RADIOACTIVE CONTAMINATION ANALYSER
TYPE : RA1006

Technical Data

FEATURES :

- ❑ Measures RaC in Bq/gm.
- ❑ 100% foolproof test for identifying Radioactive Contamination.
- ❑ Highly recommended for medium / large scale steel industry having smelting furnaces.
- ❑ System will identify the type of nuclide in the sample and also quantifies contamination in Bq/g.
- ❑ System uses 3" x 3" NaI scintillation detector for gamma spectra analysis.
- ❑ 1K/4K/8K channel resolution.
- ❑ Amplifier and High voltage units are housed in a MINBIN.
- ❑ MCA card uses USB interface.
- ❑ Adequate lead shielding 60mm to cover the detector and sample has been provided.

Radioactive contamination (RaC) in steel industry is a serious issue of concern for all exporters, these days. Most of the portable hand held meters cannot measure contamination in Bq/g. Also hand held meters may fail to detect very low levels of contamination less than 0.4 Bq/g, unless carefully measured & interpreted. Where as RaC measurement by this Gamma ray spectroscopy system with MCA using 3"x3" NaI detector is a fool proof measuring system.

This is a most sensitive equipment designed to record Gamma Spectra of the sample under study. This consists of a 3" X 3" NaI Integral assembly scintillation detector, based Multi Channel Analyser System. Detector is covered by 60 mm lead shielding to reduce background. **This system can detect nuclide specific contamination in any steel/ alloy / casting sample & quantify it also**, in Bq/Kg or Bq/gm etc.

Sample of approximately 1.5 kg 2 kg can be placed on the detector for measurement, System gives nuclide peak & area under the peak will quantify the contents in Bq/Kg or Bq/gm.

The system configuration consists of
MINBIN with power supply (MB403)
Linear Amplifier (LA520)
High Voltage (HV501)
8K MCA, 3"x3" scintillation detector 50/60mm lead shielding, personal computer system, software for isotopic data acquisition & contamination report generation software.

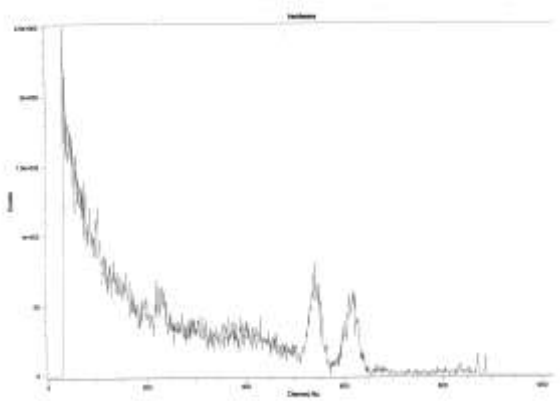

Figure shows Co-60 contaminated peak obtained by analysing a grinding ball sample from a steel manufacturing unit

SPECIFICATION

MINIBIN AND POWER SUPPLY MB 403:

Mini bin :

Accommodates SIX / EIGHT single bit modules or combination of multiple widths with Amphenol connectors. Minibin is primarily designed with the objective of conserving bench space and to achieve significant saving in cost of the Minibin based systems. Bussed wiring is provided to the power connectors to distribute +/- 12V and +/- 24V. A control panel with ON/OFF switch, low voltage test sockets is provided on the right extreme side of the bin.

Minibin Dimensions :

11.75"width X 11.00 depth (upto connectors) X 8.75" height.

Power supply :

This is either two and half bit module or a compact box type enclosure fitted at the back of this bin, which generates highly regulated D.C voltages.

Input : (230V + 10%) a.c, 50Hz.

D.C Output :

+12V @ 1A, -12V @ 1A, +24V @ 0.5A, -24V @ 0.5A 48 watts maximum.

Regulation : Better than +/- 0.1%

Noise & Ripple : Less than 3 mv

Stability :

+/- 0.5% after a 24 hr warmup at constant line, load & ambient temp.

HIGH VOLTAGE UNIT (HV 501) :

a. Output voltage variable continuously from 0V to 1500 volts
b. Output current (max) 1mA
c. Load & Line regulations : Better than 0.005% of full scale
d. Indefinite over load & short circuit protections and self recovery
e. Output ripple less than 20mv.
f. Dimensions : Single / Two bit module

LINEAR AMPLIFIER (LA 520) :

a. Input Polarity	:	Positive or Negative
b. Total gain (Typical)	:	1000 (approx)
c. Output (Unipolar)	:	0 to 8V
d. Max. output (Unipolar)	:	12V
e. Dimensions	:	Two bit module

LEAD SHIELD :

This Lead Shield is designed to shield 3”x3” NaI detector Scintillation Detectors of NUCLEONIX make. It is built-up of interlocking rings with bottom and top plates. The bottom ring is provided with a small opening so that the cables from the Scintillation Detector Pre-amplifier base could be taken out for connecting to the Gamma ray spectrometer counting system.

The inside of the lead shield is lined with Aluminium to minimise scattering.
Thickness 60mm, accommodate 3” scintillation detector including sample of 3” overall size.

MULTI-CHANNEL ANALYZER (8K MCA) :

Multi-Channel Analyzer (MCA) is an important part of nuclear spectroscopy system. The major requirement of MCA is for nuclear pulse height analysis in energy spectroscopy. The USB-MCA presented here, incorporates state of art technologies like FPGA,USB bus interface and precision analog electronics to meet the stringent system requirements in nuclear pulse spectroscopy. The resolution supported by the USB-MCA ranges from 256 channels to 8K channels selectable via software, making it suitable for all spectroscopy applications from low resolution (e.g. NaI-PMT) to high resolution (e.g.HP-Ge) systems.

The USB bus interface of the MCA provides an excellent connectivity with most of the new PCs and lap-top computers. The PHAST application software provided with the USB-MCA, seamlessly integrates with the hardware, featuring a range of standard functions required for analysis and acquisition.

SPECIFICATIONS :

Hardware features:

- MCA resolution: 256, 512, 1K, 2K, 4K and 8K channels.
- Spectrum memory : 128K bytes single port SRAM.
- Max counts / channel: 31 bit (2 Giga counts).
- Pulse processing time : 7 μs including ADC conversion time of 5 μs.
- Pile up rejection: Active high TTL input from spectroscopy amplifier
- DNL: + 1%
- INL : + 0.05% F.S.
- MCA Input: Single channel, 0 to +10 volts
- Power requirement: 5V, ~500 mA through USB cable directly (No external power supply required)

Software features:

Important software features include * spectrum display in two windows * marker selection (two) for ROI Detection & bracketing the peaks of interest, multiple ROI selection, delection of ROIs etc.,

- File Handling: Involves storing, loading of complete spectrum.
- Print: Print of Total graph, selective graph, peak report
- Acquisition: With pause option
- Erase: Erasing spectrum from memory
- Spectrum Analysis: Find peak, Shape calibration, Energy calibration, Approx Calib, Efficiency Calibration, Activity Calculation, etc.,
- Spectrum smoothing: 3,5,7,9 &11 point smoothing functions have been provided
- ROI Option: Insert, Delect, Hide Etc.,
- Scale: X-axis can be chosen as Channel number (or) Energy axis (in Kev) & Y - axis has range from 256 to 64M in binary steps with auto scaling option. Y-scale can be linear or log LLD, ULD & base line are soft selectable In built Isotope library for isotope selection & matching.

PERSONAL COMPUTER SYSTEM WITH PRINTER :

Any standard pentium IV computer configuration with printer is adequate to run MCA software.