereof the Federal Ministry of Labour, Health and Social Policy and the authorised legal entity that was in charge of dosimetric control of this source.

Radioactive lightning-conductors shall be transported in a special vehicle. During the transport, the radiation source must be placed in a transport container.

VII IONISING RADIATION SOURCES IN MASS USE

Article 68

Only tritium, ^3H , and promethium, ^{147}Pm may be used as components of radioactive illuminating paints, however they have to be bound chemically or in another way so as to present insoluble or slightly soluble material.

Article 69

Total activity of the radioactive illuminating paint applied to hour plates or hands of watches (clocks) and instruments may not exceed the following values:

Watch type	Radionuclide	Total activity
Wrist and pocket	^3H	0,30 GBq
	^{147}Pm	0,60 MBq
Wall clock	^3H	0,40 GBq
	^{147}Pm	7,40 MBq
Special	^3H	0,90 GBq
	^{147}Pm	18,50 MBq

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Radioactive illuminating paints on coated surfaces, in normal use conditions, must adhere in such a way so that the paint does not come off due to shaking or temperature changes.

Article 71

Watches (clocks) and other instruments the parts of which are coated with radioactive illuminating paints shall be placed in boxes with transparent lids. The box and the lid themselves must be resistant to shakes and blows in conditions of normal use and during smaller accidents.

Article 72

Special watches (clocks) and instruments which contain radioactive illuminating paints must have a radioactivity sign on their hour plate which warns the user or the person repairing them of presence of radionuclide content. Article 73

The same measures for protection used during work with corresponding radionuclide types and activities shall be taken and carried out during work with radioactive illuminating paints.

Article 74

Legal entities and entrepreneurs that produce, trade in or import cathode ray tubes for colour TV sets or TV monitors should provide the end user with an attestation certificate of the quality and protection against ionising radiation.

Article 75

In case of colour TV sets or TV monitors, the intensity of the equivalent dose 5cm away from the surface of the cathode ray tube may not exceed 5 mSv/h.

VII FINAL PROVISIONS

Article 76

The Rulebook on trading in and use of radioactive substances above the set limit of activity, x-ray devices and other devices that generate ionising radiation and on measures for protection against those sources (Official Gazette of the Socialist Federal Republic of Yugoslavia 40/86 and 45/89) shall be repealed on the day of entry into force of this Rulebook.

Article 77

This Rulebook shall enter into force on the eighth day following that of its publication in the Official Gazette of the Federal Republic of Yugoslavia.

Annex 1.

LIMITS OF SPECIFIC AND TOTAL ACTIVITY OF RADIONUCLIDES ABOVE WHICH A MATERIAL IS CONSIDERED TO BE RADIOACTIVE

Radionuclide	Specific activity (Bq/g)	Total activity (Bq)	Radionuclide	Specific activity (Bq/g)	Total activity (Bq)
1	2	3	4	5	6
3 H	1_10 6	1_10 9	71 Ge	1_10 4	1_10 8

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7 Be	1_10 3	1_10 7	73 As	1_10 3	1_10 7
14 C	1_10 4	1_10 7	74 As	1_10 1	1_10 6
15 O	1_10 2	1_10 9	76 As	1_10 2	1_10 5
18 F	1_10 1	1_10 6	77 As	1_10 3	1_10 6
22 Na	1_10 1	1_10 6	75 Ce	1_10 2	1_10 6
24 Na	1_10 1	1_10 5	82 Br	1_10 1	1_10 6
31 Si	1_10 3	1_10 6	74 Kr	1_10 2	1_10 9
32 P	1_10 3	1_10 5	76 Kr	1_10 2	1_10 9
33 P	1_10 5	1_10 8	77 Kr	1_10 2	1_10 9
35 S	1_10 5	1_10 8	79 Kr	1_10 3	1_10 5
36 Cl	1_10 4	1_10 6	81 Kr	1_10 4	1_10 7
38 Cl	1_10 1	1_10 5	83m Kr	1_10 5	1_10 12
37 Ar	1_10 6	1_10 8	85 Kr	1_10 5	1_10 4
41 Ar	1_10 2	1_10 9	85m Kr	1_10 3	1_10 10
40 K	1_10 2	1_10 6	87 Kr	1_10 2	1_10 9
42 K	1_10 2	1_10 6	88 Kr	1_10 2	1_10 9
43 K	1_10 1	1_10 6	86 Rb	1_10 2	1_10 5

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45 Ca	1_10 4	1_10 7	85 Sr	1_10 2	1_10 6
47 Ca	1_10 1	1_10 6	85m Sr	1_10 2	1_10 7
46 Sc	1_10 1	1_10 6	87m Sr	1_10 2	1_10 6
47 Sc	1_10 2	1_10 6	89 Sr	1_10 3	1_10 6
48 Sc	1_10 1	1_10 5	90 Sr (1)	1_10 2	1_10 4
48 V	1_10 1	1_10 5	91 Sr	1_10 1	1_10 5
51 Cr	1_10 3	1_10 7	92 Sr	1_10 1	1_10 6
51 Mn	1_10 1	1_10 5	90 Y	1_10 3	1_10 5
52 Mn	1_10 1	1_10 5	91 Y	1_10 3	1_10 6
52m Mn	1_10 1	1_10 5	91m Y	1_10 2	1_10 6
53 Mn	1_10 4	1_10 9	92 Y	1_10 2	1_10 5
54 Mn	1_10 1	1_10 6	93 Y	1_10 2	1_10 5
56 Mn	1_10 1	1_10 5	93 Zr (1)	1_10 3	1_10 7
52 Fe	1_10 1	1_10 6	95 Zr	1_10 1	1_10 6
55 Fe	1_10 4	1_10 6	97 Zr (1)	1_10 1	1_10 5
59 Fe	1_10 1	1_10 6	93m Nb	1_10 4	1_10 7
55 Co	1_10 1	1_10 6	94 Nb	1_10 1	1_10 4

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56 Co	1_10 1	1_10 5	95 Nb	1_10 1	1_10 6
57 Co	1_10 2	1_10 6	97 Nb	1_10 1	1_10 6
58 Co	1_10 1	1_10 6	98 Nb	1_10 1	1_10 5
58m Co	1_10 4	1_10 7	90 Mo	1_10 1	1_10 6
60 Co	1_10 1	1_10 5	93 Mo	1_10 3	1_10 8
60m Co	1_10 3	1_10 6	99 Mo	1_10 2	1_10 6
61 Co	1_10 2	1_10 6	101 Mo	1_10 1	1_10 6
62m Co	1_10 1	1_10 5	96 Tc	1_10 1	1_10 6
59 Ni	1_10 4	1_10 8	96m Tc	1_10 3	1_10 7
63 Ni	1_10 5	1_10 8	97 Tc	1_10 3	1_10 8
65 Ni	1_10 1	1_10 6	97m Tc	1_10 3	1_10 67
64 Cu	1_10 2	1_10 6	99 Tc	1_10 4	1_10 7
65 Zn	1_10 1	1_10 6	99m Tc	1_10 2	1_10 7
69 Zn	1_10 4	1_10 6	97 Ru	1_10 2	1_10 7
69m Zn	1_10 2	1_10 6	103 Ru	1_10 2	1_10 6
72 Ga	1_10 1	1_10 5	105 Ru	1_10 1	1_10 6
106 Ru (1)	1_10 2	1_10 5	140 Ba (1)	1_10 1	1_10 5

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103m Rh	1_10 4	1_10 8	140 La	1_10 1	1_10 5
105 Rh	1_10 2	1_10 7	139 Ce	1_10 2	1_10 6
103 Pd	1_10 3	1_10 8	141 Ce	1_10 2	1_10 7
109 Pd	1_10 1	1_10 6	143 Ce	1_10 2	1_10 6
105 Ag	1_10 2	1_10 6	144 Ce (1)	1_10 2	1_10 5
110m Ag	1_10 1	1_10 6	142 Pr	1_10 2	1_10 5
111 Ag	1_10 3	1_10 6	143 Pr	1_10 4	1_10 6
109 Cd	1_10 4	1_10 6	147 Nd	1_10 2	1_10 6
115 Cd	1_10 2	1_10 6	149 Nd	1_10 2	1_10 6
115m Cd	1_10 3	1_10 6	147 Pm	1_10 4	1_10 7
111 In	1_10 2	1_10 6	149 Pm	1_10 3	1_10 6
113m In	1_10 2	1_10 6	151 Sm	1_10 4	1_10 8
114m In	1_10 2	1_10 6	153 Sm	1_10 2	1_10 6
115m In	1_10 2	1_10 6	152 Eu	1_10 1	1_10 6
113 Sn	1_10 3	1_10 7	152m Eu	1_10 2	1_10 6
125 Sn	1_10 2	1_10 5	154 Eu	1_10 1	1_10 6
122 Sb	1_10 2	1_10 4	155 Eu	1_10 2	1_10 7

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124 Sb	1_10 1	1_10 6	153 Gd	1_10 2	1_10 7
125 Sb	1_10 2	1_10 6	159 Gd	1_10 3	1_10 6
123m Te	1_10 2	1_10 7	160 Tb	1_10 1	1_10 6
125m Te	1_10 3	1_10 7	165 Dy	1_10 3	1_10 6
127 Te	1_10 3	1_10 6	166 Dy	1_10 3	1_10 6
127m Te	1_10 3	1_10 7	166 Ho	1_10 3	1_10 5
129 Te	1_10 2	1_10 6	169 Er	1_10 4	1_10 7
129m Te	1_10 3	1_10 6	171 Er	1_10 2	1_10 6
131 Te	1_10 2	1_10 5	170 Tm	1_10 3	1_10 5
131m Te	1_10 1	1_10 6	171 Tm	1_10 4	1_10 8
132 Te	1_10 2	1_10 7	175 Yb	1_10 3	1_10 7
133 Te	1_10 1	1_10 5	177Lu	1_10 3	1_10 7
133m Te	1_10 1	1_10 5	181 Hf	1_10 1	1_10 6
134 Te	1_10 1	1_10 6	182 Ta	1_10 1	1_10 4
123 I	1_10 2	1_10 7	181 nj	1_10 3	1_10 7
125 I	1_10 3	1_10 6	185 nj	1_10 4	1_10 7
126 I	1_10 2	1_10 6	187 nj	1_10 2	1_10 6

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129 I	1_10 2	1_10 5	186 R	1_10 3	1_10 6
130 I	1_10 1	1_10 6	188 R	1_10 2	1_10 5
131 I	1_10 2	1_10 6	185 Os	1_10 1	1_10 6
132 I	1_10 1	1_10 5	191 Os	1_10 2	1_10 7
133 I	1_10 1	1_10 6	191m Os	1_10 3	1_10 7
134 I	1_10 1	1_10 5	193 Os	1_10 2	1_10 6
135 I	1_10 1	1_10 6	190 Ir	1_10 1	1_10 6
131m Xe	1_10 4	1_10 4	192 Ir	1_10 1	1_10 4
133 Xe	1_10 3	1_10 4	194 Ir	1_10 2	1_10 5
135 Xe	1_10 3	1_10 10	191 Pt	1_10 2	1_10 6
129 Cs	1_10 2	1_10 5	193m Pt	1_10 3	1_10 7
131 Cs	1_10 3	1_10 6	197 Pt	1_10 3	1_10 6
132 Cs	1_10 1	1_10 5	197m pt	1_10 2	1_10 6
134m Cs	1_10 3	1_10 5	198 Au	1_10 2	1_10 6
134 Cs	1_10 1	1_10 4	199 Au	1_10 2	1_10 6
135 Cs	1_10 4	1_10 7	197 Hg	1_10 2	1_10 7
136 Cs	1_10 1	1_10 5	197m Hg	1_10 2	1_10 6

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137 Cs 1	1_10 1	1_10 4	203 Hg	1_10 2	1_10 5
138 Cs	1_10 1	1_10 4	200 Tl	1_10 1	1_10 6
131 Ba	1_10 2	1_10 6	201 Tl	1_10 2	1_10 6
202 Tl	1_10 2	1_10 6	U-natural	1_10 0	1_10 3
204 Tl	1_10 4	1_10 4	239 U	1_10 2	1_10 6
203 Pb	1_10 2	1_10 6	240 U	1_10 3	1_10 7
210 Pb 1	1_10 1	1_10 4	240 U (1)	1_10 1	1_10 6
212 Pb 1	1_10 1	1_10 5	237 Np (1)	1_10 0	1_10 3
206 Bi	1_10 1	1_10 5	239 Np	1_10 2	1_10 7
207 Bi	1_10 1	1_10 6	240 Np	1_10 1	1_10 6
210 Bi	1_10 3	1_10 6	234 Pu	1_10 2	1_10 7
212 Bi 1	1_10 1	1_10 5	235 Pu	1_10 2	1_10 7
203 Po	1_10 1	1_10 6	236 Pu	1_10 1	1_10 4
205 Po	1_10 1	1_10 6	237 Pu	1_10 3	1_10 7
207 Po	1_10 1	1_10 6	238 Pu	1_10 0	1_10 4
210 Po	1_10 1	1_10 4	239 Pu	1_10 0	1_10 4
211 At	1_10 3	1_10 7	240 Pu	1_10 0	1_10 3

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220 Rn (1)	1_10 4	1_10 7	241 Pu	1_10 2	1_10 5
222 Rn (1)	1_10 1	1_10 8	242 Pu	1_10 0	1_10 4
223 Ra (1)	1_10 2	1_10 5	243 Pu	1_10 3	1_10 7
224 Ra (1)	1_10 1	1_10 5	244 Pu	1_10 0	1_10 4
225 Ra	1_10 2	1_10 5	241 Am	1_10 0	1_10 4
226 Ra (1)	1_10 1	1_10 4	242 Am	1_10 3	1_10 6
227 Ra	1_10 2	1_10 6	242m Am (1)	1_10 0	1_10 4
228 Ra (1)	1_10 1	1_10 5	243 Am (1)	1_10 0	1_10 3
228 Ac	1_10 1	1_10 6	242 Cm	1_10 2	1_10 5
226 Th (1)	1_10 3	1_10 7	243 Cm	1_10 0	1_10 4
227 Th	1_10 1	1_10 4	244 Cm	1_10 1	1_10 4
228 Th (1)	1_10 0	1_10 4	245 Cm	1_10 0	1_10 3
229 Th (1)	1_10 0	1_10 3	246 Cm	1_10 0	1_10 3
230 Th	1_10 0	1_10 4	247 Cm	1_10 0	1_10 4
231 Th	1_10 3	1_10 7	248 Cm	1_10 0	1_10 3
Th-natural including 232 Th	1_10 0	1_10 3	249 Bk	1_10 3	1_10 6
234 Th (1)	1_10 3	1_10 5	246 Cf	1_10 3	1_10 6

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230 Pa	1_10 1	1_10 6	248 Cf	1_10 1	1_10 4
231 Pa	1_10 0	1_10 3	249 Cf	1_10 0	1_10 3
233 Pa	1_10 2	1_10 7	250 Cf	1_10 1	1_10 4
230 U (1)	1_10 1	1_10 5	251 Cf	1_10 0	1_10 3
231 U	1_10 2	1_10 7	252 Cf	1_10 1	1_10 4
232 U (1)	1_10 0	1_10 3	253 Cf	1_10 2	1_10 5
233 U	1_10 1	1_10 4	254 Cf	1_10 0	1_10 3
234 U	1_10 1	1_10 4	253 Es	1_10 2	1_10 5
235 U (1)	1_10 1	1_10 4	254 Es	1_10 1	1_10 4
236 U	1_10 1	1_10 4	254m Es	1_10 2	1_10 6
237 U	1_10 2	1_10 6	254 Fm	1_10 4	1_10 7
238 U (1)	1_10 1	1_10 4	255 Fm	1_10 3	1_10 6

(1) Radionuclides and their radioactive descendants included in secular balance:

Radionuclide name	Descendants (daughters)
1	2
90 Sr	90 Y
93 Zr	93 mNb
97 Zr	97 Nb

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106 Ru	106 Rh
137 Cs	137 mBa
134 Ce	134 La
144 Ce	144 Pr
140 Ba	140 La
212 Bi	208 Tl (0,36), 212 Po (0,64)
210 Pb	210 Bi, 210 Po
212 Pb	212 Bi, 208 Tl (0,36), 212 Po (0,64)
220 Rn	216 Po
222 Rn	218 Po, 214 Pb, 214 Bi, 214 Po
223 Ra	219 Rn, 215 Po, 211 Pb, 211 Bi, 207 Tl
224 Ra	220 Rn, 216 Po, 212 Pb, 212 Bi, 208 Tl (0,36), 212 Po (0,64)
226 Ra	222 Rn, 218 Po, 214 Pb, 214 Bi, 214 Po, 210 Pb, 210 Bi, 210 Po
228 Ra	228 Ac
226 Th	222 Ra, 218 Rn, 214 Po
228 Th	224 Ra, 220 Rn, 216 Po, 212 Pb, 212 Bi, 208 Tl(0,36), 212 Po(0,64)
229 Th	225 Ra, 225 Ac, 221 Fr, 217 At, 213 Bi, 213 Po, 209 Pb
Th-natural	228 Ra, 228 Ac, 228 Th, 224 Ra, 220 Rn, 216 Po, 212 Pb, 212 Bi, 208 Tl(0,36), 212 Po (0,64)
234 Th	234 mPa
230 U	226 Th, 222 Ra, 218 Rn, 214 Po
232 U	228 Th, 224 Ra, 220 Rn, 216 Po, 212 Pb, 212 Bi, 208 Tl (0,36), 212 Po (0,64)
235 U	231 Th
238 U	234 Th, 234 mPa
U-natural	234 Th, 234 mPa, 234 U, 230 Th, 226 Ra, 222 Rn, 218 Po, 214 Pb, 214 Bi, 214 Po, 210 Pb, 210 Bi, 210 Po
240 U	240 mNp
237 Np	233 Pa
242 mAm	242 Am
243 Am	239 Np
