

Measurement of DQE for digital x-ray imaging devices used for radiography has been standardized in IEC 62220-1. This presentation will summarize the steps needed to measure the DQE according to the standard. These steps include adjusting the source to produce a standardized spectrum, measuring the characteristic function of the imaging device, measuring modulation transfer function (MTF), measuring noise power spectrum (NPS), measuring input air kerma, and converting input air kerma to input signal to noise ratio. Because DQE depends on the input x-ray spectrum, the radiation quality must be adjusted to a standard. The IEC standard specifies four standard spectra: RQA 3, RQA 5, RQA 7, and RQA 9. Measurement of DQE for any input radiation level requires knowledge of the response of the detector output to change in input at that input level. This requires measurement of the characteristic function of the detector which relates detector signal to air kerma at the input. The characteristic function is used to linearize the data used for NPS and MTF. In the standard, the MTF is measured using an image of a 1-mm thick tungsten plate. The thick plate is used to minimize effects of secondary radiation from the test device. The edged response function of the plate is converted to a line spread function by differentiation, and the MTF is calculated from a Fourier transform of the line spread function. Noise power spectrum is measured from images obtained without anything in the beam. The 2-D NPS is calculated from Fourier transforms of regions within the NPS images. These 2-D NPSs are averaged, and the NPS at specific spatial frequencies is obtained by averaging over a specified range of frequencies within the averaged 2-D NPS. The input air kerma for the NPS images is determined by measurement with an ionization chamber. From the measured input air kerma, one must determine the input signal to noise ratio. In the standard the input  $SNR^2$  is defined as the photon fluence at the input, and the conversion from air kerma to fluence is defined in the standard for each standardized spectrum.