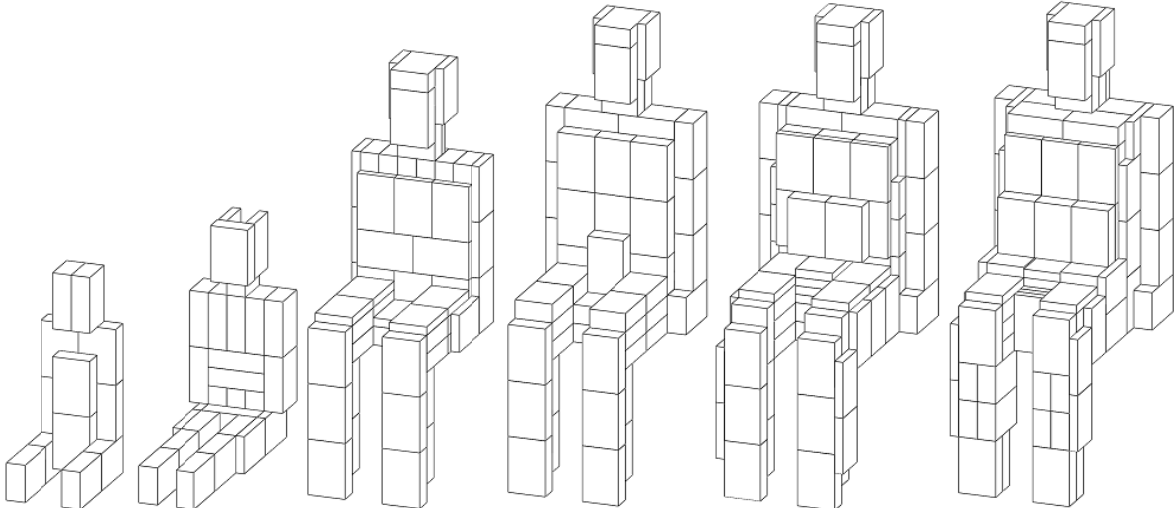
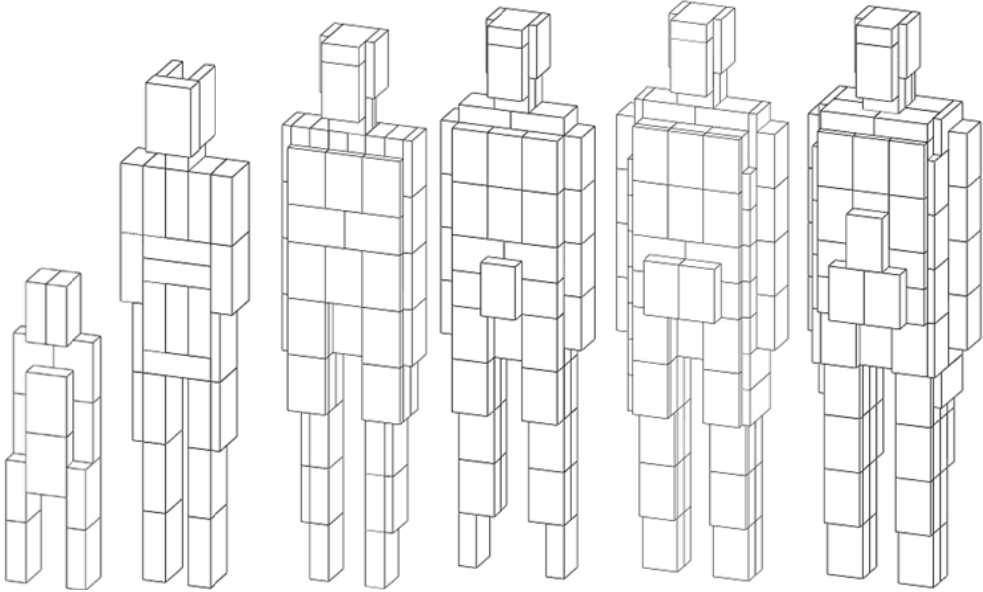
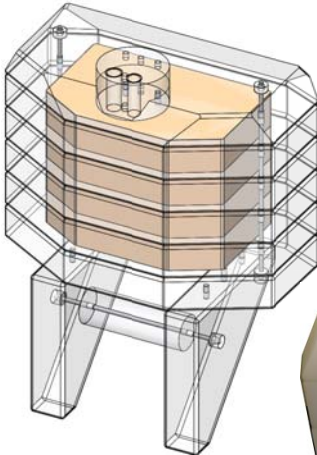
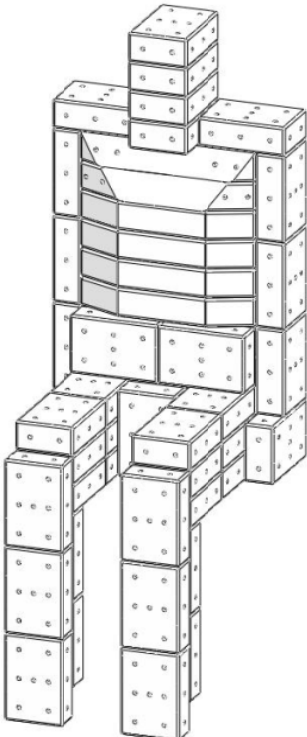


Universal whole body phantom, chest and neck phantom



Purpose

The Phantom uses for calibration of a whole body counters (WBC) for measuring the activity of radionuclides incorporated in human body with use of scintillation and semiconductor detectors of gamma-radiation in the energies range from 50 to 3000 keV.

The Phantom can be used in radiation medicine centers, nuclear power stations, research institutes, industrial hospitals and other institutions performing radiation monitoring of personnel and population, as well as by the Federal Agency for Technical regulation and metrology in order to comply with the Traceability Law.

Description

Universal phantom, adequate on interaction with gamma-radiation to biological soft tissue of the human body, containing uniformly distributed radionuclide.

Universal phantom is a collapsible construction and includes a set of components:

- Polyethylene blocks of a type "solid" (90pcs.) and "half"(40pcs.);
- Rod radionuclide sources of a type "nominal" (180pcs.) and "half" (80pcs.);
- Connectors (280pcs.);
- Fixings (10pcs.);
- Tripod;
- Mounting blade;
- Pusher;
- Pen-box;
- Chest (with left and right lungs) and neck (with thyroid glands) phantoms.

There are six types of the whole body phantom assembly with age and anthropometric characteristics given in table, for the three standard measurements geometries on whole body spectrometer: standing (lying), sitting and sitting bended.

Type of the phantom (reference sample index of the set)	Age and anthropometric characteristics of human body			
	Age, years	Weight, kg	Height cm	Average thickness, cm
F ₁	2	12	82,5	8,8
F ₂	6	24	121,0	10,9
F ₃	14	50	160,0	11,8
F ₄	≥ 18	70	170,5	14,3
F ₅	≥ 18	90	170,5	15,7
F ₆	≥ 18	110	170,5	19,4

The whole phantom with radionuclide sources forms a reference sample of activity of incorporated radionuclides uniformly distributed in the human body. This reference sample reproduces the gamma-radiation spatial-energy spectrum of incorporated

radionuclides to transfer the activity value of radionuclides to whole body spectrometers by means of its calibration.

Rod sources are made in the form of the sealed radioactive sources, which eliminates the intake of radionuclides into the environment by transportation, storage and use. Assembly of polyethylene blocks without the radionuclide sources forms the background samples (background phantoms) of the appropriate size.

The chest phantom is the construction from the polyethylene (polyurethane for ^{241}Am) units, which are the simulators of the adult man thorax. There is the polyurethane unit inside of the thorax simulator which is the lung simulator (2pcs). The radionuclides are distributed uniformly in the lung simulator.

The neck phantom consist reference volumetric sources (2pcs.) with radionuclide ^{133}Ba and it is simulator thyroid gland with incorporated radionuclide ^{131}I .

The chest phantom has connecting places for install the neck phantom.

Standard values of activity

Phantom	Activity, Bq			
	Barium-133	Caesium-137	Cobalt-60	Americium-241
Body	-	10000	-	-
Lungs	-	-	30 000	30000
Thyroid	20000	-	-	-