

DIN 6868-161:2022-01 (E)

Image quality assurance in diagnostic X-ray departments - Part 161: Acceptance testing of dental radiographic equipment for digital cone-beam computed tomography

Contents

	Page
Foreword	4
1 Scope	6
2 Normative references	6
3 Terms and definitions.....	6
4 Performance of the acceptance test	8
4.1 General	8
4.2 Test phantom.....	8
4.3 Test items.....	10
4.3.1 Visual inspection and functional tests.....	10
4.3.2 Alignment of the useful radiation field and the active detector area.....	11
4.3.3 Reproducibility of the dose	11
4.3.4 Spatial resolution of the reconstruction	11
4.3.5 Spatial resolution	12
4.3.6 Acceptance index.....	13
4.3.7 Homogeneity index.....	14
4.3.8 Artefacts	15
Annex A (normative) Simplified determination of the modulation transfer behaviour	16
Annex B (normative) Calculation of the contrast-to-noise index.....	18
Annex C (informative) Possible artefacts in dental digital cone-beam computed tomography (CBCT)	20
C.1 General	20
C.2 Beam-hardening artefacts.....	20
C.3 Extinction artefacts.....	21
C.4 Partial volume effect and exponential edge-gradient effect (EEGE).....	22
C.5 Aliasing artefacts	22
C.6 Ring artefacts.....	23
C.7 Artefacts caused by geometrical errors (e.g. motion artefacts).....	24
Annex D (informative) Dose measurement in dental digital cone-beam computed tomography (CBCT) — Differences from computed tomography	25
D.1 Background	25
D.2 Prerequisites for the measurement of dose in dental CBCT	25
D.2.1 Imaged volume.....	25
D.2.2 Scan geometry	25
D.2.3 Measurement devices	25
D.3 Summary	26
Annex E (informative) Illustrations	27
E.1 Modulation transfer behaviour	27
E.2 Scan geometry	28
E.3 Homogeneity.....	29
Bibliography	30
Index of defined terms	32

Figures

Figure 1 — Set-up and alignment of the test phantom in the beam path.....	8
Figure 2 — Homogeneous elements of the test phantom	9
Figure 3 — Structure elements of the test phantom; top view and cross-sectional view	10
Figure C.1 — Typical striped beam-hardening artefacts in the direction of the beam path, caused by metal implants (titanium) in dental CBCT	21
Figure C.2 — Extinction artefacts in the direction of the beam path due to very dense gold restorations in the teeth.....	21
Figure C.3 — Intensity errors.....	22
Figure C.4 — Subtle line patterns (Moiré patterns).....	23
Figure C.5 — Ring artefacts.....	23
Figure C.6 — Typical motion artefacts that manifest themselves as double contours.....	24
Figure E.1 — Example of the positioning and borders of the region of interest (ROI) used to determine the modulation transfer behaviour.....	27
Figure E.2 — Example of the graphical presentation of the modulation transfer behaviour	27
Figure E.3 — Horizontal slice through a scan geometry (Example 1).....	28
Figure E.4 — Horizontal slice through a scan geometry (Example 2).....	29
Figure E.5 — Example for the position and borders of the fields for the determination of homogeneity.....	29