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*Test Standard for the Determination of the Visible Entrance Field  
of an X-Ray Image Intensifier System*

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## Foreword

This NEMA Standards Publication is one of a series of test standards developed by the X-ray Imaging Products Section and the medical diagnostic imaging industry for the measurement of performance characteristics governing the image quality of X-ray image intensifier (XRII) systems. These test standards are intended for the use of equipment manufacturers, prospective purchasers, and users alike. Manufacturers may find these standards useful in establishing standard test conditions for the determination of system performance specifications. Prospective equipment purchasers may benefit from these standards as the employment of standard test conditions and methods enables meaningful comparisons to be made of NEMA-referenced, competitive, equipment performance specifications. Users may also benefit from these standards through a better appreciation of the performance of XRII systems.

Characterizing the parameters that govern image quality is a non-trivial task. The assessment of image quality lies in the eye of the beholder and so is a somewhat subjective measure influenced by the spatial, temporal, contrast, and noise characteristics of the image. Historically, many techniques have been developed employing varying degrees of sophistication to establish subjective and objective measures of these parameters, and the following non-exhaustive list of parameters can be considered as relevant to image quality:

- Contrast Ratio
- Detective Quantum Efficiency (DQE)
- Fixed Pattern Noise
- Gain
- Image Signal Uniformity
- Lag
- Limiting Spatial Resolution
- Modulation Transfer Function (MTF)
- Noise Power Spectrum
- Radial Image Distortion
- Signal to Noise Ratio
- Visible Entrance Field Size

These parameters are not all independent and some of them may partially overlap in assessing the image quality. Moreover, it must be recognized that not all of these parameters lend themselves to measurement at the installation site. Some parameters require instrumentation better suited to factory measurements while others require the facilities of an instrumentation laboratory to assure the stable test conditions necessary for reliable measurements. The NEMA X-ray Image Intensifier Systems Subcommittee intends to make a selection from the above-mentioned list of parameters where practical and technically feasible measurements can be made at the system level and to prepare a set of NEMA standards.

This publication has been prepared by the X-Ray Imaging Products Section of NEMA which periodically reviews it for revisions necessary to keep it up to date with advancing technology.

Comments or proposed revisions are welcomed and should be submitted to:

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- National Electrical Manufacturers Association
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## **Introduction**

This document defines the NEMA test standard method for the determination of the visible entrance field size of an X-ray image intensifier (XRII) system. These systems include direct viewing systems, video systems, photofluorographic film recording systems, and cine film recording and projection systems.

The visible entrance field size is a measure of the area imaged by an X-ray image intensifier system.

## **Scope**

The procedures in this standard determine the visible entrance field size of an X-ray image intensifier system.