

QUART DVT_AP

Test Phantom for Critical Examination & Manufacturer
Testing of Cone Beam CT and Dental 3D X-Ray Equipment



The QUART DVT_AP phantom is designed to be used as a technical tool for QA/QC testing in Cone Beam CT (CBCT), Dental Volume Tomography (DVT) and DICOM based 3D Imaging applications.

Only one exposure is required to collect all necessary parameters to determine the imaging quality for the x-ray equipment. After the exposure, the image is automatically evaluated through the unique QUART QA/QC software. The test results can be saved or printed out for documentation purposes.

The QUART DVT_AP phantom can be used as QA/QC tool for a wide range of 3D imaging equipment with field sizes from about 4x4cm field-of-view (FOV) and larger.

Customised phantom holders for easy and reproducible positioning are available.

Test Phantom

The phantom design is comparable with the design of a standard CT Head Phantom. However, the QUART DVT_AP has additional test objects which simulate structures and materials which are found in the specific anatomical region where the 3D x-ray imaging is applied to.

The standard materials, which are also integrated in the QUART DVT_KP routine test phantom due to their generic attenuation properties, are free air, soft tissue and bone equivalent. Additional material inserts are available as Enhanced Test Objects Set.

The Enhancement Set includes: Water Equivalent (density $1.05 \pm 1\%$), Soft Tissue Equivalent (Density $1.19 \pm 1\%$), Bone Equivalent (Density $1.4 \pm 1\%$), Bone+Tooth Equivalent (Density $2.17 \pm 2\%$). The equivalent objects are interchangeable and are inserted directly in the phantom centre. When imaged, the central configuration of the material equivalents directly puts them into the scanning centre of the x-ray equipment where the region-of-interest of an image is generally set.

The phantom body consists of 4 slabs. The parts which contain the test structures are solidly combined to ensure a good handling when used for QA/QC procedures. They can be disassembled easily for interchanging the test objects.

2 large cylindric slabs are added for scatter simulation purposes as scatter radiation measurement is also part of the Acceptance Test/Critical Examination of X-ray Equipment. Additionally, they may be used for uniformity testing in the fringe areas of images compiled with a large FoV.

The QUART DVT_AP has a modular set up and can be modified in case future Standards, a new National Standard, or specific manufacturer specifications should require additional test objects.

Test Procedure

The QC procedure is very easy and straight forward. It can be carried out by service experts as well as less experienced users.

After the phantom had been positioned in the scan centre, the exposure is initiated. After the exposure, DICOM slice images are directly loaded into the QUART DVT_tec software. The software will guide the user step-by-step through the evaluation process, collect all data from the test images and create a test protocol.

Since the application of the QUART DVT_AP phantom tends to a technical and scientific validation of CBCT X-Ray equipment, the associated QA software evaluates and provides the exposure data and parameters more detailed. (In comparison, the QUART DVT_pro software which comes with the DVT_KP phantom is designed for routine test performance and is therefore laid out for ease-of-use in application.)



QUART DVT_tec

Automatic Evaluation Software accompanying the DVT_ap Test Phantom
For Image Quality Assessment and Calculation of Figure of Merit



Test Parameters

- _ Nyquist Frequency (NF)
- _ Contrast
- _ Noise
- _ Contrast-to-Noise Ratio (CNR)
- _ Homogeneity
- _ Modulation Transfer Function (MTF) at 10% & 50% _
- Artefacts, Image Flaws, etc.
- _ System Indicator / Acceptance Indicator (Figure of Merit)
- _ Patient / Phantom Positioning Accuracy
- _ Geometry Test

Phantom Description _

Size: Ø16cm

_ Height: 4 disc setup (2x 2cm, 1x 5cm, 1x 6cm - 15cm cylinder total)

_ Test Object Equivalents: Free Air, Soft Tissue, Bone

NB: Water and Bone+Tooth Equivalents are optionally available

_ Positioning Tools: linear and/or selective markers, bubble level _

Customised Holders for varying manufacturers available

QUART DVT_tec Software Module

The unique QA/QC software automatically evaluates and displays all collected parameters. Unique in kind, the software automatically calculates a figure of merit (system indicator) thus establishing a direct correlation between measured dose values and image quality.

Despite its technical character, the software is easy to use. It provides a walk-through function which assists users in carrying out the QC procedure. The QUART DVT_tec stores the result of each single test in its internal data bank. In addition, a Protocol Print-Out function is provided for matters of documentation (hardcopy) or general reference.

Delivery includes

- QUART DVT_AP Test Phantom
- QUART DVT_tec Technical Evaluation Software / License
- Manuals
- Transport Case with Foam Insert

Also available

Enhanced Test Inserts Set

QUART DVT_KP

QUART DVT_pro

QUART dent/digitest

QUART dent/digitest M2

Additional Material Inserts

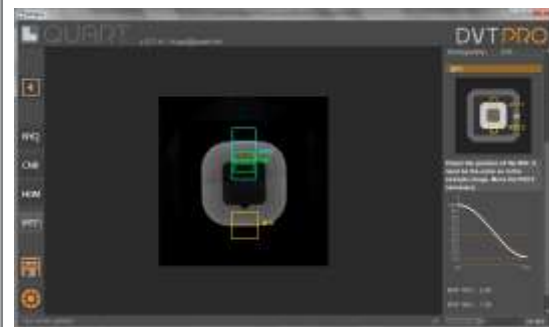
Variety of customised Holders

Phantom for Routine QA/QC

Software Tool for Routine QA/QC Testing

2D Phantoms for Routine Dental QA/QC

2D Phantom for Manufacturer QA/QC



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 **QUART**
Quality Assurance in Radiological Technologies