Wide Range Segmented Gamma Scanner

G3250-220

Introduction

The ANTECH G3250-220 Wide Range Segmented Gamma Scanner (WR-SGS) builds on the segmented gamma scanning technique to measure the radionuclide content of waste drums. The technique is applicable to the measurement of activity from extremely low levels to extremely high levels and across a large range of densities. It is capable of measuring waste in a variety of matrices and chemical forms and is particularly applicable when the chemical form and the relationship between the nuclide and matrix are unknown.

As in the standard Segmented Gamma Scanner (SGS), the drum or sample is rotated about its vertical axis as horizontal segments are scanned. This allows for any inconsistencies in the matrix density whilst building a vertical profile of gamma-ray transmission and nuclide concentration.

The ANTECH G3250-220 is the first system to utilise both the storage of the transmission source within a tungsten shielded safe and a fully automated variable collimator aperture. The variable aperture collimator greatly increases the range of activity that can be assayed on one measurement system without the need for any manual alteration. Laser alignment during assembly and PLC motor control ensures optimum alignment of the transmission source and the detector once the source leaves the safe. When the transmission source is stored in the safe, there is typically a leakage of less than 5 µSv/hr near the surface of the safe. In the safe storage position the detector does not detect any gamma-rays from the transmission source.

The ANTECH implementation of the wide range segmented gamma scanning technique in the Model G3250-220 complies with the Standard Test Method for Non-destructive Assay by Segmented Passive Gamma-ray Scanning, ASTM number C1133-03.

Features

- Automated variable collimator aperture
- Safe storage of the transmission source when not in use
- Adjustable detector position for optimal measurement
- Multiple drum loading solutions available
- Optional built-in Geiger-Müller dose rate sensor
- Waste drum barcode recognition
- One or two pass measurement, emission and/or transmission
- Remote operation
- Windows based menu driven software for ease of use

Benefits

- Ability to detect both very low and very high activity gamma radiation on one measurement instrument
- Typical measurement time of 30 minutes although increased accuracy and precision can be achieved by extending the measurement time
- Non-destructive assay of up to a 200 litre drum with a 320 litre overpack drum option
- GammaScan SGS analysis complies with Standard Test Method for Non-destructive Assay by Segmented Passive Gamma-ray Scanning ASTM standard number C1133-0.3

Built-in Geiger-Müller dose rate sensor and waste drum barcode recognition

Specification

Dimensions (H x W x D)	2500 mm x 2900 x 1000 mm* (98.43 in x 114.17 in x 39.37 in*) *1700 mm (66.23 in) long conveyor illustrated in photo
Drum size	200 litre with 320 litre overpack
Variable collimator range	1 mm - 70 mm
Germanium Coax Detector efficiency	40% + typical (other detector efficiencies as an option)
Transmission source	^{152}Eu (typical)
Detectable activity range	Up to 10^{12} Bq per drum
Density range	Up to 2000 kg/m^3
Analysis software	Windows operating platform, GammaScan user interface
Digital MCA	ORTEC DSPEC Pro or DSPEC 50
Network connection	Ethernet or USB

	Calculated MDA for 360s emission 120s transmission 3 layers (Bq)	**ANTECH Calculated MDA for 0.3g/cc drum (kBq)**
^{60}Co	1.80E+02	0.54
^{58}Co	7.30E+02	2.19
^{134}Cs	7.50E+02	2.25
^{137}Cs	9.50E+02	2.85
^{110m}Ag	7.50E+02	2.25
^{54}Mn	8.30E+02	2.49
^{51}Cr	7.00E+03	21
^{124}Sb	6.70E+02	2.01
^{132}Te	9.10E+02	2.73
^{152}Eu	2.20E+03	6.6
^{235}U	1.40E+03	4.2
^{239}Pu	1.50E+07	4.50E+04
^{238}U	1.30E+05	390

ANTECH MDA data is based on background measurements made at customer site (low background room in power plant). A density 0.3 sawdust drum was measured (3 segments, 0.5 hr total measurement time) with no sources. Helical scanning was employed with 360 s emission and 120 s transmission per segment. The Currie Limit formulation (1 sigma) was used to calculate the MDA.

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