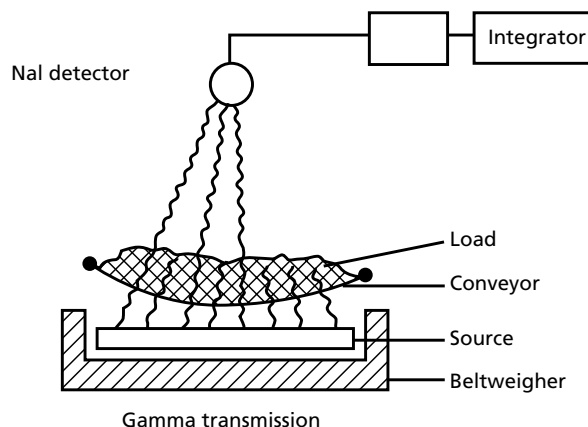


# Thickness gauging

## Transmission thickness technique

The source and the detector are placed on opposite sides of the material to be measured. Gamma or beta radiation transmitted through the sample is then directly related to the sample thickness, provided the density of the material is constant.

## Geometry



## Applications

### Gamma gauging

- Thickness gauging of sheet metal, glass, plastic, and rubber at thicknesses greater than 500mg/cm<sup>2</sup>.
- Belt weighing, giving mass (kg/m<sup>2</sup>) flowing on conveyor belt.

### Measure range

Nuclide	Activity	Belt weight	Gauging thickness	See page
Americium-241	10–1000mCi 0.37–37GBq	10–100 kg/m <sup>2</sup>	up to 10mm in steel	B1
Cesium-137	10–1000mCi 0.37–37GBq	30–200 kg/m <sup>2</sup>	up to 100mm in steel	B10
Cobalt-60	1–10mCi 37MBq–3.7GBq	100–400 kg/m <sup>2</sup>		B19

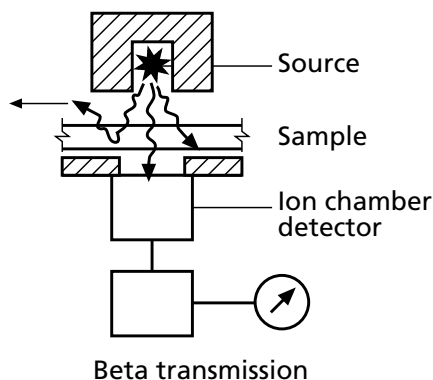
- Non contact measurement and control of liquids, solids or slurries in pipelines.

Nuclide	Activity	See page
Cesium-137	10–1000mCi 0.37–37GBq	B10

Specific source size is selected for each application.

# Thickness gauging

## Geometry



## Applications

### Beta gauging

- Thickness gauging of thinner plastics, thin sheet metal, rubbers, textiles and paper, e.g. 1–1000mg/cm<sup>2</sup>.
- The 'weighing' of cigarettes
- Measurement of dust and pollutant levels on filter paper samples, e.g. 0.1–200 mg/m<sup>3</sup> dust.

### Measure range

Nuclide	Half thickness (mg/cm <sup>2</sup> )	Useful measurement range (mg/cm <sup>2</sup> )	See page
Promethium-147	5	1 to 15	B30
Krypton-85	23	5 to 100	B27
Thallium-204	29	7 to 150	xx
Strontium-90/Yttrium-90	90	25 to 500	B33

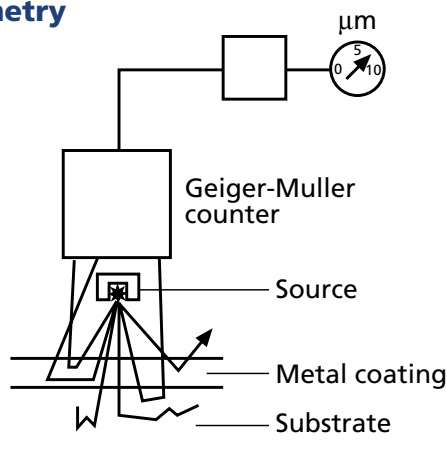
Activities according to nuclide and application, 1 to 1000mCi, 37MBq to 37GBq.

# Thickness gauging

## Beta backscatter thickness technique

The intensity of beta radiation which is scattered back from thin samples is related to thickness and atomic number.

### Geometry



Beta backscatter thickness gauging

### Applications

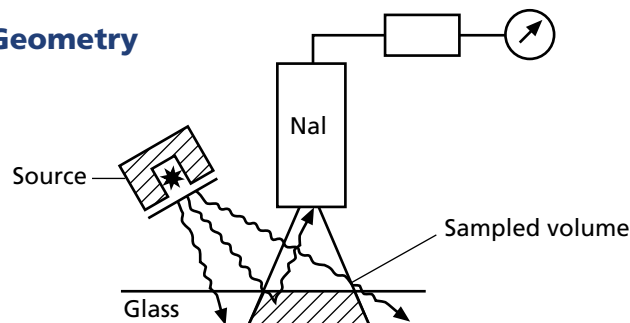
- The thickness gauging of paper plastic and rubber on steel rolls
- The measurement of a coating thickness on a substrate, providing there is sufficient difference in density or atomic number between coating and substrate. Coating range <math><1-100\mu\text{m}</math> depending on source and materials.

Nuclide	Activity	See page
Promethium-147	1-5mCi (37MBq)	B30
Krypton-85		B27
Thallium-204		xx
Strontium-90/ Yttrium-90		B33
Ruthenium-106/ Rhodium-106		xx

## Gamma backscatter thickness technique

The intensity of backscattered radiation from the sample is measured to give sample thickness or mean atomic number. Used for the measurement of substances of low atomic number for which transmission measurements are not sufficiently sensitive.

### Geometry

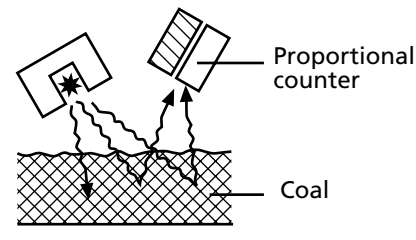


Gamma backscatter thickness gauging

### Application

#### Thickness gauging

- Measurement of light alloys, glass, plastics, rubbers for which beta sources are not suitable, e.g.



Mean atomic number (Z) gauging (ie. Where thickness is known).

greater than 500 mg/cm<sup>2</sup>, and access only available from one side. e.g. tube wall thickness gauging

#### Measurement range

Nuclide	Activity	Material	Thickness	Accuracy	See page
Americium-241	100mCi 3.7GBq	Glass	1-10mm	±0.03mm	B1
		Plastic	1-30mm	±0.05mm	
Cesium-137	50mCi 1.85GBq	Glass	>20mm	±0.1mm	B10