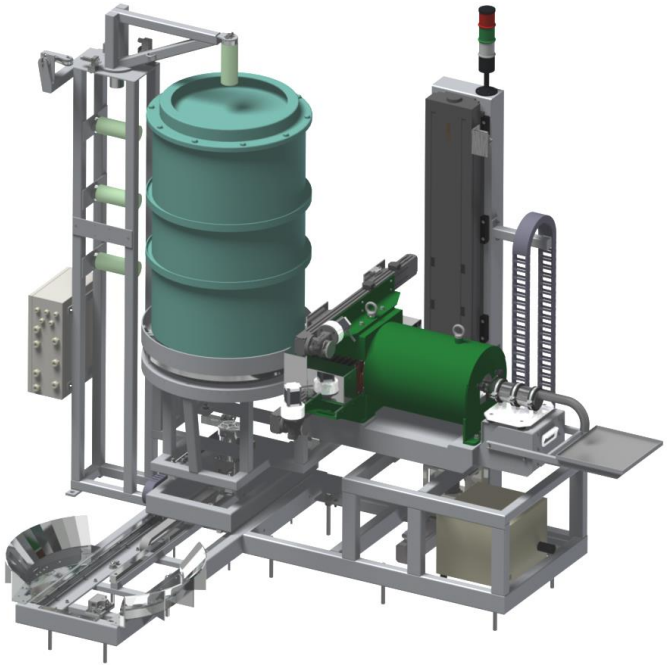
Waste Assay Monitor "Waste-Scan" WAM-202



"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-202 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 their distribution in the drum volume.

The WAM-202 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:
  - Mobile platform with a drum rotator and weighing sensors
  - Vertically moving part with spectrometric detector shielding, collimator and shutter with vertical lifting mechanism
- Fast scan detector SDG-12S and background dose rate detector SDG-04
- 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
- The part with the detector moving only vertically

Standards and Certificates

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

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Description

Mobile platform with drum rotator

Drum is located on the bench, which is moving horizontally toward the detector. Each drum is weighed automatically before the measurement starts. During the measurement, the drum rotates at adjustable speeds and detector is moving vertically.

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 with lifting mechanism

Detection part of system is shielded to ensure low-level background. Collimator and shutter are used to obtain required conditions for reliable gamma-spectrometry measurement. The detector-collimator-shutter set is moving vertically during the measurement. The zone of measurement is divided into 9 main sectors. Each main sector is divided into 9 sub-sectors. Evaluation can be done from each of main sectors. Control software allows retrospective evaluation of each measured main sector.

The vertical movement motor is fitted with an electromagnetic brake which stops the assembly automatically in case of power failure to prevent fall, which could cause damage to the device or personal injury.

High resolution spectrometry

As standard a HPGe detector is used for the acquisition of the spectra of gamma emitting nuclides contained in waste. The typical measuring parameters (i.e. detection limits) depend on detector model/efficiency used. Data processing is done by digital signal processing and a multi-channel analyser (up to 64k channels).

Software

The data obtained and processed from the detector electronics are evaluated by sophisticated software. Spectra processing includes complete calibration with MCNP efficiency calibration module, peaks parameters determination, nuclides identification with whole decay chain, activities calculation including corrections to waste nature etc.

Control system

The system is operated remotely from the PC (both manually and automatically). On this PC the spectrometric, device control and special waste assaying evaluation software modules are run.

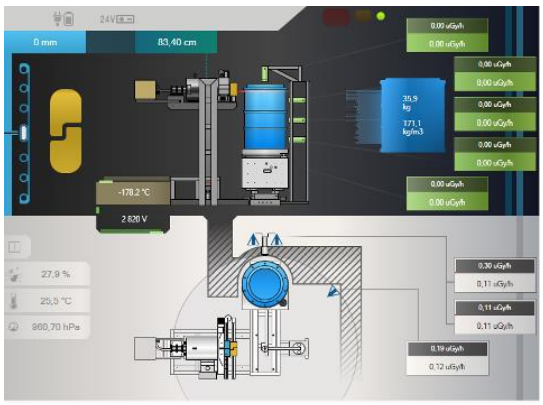
Maintenance operations can be manually controlled locally from the control and power supply switchboards.

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
- A printer connected to the PC for printing the protocols
- Sophisticated peak analysis for the quantitative gamma analysis of the fission products or TRU radionuclides

Specification

Detector	
Detector type	HPGe
Standard efficiency	30 %
Measuring range	3 kBq ~ 1 TBq (81 nCi ~ 27 Ci)
Energy range	60 keV ~ 10 MeV
Precision height adjustment	0.5 mm (0.02 in)
Resolution at 122 keV	< 850eV
Resolution at 1 330 keV	< 1850eV
Peak to Compton ratio	60:1
Drum specification	
Maximum weight	1500 kg (3300 lb)
Maximum diameter	650 mm (25.6 in)
Operating conditions	
Temperature	5 ~ 55 °C (41 ~ 131 °F)
Relative humidity	80 %
Operational pressure	86 ~ 106 kPa (654 ~ 795 mmHg)
Power supply	220~240 VAC / 3 A
Dimensions **W x H x D**	2145 x 2560 x 1670 mm (100.8 x 84.4 x 65.8 in)
Weight	app. 1 700 kg (3 750 lb)



Main screen of control SW

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