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3.5
Geometry corrections –
Software codes

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Study of efficiency transfer codes

- Codes were compared to each other for a set of well defined detector and sample geometries
- No reference to experimental data
- **Testing Efficiency Transfer Codes for Equivalence.**

  T. Vidmar et al., Applied Radiation and Isotopes 68 (2010) 355-359.

Codes and Modes

Computer Code	ET Implementation		Code Type	
	FEPE	TE	Specialized	General
ANGLE		x	x	
DETEFF 4.2	x	x	x	
EFFTRAN		x	x	
ETNA		x	x	
EGS4	x			x
GEANT 3.21	x	x		x
GESPECOR 4.2	x		x	
MCNP4C	x			x
MCNP5	x			x
MCNPX	x			x
PENELOPE 2003	x			x
PENELOPE 2008	x			x
PENELOPE PENCYL	x			x

Detector models

Parameter	Detector A	Detector B
Crystal type	p	n
Crystal material	Ge	Ge
Crystal diameter (including the side dead layer)	60	60
Crystal length (including the top dead layer)	60	60
Dead layer thickness (top and side)	1	0.0003
Hole diameter	10	10
Hole depth	40	40
Window diameter	80	80
Window thickness	1	0.5
Window material	Al	Be
Crystal-to-window distance	5	5
Housing length	80	80
Housing thickness	1	1
Housing material	Al	Al

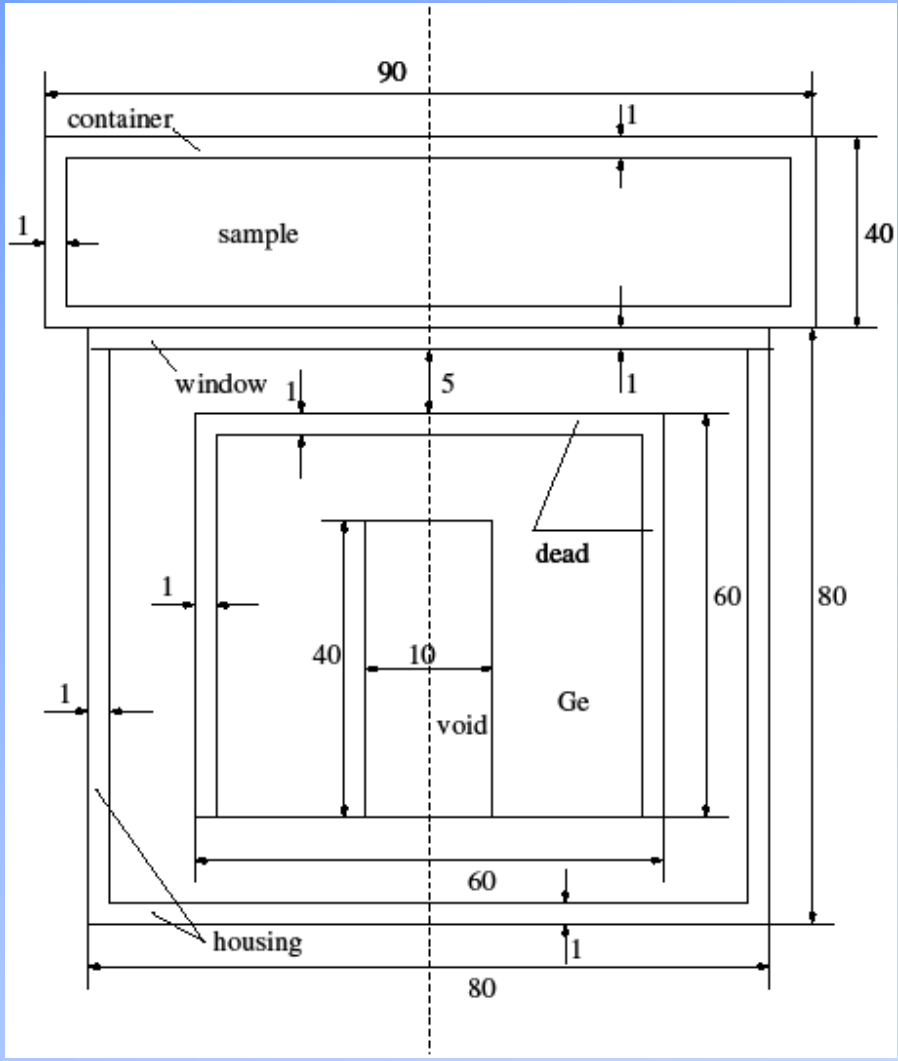
Samples

Parameter	Reference	Point	Soil	Filter
Sample diameter (including the container)	60	0.0	90	80
Sample height (including the container)	20	0.0	40	3
Sample material	Water	-	Quartz	Cellulose
Container-to-detector-window distance	0.0	1.0	0.0	0.0

Materials

Material	Density	Chemical formula
Ge	5.323	Ge
Al	2.700	Al
Be	1.848	Be
Water	1.000	H_2O
Quartz	1.400	SiO_2
Cellulose	0.200	$C_6H_{12}O_6$
Plastics (polystyrene)	1.050	C_8H_9

Water sample, Detector B



Results – Standard Deviations

Energy	Point A	Point B	Soil A	Soil B	Filter A	Filter B
20		1.4		**2.5**		1.2
45	0.5	0.9	0.9	0.5	0.9	0.8
60	0.6	0.5	0.9	0.9	1.0	0.5
80	0.6	0.4	0.9	0.7	0.8	0.5
120	0.5	0.4	0.7	0.5	0.6	0.6
200	0.7	0.7	0.6	0.6	0.6	0.8
500	0.8	0.9	0.8	0.3	0.6	0.9
1000	0.7	1.1	0.5	0.5	0.8	0.9
2000	0.7	1.0	0.7	0.6	0.8	0.8

Results – Maximum Deviations

Energy	Point A	Point B	Soil A	Soil B	Filter A	Filter B
20	-	**3.1**	-	**7.6**	-	**3.4**
45	1.2	1.7	**3.1**	1.3	**2.2**	1.4
60	1.2	1.1	1.9	**2.3**	**2.5**	1.0
80	1.2	1.0	2.0	1.6	2.0	1.1
120	0.9	0.8	1.8	1.6	1.2	1.1
200	1.1	1.4	1.2	1.6	1.2	1.4
500	1.4	1.9	1.7	0.5	1.1	1.5
1000	1.6	2.0	0.9	1.2	1.4	1.5
2000	1.9	1.9	1.5	0.9	1.4	1.3