AT130 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.



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 6 sources
- Software control of sources travel from exposure position to storage position
- Programmable control of moving plate positioning in fully automatic or manual mode
- φ and Z servo motors are used for positioning sources inside irradiator, and servomotor X is used for actuation of moving platform
- 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
- Meteorological meter on moving platform
- Intercom system for operator communication in working chamber and control room
- Three power outlets (230 VAC, 50 Hz) with insulated neutral on moving platform for verified instruments
- Available alarm and interlocks system ensures safety
- Measurement of radiation environment in working chamber and adjacent rooms
- Video surveillance of room with working chamber
- Safe braking and trip limiting of moving platform
- Emergency power source is available
- Loading of sources into Facility using transfer device, 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 ¹³⁷Cs radionuclide sources and optional ⁶⁰Co and ²⁴¹Am radionuclide sources.

The facility implements irradiation scheme with fixed irradiator and calibration bench on linear travelling platform.

The range of gamma radiation dose rate values is achieved by use of ¹³⁷Cs sources of different activities and varying the "source-detector" distance. Field shape can be changed by varying the distance between source and detector or diameter of collimator channel.

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



ATOMTEX "

INSTRUMENTS AND TECHNOLOGIES FOR NUCLEAR MEASUREMENTS AND RADIATION MONITORING

AT130 Gamma Beam Irradiator with Calibration Bench

	Specif	ications		
Gamma radiation sources.		¹³⁷ Cs – 9.6·10 ¹³ Bq (2600 Ci)		
maximum activity		⁶⁰ Co - 7.2·10 ⁹ Bq (0.2 Ci)		
			²⁴¹ Am – 1.6·10 ¹⁰ Bq (0.4 Ći)	
Generated ranges				
- Air kerma rate - Exposure dose rate		0.36 μGy/h – 48.6 Gy/h 40 μR/h – 5540 R/h		
- Ambient dose equivalent rate,			$40 \ \mu R/h = 5540 \ R/h$ 0.42 $\mu Sv/h = 58 \ Sv/h$	
Individual dose equivalent rate				
Intrinsic relative error		±2.5% (±5%) [Air kerma rate and exposure dose rate]		
certification as a working standard I-st category (2-nd category)		±4.5% (±7%) [Ambient dose equivalent rate and individual dose equivalent rate]		
Collimator channel	Ø60 mm/Ø90 mm, length 150 mm		Complete set	
Padiation beam axis beight from floor level	(1500±30) mm		 Remotely-controlled irradiator: 	
Radiation beam axis height from floor level			- Irradiator	
Working distances interval R	0.3 – 7 m		 Control unit, control panel Accessories including source holders and 	
meter of uniform radiation field at R=1 m			tools for source holder assembling, transfer	
(Non-uniformity ±3%) - For Ø60 mm collimator	160 mm		container and lift	
- For Ø90 mm collimator	260 mm		 Calibration bench: Base frame 	
Time of source transfer into operational position	≤20 s		- Moving platform	
			- Video surveillance system for measurements	
Radiation background at 1 m distance from irradiator in storage position	≤0.6 µSv/h		- Laser targeting system - Intercom system	
Reproducibility of moving platform position on X coordinate	<0.5 mm		 Accessory set for unit performance monitoring Accessory set with clamps for attaching instruments to working table and 	
Absolute error of detector position in radiation field	≤0.002R		300x300x150 mm phantom • AC power adapter	
Speed of platform travel	0.9 mm/s – 26 cm/s		 Uninterrupted power supply 	
Travel range of platform workbench:			 Alarm and interlock system Radiation monitoring service 	
- Vertically from floor level - Horizontally	1140 – 148	30 mm	Video surveillance system Accessories kit	
- Along radiation beam axis	±50 mm		 Spare parts kit 	
Across radiation beam axis	±140 mm		"UDG software solution"	
- About vertical axis with 15° steps	360°		Desktop computer Transfer device	
Weight of equipment on:			User's manual	
- Workbench - Travelling platform	≤35 kg ≤75 kg		 Optional AT5350/1 standard dosimeter (Basic error not more than ±3%) can be 	
Initialisation time	≤1 min		included into delivery set	
Continuous run time	≥24 h			
Power supply		V, (50±1) Hz	Laboratory corresponds to the following regulations:	
Power consumption	(200 220)	., (3021)112	GŎST R 8.804-2012	
Facility	≤1000 VA		(State verification schedule) GOST 8.087-2000	
Auxiliary equipment	≤400 VA		(Dosimetric installations. Methods of verification)	
Operation temperature range	15°C – 35°C		GOST 27451-87 (Ionizing radiation measuring means)	
Relative air humidity	≤80%		GOST 12.2.091-2012 (IEC 61010-1:2001) (Safety requirements)	
Dimensions and weight, maximum	040-040-4050		GOST R 51522.1-2011 (IEC 61326-1:2005)	
Irradiator Base frame of calibration bench		950 mm; 1370 kg 0x860x220 mm;35 kg	(Electromagnetic compatibility)	
Moving platform	910x855x1820 mm; 70 kg		NP-038-11 (Safety of radiation sources) SanPiN 2.6.1.13-25-2005	
Workbench	270x330 mm		(Radiation safety of powerful isotope plants)	
Control equipment (Area, weight) Transfer device) mm; 150 kg (1330 mm: 200 kg	Excility is listed in national registry of	
Transfer container	1250x765x1330 mm; 200 kg 270x409 mm; 200 kg		Facility is listed in national registry of measurement instruments of Russian Federation	
Dimensions of working chamber room, minimum	10x5x3.5 r	n	(Certificate No. 44761-15 in State Register	
			of approved measuring instruments of Russian Federation)	

Design and specifications are subject to change



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