Quality Assurance in Radiology and Medicine

D100

QRM-DEP-002

Dual Energy Phantom

QRM-DEP-002

The phantom is specially designed for dual energy (DE) purposes and can be used for quality assurance, scanner performance and evaluation of different DE post-processing techniques.

Research in computed tomography is currently focused on using dual energy to distinguish between different tissues on CT images.

The DEP-002 is the first phantom providing the opportunity to test CT-scanner performance and to evaluate different DE post processing techniques.

Therefore the phantom provides different virtual non-contrast lesions.

The different cylindrical lesions consists of Ca^{++} or iodine. For example, in the CT-images some lesion's CT-values (HU) can be detected as equal to the surrounding material at one energy (e.g. 120 kV) and with a contrast at other energies (e.g. 80 / 140 kV).

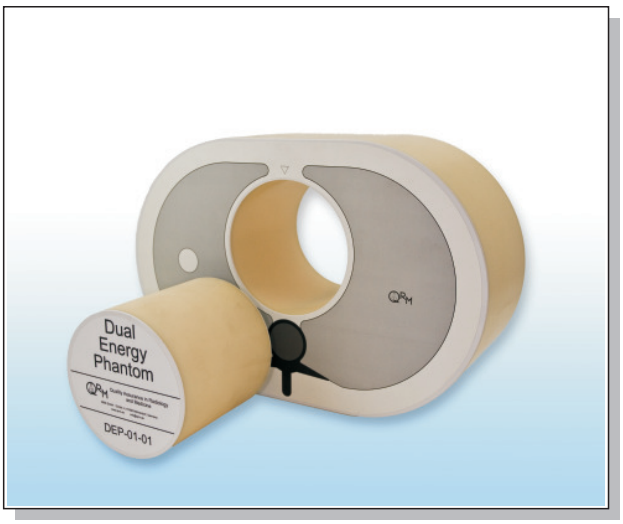
The DEP-002 fits to our additionally available thorax phantom. Extension rings, to simulate obese patients are available, as well.

Specifications

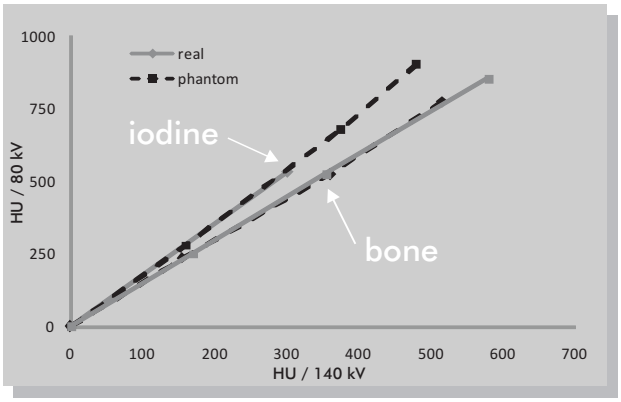
Phantom diameter ..... 100 mm
Phantom length ..... 100 mm
Phantom weight ..... 0.9 kg

Material ..... CT WATER® (0 HU @ 80 - 120 kV)
CT IODINE® (solid iodine)
CaHA (Ca^{++})

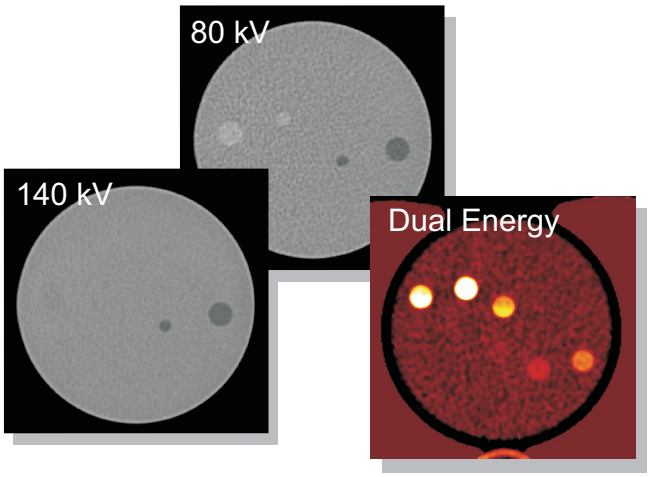
Specifications of lesions see next page!



Dual Energy Phantom with additionally available QRM-Thorax



The graph shows the excellent correlation between real and phantom material [1].



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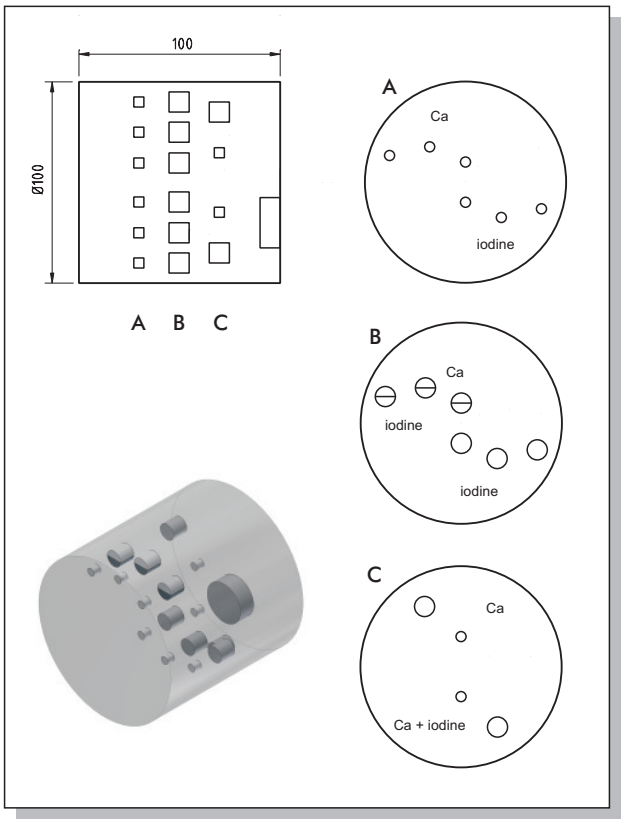
Dual Energy Phantom



Shematic view of the DE-Phantom

Specifications of lesions

Dimensions of the cylindrical inserts:

8 lesions ..... 10 mm
8 lesions ..... 5 mm
1 calibration cylinder ..... 25 mm

CT-values (HU) valid for 120 kV (± 5 HU):

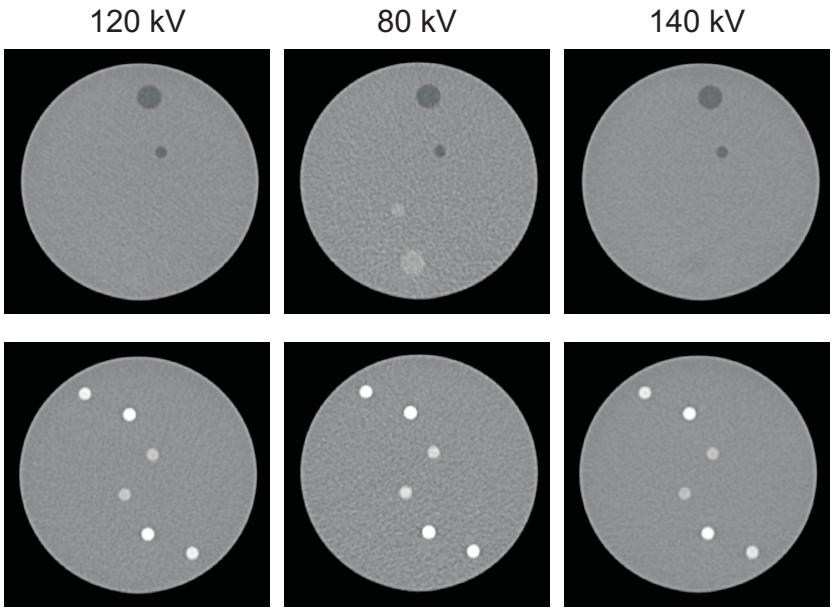
Phantom body ..... 0 HU at 80 - 140 kV

Layer A: Ca^{++} (200 HU, 400 HU, 590 HU)
Iodine (200 HU, 400 HU, 590 HU)

Layer B: Half cylinder:
Ca^{++} (200 HU, 400 HU, 590 HU)
Iodine (200 HU, 400 HU, 590 HU)
Full cylinder:
Iodine (25 HU, 50 HU, 100 HU)

Layer C: Ca^{++} (-140 HU, -140 HU)
Ca^{++} + Iodine (0 HU, 0 HU)

Calibration cylinder (0 HU at 80 - 140 kV)



Contrasts of Iodine and Ca++ lesions at different kV levels.

References: [1] Schmidt B, Sedlmair M, et al. Assessment of a Quality Assurance Phantom for Dual Energy CT. 2009, in Proceedings of Radiological Society of North America (RSNA) 95th Scientific Assembly and Annual Meeting, Chicago.

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