

Waste Assay Monitor "Waste-Scan" WAM-300



"Waste-Scan" monitors are used for spectrometric characterization of radioactive waste. It can be used in nuclear power plants, waste repositories, science facilities, reprocessing plants etc. for typically LLW/ILW measurements or free release.

Purpose

The "Waste-Scan"; WAM-300 is the latest generation of segmented waste assay monitors. It is intended mainly for quantitative and qualitative characterization of gamma emitting radionuclides in waste stored in drums of different height, shape and weight. Analysis of non cylindrical objects is also possible optionally.

Typical applications are assay of low or intermediate level waste to be stored in the repository or checking of the waste potentially suitable for free release.

Integrated sophisticated software enables the total and radionuclide specific activities evaluation and its distribution in the drum volume.

The WAM-300 is designed to detect nuclides typical for NPPs such as ^{134}Cs , ^{137}Cs , ^{60}Co , ^{54}Mn , ^{59}Fe , ^{95}Nb , ^{65}Zn , ^{95}Zr , ^{58}Co , ^{51}Cr , ^{144}Ce , ^{181}Hf , ^{103}Ru , etc. as standard. It can be optionally customized and used for other (difficult to detect) radionuclides.

Description

The monitor is composed of following parts:

- Mechanical part containing amongst others
 - Platform with a drum rotator, lifting mechanism and weighing sensors
 - Fixed part with spectrometric detector shielding, collimator and shutter (and optionally with transmission source)
- Fast scan detector MDG and background dose rate detector MDG-02
- Spectrometric gamma detector (HPGe as standard, model depending on the application)
- Electronics including MCA for the processing of data from the detector
- Control and power supply switchboards which allow local manual control of the system, remote control and display PC with the application software and the database
- Basic calibration kit
- Optionally manual or automatic loading and/or feeding system

Main Advantages

- Design enabling optimization for specific customer's requirement
- Different detectors can be used for optimal performance and throughput at specific applications
- Fast scan feature and automatic shutter of the main detector allowing larger range of activities to be measured
- Full analysis and post-analysis of all acquired spectral data from each volume element with acquisition parameters
- Fully integrated software for total spectrum analysis
- Peak attenuation correction
- Automatic weighing of the drum as standard
- Quality analysis and control module to secure reliable data all the time

Standards and regulation used

ISO 14850-1:2004 - Nuclear energy – Waste-packages activity measurement; High resolution gamma spectrometry in integral mode with open geometry;

ISO 11929 – Determination of the detection limit and decision threshold for ionising radiation measurements, Parts 1, 3 and 8;

96/29/EURATOM – EU directive laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation.

Description

Platform with drum rotator and lifting mechanism

Each drum is weighed automatically before the measurement starts. During the measurement, the drum moves vertically and/or rotates at adjustable speeds.

Fast Scan & Shutter set

As the first step, before the characterization starts, the system performs fast scan of the drum by measuring the dose rate. Based on the result, the shutter of the main spectrometric detector is automatically adjusted. This feature allows the larger range of activities to be measured.

Detector shielding and collimator

The detection part of the system is provided with background shielding, a collimator and a shutter to achieve the conditions required for a reliable gamma quanta acquisition.

High resolution spectrometry

As standard a HPGe detector is used for the acquisition of the spectra of gamma emitting nuclides contained in waste. Data processing is done by digital signal processing and a multi-channel analyser (up to 64k).

Software

The data obtained and processed from the detector electronics are evaluated by sophisticated software. Spectra processing includes complete calibration with MCNP efficiency calibration, peaks parameters determination, nuclides identification with whole decay chain, activities calculation including corrections to waste nature etc. Results of the mathematical procedures showing activity distribution into partial volume elements can be visualized in 3D perspective. It contains also a quality analysis and control module to secure reliable data all the time.

Control system

The system can be manually controlled locally by the control and power supply switchboards and remotely from the PC (both manually and automatically). On this PC the spectrometric, device control and special waste assaying evaluation software modules are run.

Optional accessories

- Manually operated mechanical equipment for the loading of the drums;
- Different types of automatic and semi-automatic drum conveyors;
- Remote camera surveillance system;
- Bar code reader (for identification and tracking of the waste package);
- A printer connected to the PC for printing the protocols.

Specification

Detector

- Detector type HPGe, stand. efficiency 30%
- Typical range 3.7 kBq ~ 1 TBq
(100 nCi ~ 27 Ci)
- Measuring range with optional shutter up to 3 TBq
(81 Ci)
- Typical energy range 60keV ~ 10 MeV
- Typical Resolution at 122 keV < 850 eV
- Typical Resolution at 1330 keV < 1850 eV
- Typical Peak to Compton ratio 60:1
- Multichannel analyser up to 64k channels

Standard collimator

- Max. detector diameter 100 mm (3.93 in)
- Horizontal angle (shutter) 0 ~ 60°

Drum rotator

- Maximum drum weight 1000 kg (1 543 lb)
- Maximum drum diameter 610 mm (24.1 in)

Operating conditions

- Temperature 5 ~ 55°C (41 ~ 131°F)

Power supply 110/230VAC, 2 kW

**Dimensions
H x W x D** (2260 x 2650 x 1200) mm,
(89.3 x 104.8 x 47.4 in)

Weight 1 800 kg (3 968 lb)



Shielded transmission source container



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