

### **The importance of spatial resolution in Dentistry and Diagnostic Monitor Testing**

Most Dental Intra oral DDR sensors manufactured specify a spatial resolution of at least 12, 14 or 20 line pairs per mm. This is way higher than medical imaging. The reason for the higher spatial resolution is due to the fact that dentists require this for diagnostic purposes. The scale of image in Dental as opposed to medical imaging is vastly different. Dentists are required to look for very subtle changes in the image quality on a much smaller scale and therefore require higher spatial resolution. This is an important part of the image chain.

The purpose of the inspection by an inspection Body is to verify the spatial resolution as claimed by the manufacturer. The dentist purchases an intra oral sensor based on the quality claimed by the manufacturer. The ability to measure the highest spatial resolution is a fundamental part of the testing process. Any loss of spatial resolution will affect the ability of the practitioner to diagnose properly. This is a requirement by the department of Health Radiation Control.

The baseline spatial resolution must be recorded and monitored for changes. If the incorrect phantom for spatial resolution is used during an inspection then ie: if the phantom can only measure 6.3 line pairs per mm but the actual spatial resolution is 14 line pairs per mm, then as per Diagnostic QC Dental (March 2017) Version 10 Table 2 II.2.6.

<b>Test Physical parameters</b>	<b>Frequency</b>	<b>Acceptance standard</b>
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95. Limiting Spatial resolution	On acceptance	Baseline minus 25%
	And 3 yearly	

Then the inspection Body cannot determine if there has been a deterioration of 25% if their baseline measurement instrument could not measure the limiting spatial resolution in the first place.

The image chain is required to be tested during an inspection this includes the Reporting Monitor as specified by DOH. Therefore the following tests should have been conducted as well.

<b>II.2.4. Reporting Monitor<sup>3</sup></b>			
General image quality and artefacts; Geometric distortion; Luminance, reflection, noise, and glare & Resolution	On acceptance & 3 years	Use TG18-QC image	Ref 23 & Ref 16 IPEM 91 IDD09
Minimum resolution	On acceptance & 3 years	Comply with table 4	Ref 21 & 22

Reporting monitors – Greyscale (luminance response)	On acceptance & 3 years	For Cone Beam CT: Ratio white to black 250; For intra-oral, panoramic and cephalometric radiography: Ratio white to black 100	IDD07& TG 18
Luminance uniformity	On acceptance & 3 years	Maximum variation 30%	IPEM 91 IDD12
Room illumination	On acceptance & 3 years	20 lux Images produced with intra-oral image receptors 100 lux A hood can be placed over the monitor to achieve the above or install dimmer lights, etc.	IPEM 91IDD14 Ref 22 p 53

Further to this the inspection Body is required to check if routine quality control tests were conducted. If these were not conducted this should be noted and should the facility not be aware of the requirements then proof of notification of the requirements should be noted and the facility notified of what needs to be done to rectify this.

What should facilities expect from the Inspection Body who conducted the inspection?

1. Training on routine quality control testing
2. Baseline images for the facility to compare monthly image quality
3. Spatial resolution measurement with the correct instrument for the job.
4. Reporting monitor testing so that the facility can make an informed decision on the best way to correct image quality issues.