M10. CT number linearity

At all clinically used voltage settings, the CT number linearity should be assessed. The CT number linearity should be assessed by scanning a phantom containing uniform objects of known materials with a wide range of CT numbers. The measured CT numbers of the materials should be compared with the nominal values provided by the phantom manufacturer and with previously measured values. The measured values must remain within established limits for the CT scanner.

This is essentially the same as M9 but over the range of clinical CT numbers. Some manufacturers provide such phantoms; otherwise the RMI-Gammex ACR phantom can provide this test.

The first section of the ACR phantom has 5 cylinders of different CT number, which can be seen on the front of the phantom. Take an axial scan through this section. Use the image analysis software on the scanner or a PACS workstation to determine the average CT number.

On the right is a typical image of this section showing the ROIs. The image also shows the inclined plane indicators of a 5mm beam thickness, and the steel surface alignment beads which are also in this section.
Although this is not a mandatory test, it is recommended that this procedure be carried out on at least a semi-annual basis, as many clinical decisions are based upon an accurate knowledge of the CT value of the tissue involved.