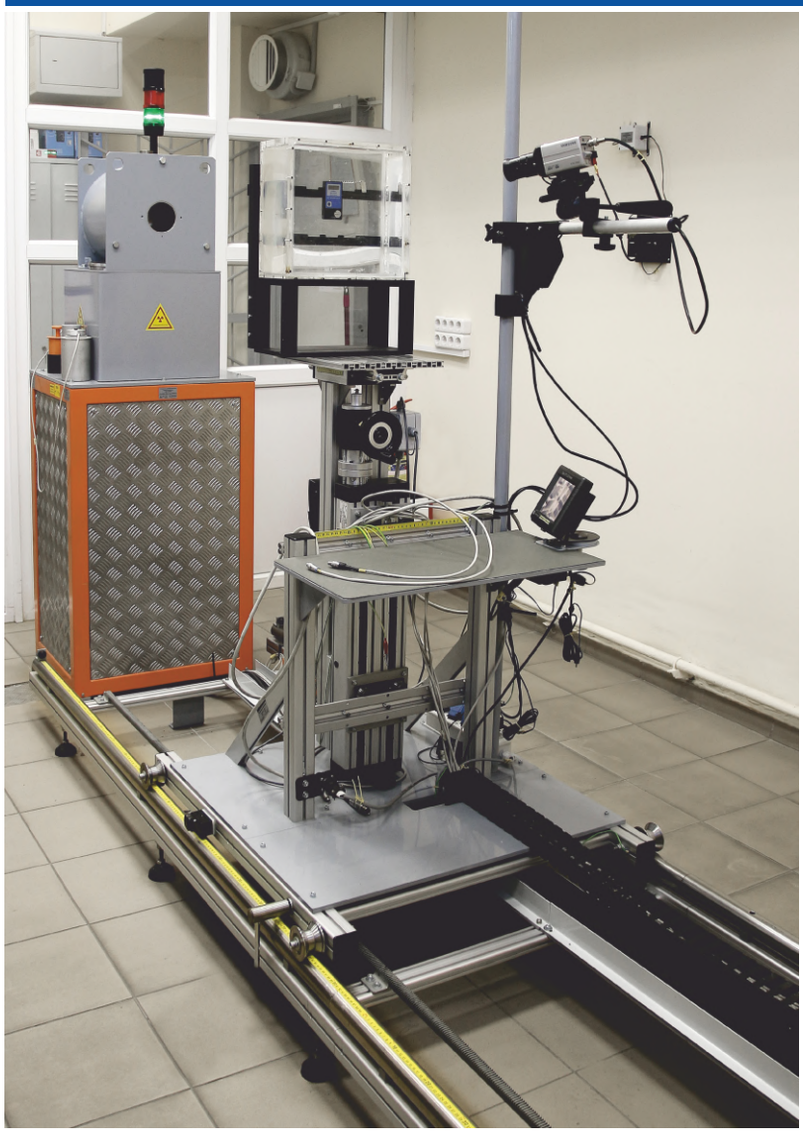
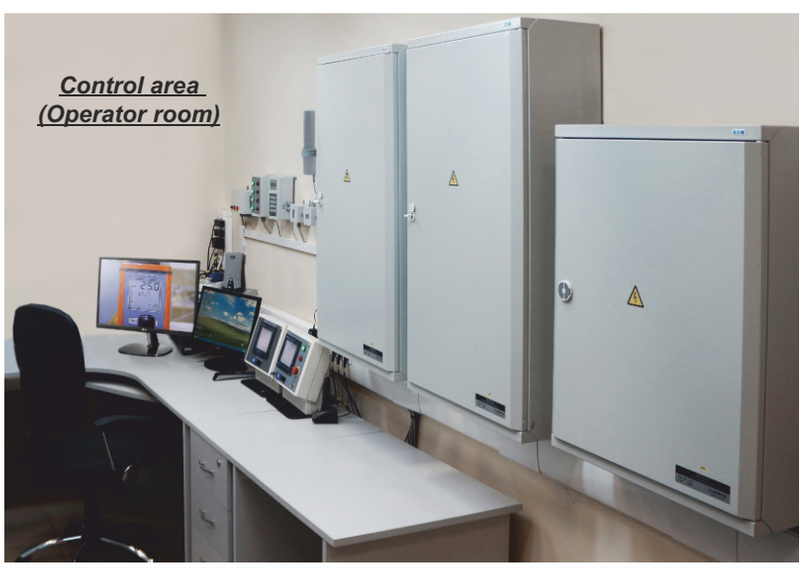
AT110 Gamma Beam Irradiator with Calibration Bench



Reference gamma beam irradiator with calibration bench is designed to simulate and transmit air kerma, exposure dose, individual dose equivalent and dose equivalent units and their respective rates into working standards and measurement instruments during verification, calibration and test procedures.



Control area (Operator room)

Application

Metrology support of gamma dosimetric measurements

- Verification and calibration in metrology service facilities
- Calibration procedures in Secondary Standard Dosimeter Laboratories (SSDL)
- Calibration of measurement instruments in the process of development, manufacturing and production
- Applied metrology

Features

- Typical collimating unit according to GOST 8.087-2000
- Revolving drum magazine with chambers for sources
- Software control of sources travel from exposure position to storage position
- Programmable control of moving platform travel in fully automatic and manual mode
- Digital servos for positioning of moving platform and sources
- Control system based on personal computer and operator panel with automatic calibration functions
- Lasers and calibrated gauge bars are used for detector centring in radiation beam
- Readouts are taken using video surveillance system or instrument interface
- Safe braking and trip limiting of moving platform
- Three power outlets (230 VAC, 50 Hz) with insulated neutral on moving platform for verified instruments
- Alarm and interlock system to provide secure operation of laboratory
- Measurement of radiation environment in working chamber and adjacent rooms
- Emergency power source is available
- Loading of sources into laboratory using transfer container and accessories
- Layout design and calculation of radiation parameters for client's premises

Operating principle

The principle of facility operation is based on the use of ^{137}Cs radionuclide sources.

The facility implements the irradiation schemewith fixed irradiator and calibration bench on linear moving platform.

The range of gamma radiation dose rate values is achieved by set of sources with different activities and varying the distance between source and detector. Field shape can be changed by varying the distance between source and detector or diameter of collimator channel.

Automatic functions of irradiator and calibration bench are remotely controlled from operator room.

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Specifications	*AT110*
Gamma radiation source, maximum activity	^{137}Cs – 1.3·10^{12} Bq (35 Ci)
Number of sources	Up to 5
Ranges - Air kerma rate - Exposure dose rate - Ambient dose equivalent rate, Individual dose equivalent rate	 0.25 μGy/h – 350 mGy/h 30 μR/h – 40 R/h 0.30 μSv/h – 420 mSv/h
Intrinsic relative error for certification as a working standard of 1-st category (2-nd category)	±2.5% (±5%) [Air kerma rate and exposure dose rate] ±4.5% (±7%) [Ambient dose equivalent rate and individual dose equivalent rate]
Actual range limits and error are determined by calibration. *Source composition and range can be adjusted by agreement with customer.*	

Collimator channel	Ø60 mm / Ø90 mm, length 150 mm
Radiation beam axis height from floor level	(1500±30) mm
Working distances interval R	0.5 – 8 m
Diameter of uniform radiation field at R=1 m (Non-uniformity ±6%) - For Ø60 mm collimator - For Ø90 mm collimator	 300 mm 450 mm
Time of source transfer into operational position	≤15 s
Radiation background at 1 m from irradiator in storage position	≤0.5 μSv/h
Reproducibility of moving platform position on X coordinate	<0,5 mm
Absolute error of detector position in radiation beam	≤0.002R
Speed of platform travel	0.9 mm/s – 26 cm/s
Travel range of platform workbench: - Vertically from floor level - Horizontally - Along radiation beam axis Across radiation beam axis - About vertical axis with 15° steps	 1140 – 1480 mm ±50 mm ±140 mm 360°
Weight of equipment on: - Workbench - Moving platform	 ≤35 kg ≤75 kg
Initialisation time	≤1 min
Continuous run time	≥24 h
Power supply	(230 ±23) V, (50±1) Hz
Power consumption - Facility - Auxiliary equipment	 ≤600 VA ≤400 VA
Operation temperature range	15°C – 35°C
Relative air humidity	≤80%
Dimensions (maximum) Irradiator Base frame of calibration bench Moving platform Workbench Operator station equipment (footprint)	 640x540x1700 mm Up to 9000x860x220 mm 910x855x1820 mm 270x330 mm 3500x1500 mm
Weight (not greater) Irradiator Base frame of calibration bench Moving platform Transfer container - Operator station equipment	 800 kg 135 kg 70 kg 100 kg 150 kg
Dimensions of working chamber room (minimum)	10x5x3.5 m

Complete set

- Remotely-controlled irradiator:
  - Irradiator
  - Control unit, control panel
  - Accessories including source holders and tools for source holder assembling, transfer container, pneumatic gripper and lift
- Calibration bench:
  - Base, moving platform, control unit, control panel
  - Video surveillance system for measurements
  - Laser targeting system
  - Accessory set for unit performance monitoring
  - Accessory set with clamps for attaching instruments to working table and 300x300x150 mm phantom
- Alarm and interlock system
- Radiation monitoring service
- AC power adapter
- Uninterrupted power supply
- Desktop computer
- User's manual
- "UDG software solution"
- Accessories kit
- Spare parts kit
- Calibration procedure
- Optional accessories:
  - AT5350/1 Standard dosimeter (Intrinsic error under ±3%)
  - AT1102 Comparator (Intrinsic error under ±5%)

The facility complies with:
GOST 8.087-2000, GOST 27451-87,
Safety requirements of IEC 61010-1:2010,
EMC requirements of EN 55011:2009,
IEC 61000-4-2:2008, IEC 61000-4-3:2008,
IEC 61000-4-4:2004, IEC 61000-4-5:2005,
IEC 61000-4-6:2008, IEC 61000-4-11:2004

Design and specifications are subject to change without notice

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