

# FRM-06 Facility for Free Release of Large-Volume Material



**FRM-06 represents a complex monitoring facility which is used for the activity measurement and radionuclide analysis in waste material stored in standard roll-off container.**

**Based on the results it is possible to make a decision about next waste management.**

## Purpose

The FRM-06 facility is intended for the activity measurement and analysis of radionuclides which can be present in large volume waste material, e.g. clay, building debris, crushed concrete, etc., before its free release (clearance) into the environment.

Technology allows for monitoring of gamma radiation in the material which is stored in standard roll-off containers; its advantage is high line throughput.

Based on the measured activity concentrations and radionuclide distribution, it is possible to make a decision if material can be released into the environment, be decontaminated again, or stored as radioactive waste.

## Description

### Basic technological elements:

- Axle weighbridge for the differential weight calculation of the measured material;
- Container loading / off-loading portal;
- Railway portal with detection units (3 at top, 3 at bottom);
- Optical barrier system and limit sensor system to secure safe portal movement, optical and acoustic signalling, safety STOP button;
- Independent control room: PC with evaluation software, data archiving (database), and operator identification; and
- Electrical distribution and functional elements.

The method of waste manipulation and the specific spatial layout is realized according to the customer's requirements and is solved in detail in the framework of the project in cooperation with the customer.

## Main Advantages

- Detection and radionuclide analysis in waste material;
- High technology throughput – material loaded in roll-off containers;
- Mechanized manipulation, safety elements, injury risk minimization; and
- Possible connection to master monitoring system.

## Standards and Certification

**ISO 11932** - Activity measurements of solid materials intended for recycling, reuse and storing as non-radioactive waste.

**Act of National Council of SR no. 223/2001 Coll.** (on waste) and its implementation regulations of Ministry of the Environment no. 283/2001 Coll. and no. 284/2001 Coll.



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## Description

### Measurement process:

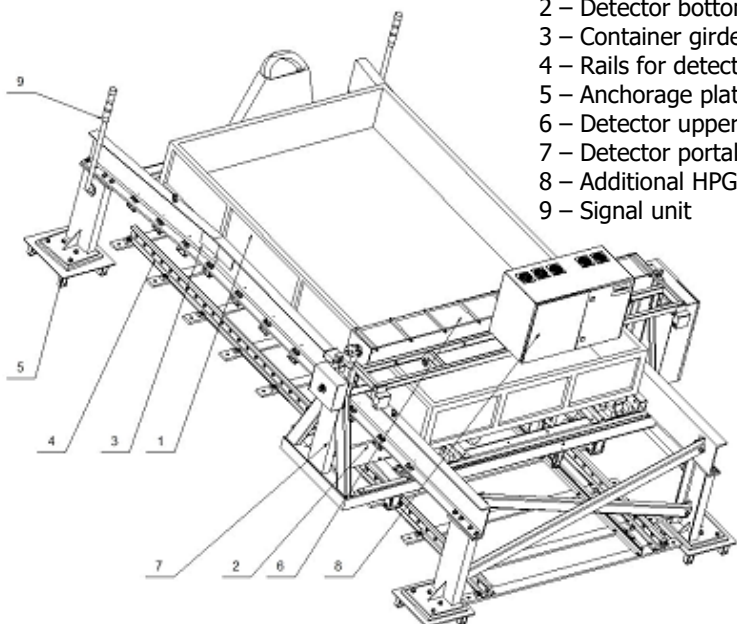
- Weighing the truck with roll-off container
- Container off-loading onto container girder
- Ultrasound measurement of material layout equality (the differences are bounded), corrections for each sector
- Detection of point sources (substantial non-homogeneity)
- Gamma activity measurement – single for each sector
- The measurement evaluation – determination of the measured material specific activity, printing the labels, docs, etc.
- Loading the container onto truck for subsequent treatment

The measuring process is controlled and monitored from the operator's room via PC. The supervising worker can intervene in the measuring process. They can, for example, interrupt the process in the case of equality material layout out limits or radiation non-homogeneity; they can set a particular measurement to be repeated as well. All particular measurement results are archived (usually in database system) and based on them the respective documentation is edited. A bar code identifying system speeds up the process and prevents administration mistakes.

A natural background dynamic measurement (without container, with the detector portal movement) is initialised by operator; a static natural background measurement is performed automatically during the idle time. Subsequent measured data correction is implemented in evaluating system. The detectors are checked in pre-set mode: basic functionality is tested and operating temperature adjusted (a heater on-off).

### Schema:

- 1 – Container
- 2 – Detector bottom block
- 3 – Container girder
- 4 – Rails for detector portal
- 5 – Anchorage plate
- 6 – Detector upper block
- 7 – Detector portal
- 8 – Additional HPGe detector
- 9 – Signal unit



## Specification

Container dimensions (L x W x H, max.)	3.9 x 2.2 x 1.05 m (12.8 x 7.2 x 3.45 ft)
Container weight	3 ~ 5 t (6600 ~ 11000 lb)
Measuring cycle time	approx. 22 min.
Workplace dimensions (L x W x H)	6.0 x 4.0 x 3.5 m (20 x 13 x 11.5 ft) /no axle weighbridge and no control room/
Power	230 V, 50 Hz, 2.7 kVA
Operating temperature	-15 ~ +30 °C
Operating rel. humidity	20 ~ 85 % (non cond.)

### Detectors

Scintillation, NaI(Tl)	6 pcs
Energy range	200 keV ~ 2 MeV
Sensitivity to reference point source ( <sup>137</sup> Cs)	0,013 s <sup>-1</sup> /Bq
Detectable specific activity	10 Bq/kg ~ 6 MBq/kg
Relative intrinsic error (for <sup>60</sup> Co, <sup>137</sup> Cs at homogeneous specific activity > 35 Bq/kg)	± 20 %
Lead shielding thickness	50 mm

### MCA-1000 multichannel analyser

Number of channels	1024
Channel capacity	232 pulses
Dead time	2.5 µs

## Models and Accessories

Type	Description
K1040	FRM-06 waste monitor, standard model

### Optional Accessories

- Additional HPGe detector for spectrometric determination of material radionuclide composition (incl. cooling, analyser and software)
- Video camera surveillance system

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