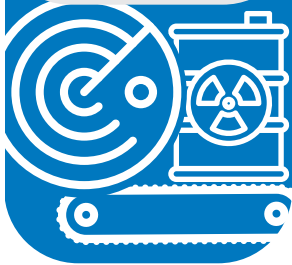


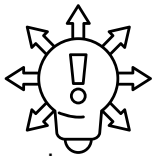


**ELSE**  
NUCLEAR



# FREE-AND 16

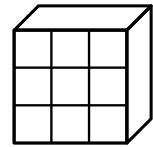
## SPECTROMETRIC STATION WITH SCINTILLATORS FOR CHARACTERIZATION OF RADIOACTIVE WASTE



Versatile structure



Efficient alternative to  
HPGe-based systems



Sub-sections  
measurements

Detectors: 16 NaI(Tl)  
scintillators 3"x3" with MCA

Weighting platform

Lead shielding/collimation  
for each detector

Container max dim.: 2 m<sup>3</sup>

Geometries database and  
release limits calculation

MDA (Cs-137): 0.04 Bq/g  
(15 min)

The **FREE-AND 16** spectrometric station is a robust and handy system designed to perform spectrometric analysis of waste materials, where the fine spectroscopy provided by HPGe-based systems is not needed.

The **FREE-AND 16** main components are:

- 16 NaI(Tl) 3"x3" scintillator detectors coupled to MCAs
- Lead shielding for each detector, which also defines the scintillator field of view (collimation)
- Mechanical support structure for detectors and weighting platform
- Control PC with user-friendly software interface

The detectors are distributed in two arrays of 4 units mounted on each side of the stainless steel support structure. The detectors' Field Of View (FOW) is defined by dedicated lead collimators, which act also as background shielding elements; therefore, each detector analyses a specific subsection of the sample, allowing identification of inhomogeneities and hot-spots.

The system can achieve an MDA of 0.04 Bq/g (15 minutes measurement, 300 kg of material, 1 g/cm<sup>3</sup> density).

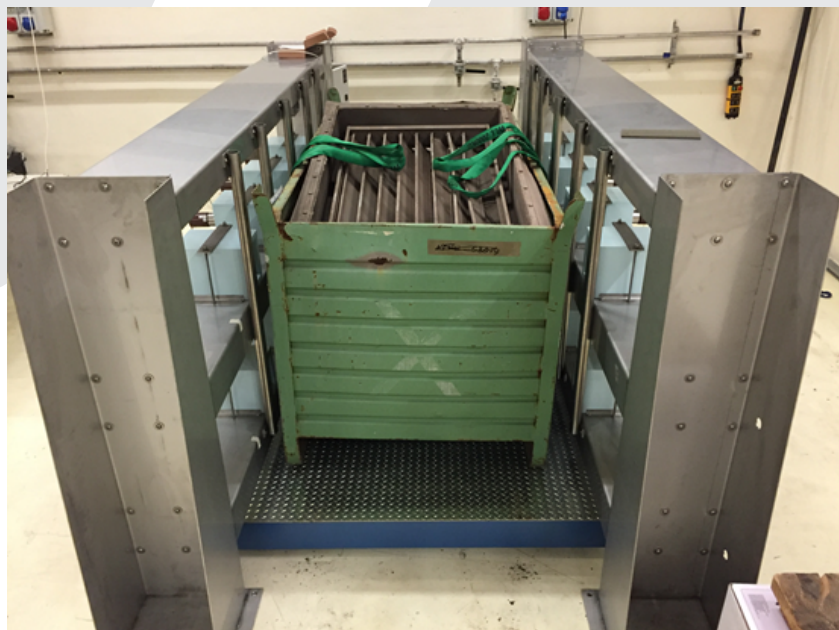
The mechanical structure is designed to well resist to the weight of the equipment and to accidental bumps.

The maximum payload of the weighting platform is 6000 kg.

Containers of different type and dimensions can be placed on the platform, up to 100 x 100 x 200 cm (WxHxD).

The operator interacts with FREE-AND 16 through a sophisticated yet easy-to-use software. To perform the measurement, the operator selects the proper geometry from a previously defined database, then sets the measurement time; the procedure automatically starts when the container is placed upon the weighting platform. Measurement reports are provided at the end of each scan. Thanks to the geometry and the configuration of the spectrometric station, FREE-AND 16 can be used for many applications, and it can be adjusted to the requirements as for dimensions and detectors number.

Container loading on FREE-AND 16 platform



## TECHNICAL SPECIFICATIONS

### Overall maximum dimensions

- WxHxD = 202 x 150 x 360 cm

### Detectors

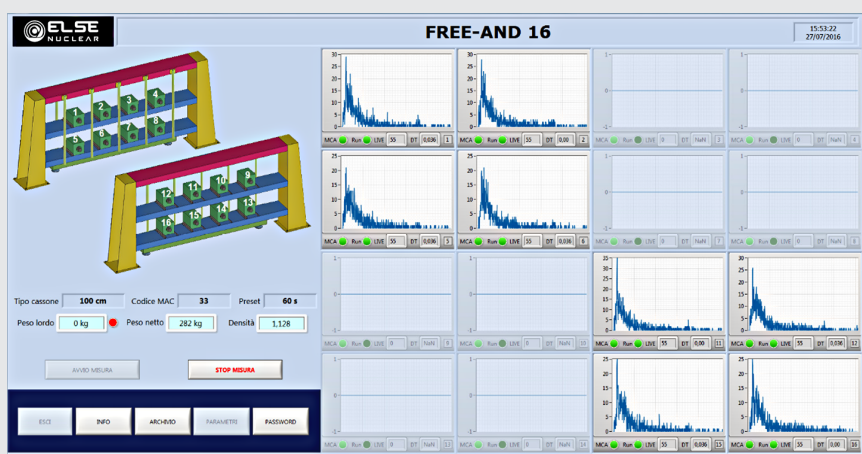
- Type: 3"x3" NaI(Tl) scintillator crystals coupled to PMT
- Number of units: 16 in total, 8 for each side, distributed over two arrays
- Energy resolution: < 7.5 % for Cs-137
- Compact MCA
- Lead shielding thickness: 5 cm

### Weighting system

- Maximum payload: 6000 kg
- Resolution: 1 kg
- Platform dimensions: 150 x 250 cm
- Steel platform and framework

### Management software

- Representation of detector – collimator – container
- Efficiency curves calculation
- Calculation of specific activity (Bq/g)
- Container geometry database
- Customizable release concentration limits
- Customizable analysis reports and printing options
- Calculation of the activities of non gamma-emitters using tabulated scaling factors
- Good functioning verification



FREE-AND 16 software interface

