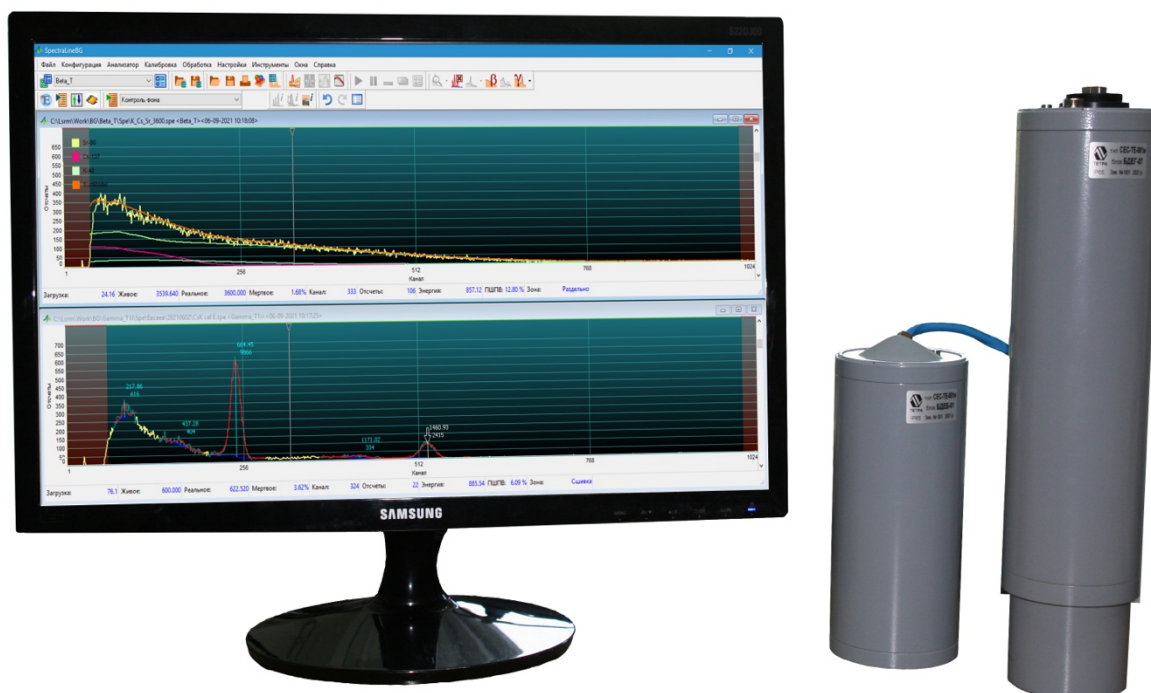


Spectrometer of beta, gamma radiation SES-TE-001m



Purpose and principle of operation

A spectrometer is aimed to measure of activity of beta-, gamma-emitting radionuclides in countable samples in the countable samples which has been obtained from the food samples, building material, environment, biological objects and etc.

Application field

The spectrometer is applied as a stationary measurement device in the laboratories for radiological control for the measurement of radionuclide activity in the test samples if there are the appropriate methodologies for measuring which has been certified in accordance with the established procedure.

Features

- A detector of beta-channel connects to a detector of gamma-channel with an internal dual-ported AD converter. The detector of gamma-channel connects to a USB input of personal computer. A quantity of channels in each port is 1024.
- The spectrometer satisfies the requirements of electromagnetic compatibility according to: EN 55022:2017; EN 61000-4-2:2009; EN 61000-4-3:2006/A2; EN 61000-4-4:2012; EN 61000-4-5:2014/A1:2017; EN 61000-4-6:2014/AC:2015; EN 61000-4-8:2017; EN 61000-4-11:2014/A1:2017.
- Application conditions.
 - ambient temperature from + 10 to + 40 °C;
 - atmospheric pressure from 84 to 106,7 kPa;
 - upper value of relative humidity 75 % at 30 °C and at lower temperature with water condensation;
 - ambient background of gamma-radiation is no more 0,15 $\mu\text{Sv/h}$.

Main technical characteristics

Detector type <ul style="list-style-type: none"> - beta channel – scintillation plastic - gamma channel – scintillation counter NaI(Tl) - full width at half maximum according to Cs-137 (662 keV) 	$\varnothing 70 \times 10$ mm $\varnothing 63 \times 63$ mm 8%.
Energy detection range: <ul style="list-style-type: none"> - beta radiation - gamma radiation 	200 keV...2400 keV 100 keV ...3000 keV
Minimum measured activity: <ul style="list-style-type: none"> - in the countable sample with density 1 g/cm³ in geometry «15 cm³» during measurement time 3600 s (at radiation background is not more 0,15 $\mu\text{Sv/h}$) for P = 0,95: <ul style="list-style-type: none"> - as per Sr-90 – no more - as per Cs-137 – no more - as per K-40 – no more - in the countable sample with density 1 g/cm³ in geometry « Marinelli 1 l» during measurement time 3600 s (at radiation background is not more 0,15 $\mu\text{Sv/h}$) for P = 0,95: <ul style="list-style-type: none"> - as per Ra-226 – no more 	0,5 Bq/sample 1,6 Bq/sample 0,9 Bq/sample 40 Bq

- as per Th-232 – no more - as per Cs-137 – no more	4 Bq 3 Bq
Limits of the permissible basic relative error of radionuclide activity measurement for volumetric geometry (P = 0,95) is not more	± 30%
Integral nonlinearity of measuring path is not more	1 %
Instability of calibration characteristics for 8 hours of continuous work less than	± 0,5 %
Maximum statistical input load	10 ⁴ s ⁻¹
Warm-up time of spectrometer, no more	30 min
Uptime of spectrometer, no more	24 h
Power supply of printer and PC of spectrometer is provided from a single-phase alternating current network with voltage and frequency	from 187 to 242 V from 49 to 51 Hz
Consumption capacity, no more	250 VA
Mean time between failures of spectrometer, no more	20000 h
Average service life of spectrometer, no more	10 years
Dimensions and weight of component parts of spectrometer, no more: - radiation detector of beta-channel - lead shielding of beta-channel - total weight of beta-channel - radiation detector of gamma-channel - lead shielding of gamma-channel - total weight of gamma-channel	Ø87×280 mm 220×180×173 mm 45 kg Ø87×435 mm 370×574×710 mm 125 kg
Protection degree of radiation detectors of beta- and gamma-channels	not worse IP54

Purpose indicators:

- According to the impact on the safety of nuclear power plants the spectrometer belongs to the elements of normal operation, which do not affect the NPP safety (according to NP 306.2.141 safety class 4H, according to NP 306.2.202 safety class 4).
- According to a noise immunity according to SOU NAEK 100, the spectrometer belongs to the group of execution of technical equipment of nuclear power plants designed to operate in an electromagnetic environment of mild severity.

Delivery set

Standard:

- a gamma radiation detector with a connection cable USB PX0840/B;
- a lead shielding of gamma-channel 3CF-01;
- the Marinelli vessels 3...5 pcs;
- a control sample with a passport;
- a personal computer with licensed Windows 10 installed;
- a printer A4;
- a mains filter-extension;
- SpectraLineBG. Software with individual access key and necessary drivers;
- a product status record;
- an operation manual;
- SpectraLineBG1.6. Description of the main functions. User's manual;
- the appropriate methodologies for measuring which has been certified in accordance with the established procedure.

On request:

- a beta radiation detector with a connection cable;
- a lead shielding of beta-channel 3CB-01;
- a device for forming samples;
- a measuring cuvette 3...5 pcs;
- a control sample with a passport;
- the appropriate methodologies for measuring which has been certified in accordance with the established procedure.