

Near-infrared Light and Eye Safety When Using VeinViewer

THE FACTS:

VeinViewer® uses near-infrared light to detect subcutaneous blood and create a digital image of the patient's superficial vein pattern projected directly onto the surface of the skin.

VeinViewer projects NIR light at a wavelength of approximately 850 nm; this wavelength of light is just outside of the visible spectrum.

VeinViewer has been tested against the IEC 62471 NIR threshold exposure limits (EL) for eye safety as described in their 1st Edition Reference entitled Photobiological Safety of Lamps and Lamp Systems.

None of the measured values of spectral radiance exceeded the limit of safety values established by IEC standards.

	Requirement/ Test	Infrared Limit	VeinViewer Actual	Percent Below Exposure Limit
Results	For an infrared source 780-1000nm, the exposure for 10 seconds	$\frac{60000W}{m^2} / sr$	$\frac{488W}{m^2} / sr$	12,300%
	Avoidance of thermal injury to the retina, lens, and cornea of the eye	$\frac{244mW}{m^2}$	$\frac{2.44mW}{m^2}$	10,000%
	Near-infrared exposure of the skin	$\frac{475.6mW}{m^2}$	$\frac{244mW}{m^2}$	95%

W-watts; m-meter; sr-steradian

Table 1.

Conclusion

VeinViewer energy output is well below the near-infrared exposure limits that have been set by international committees. When properly used within manufacturer's instructions, VeinViewer can be trusted to function safely for patients and workers.

IN SUMMARY:

Near-infrared light is a small portion of a wider electromagnetic spectrum of radiation that exists just outside of the red portion of the visible spectrum (fig 1).

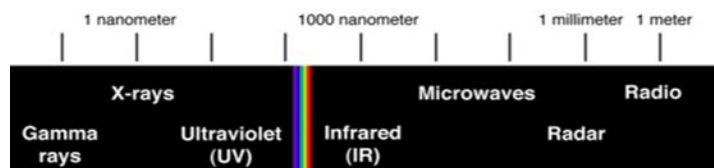


Figure 1: Electromagnetic Spectrum

Because the cornea and lens of the eye focus all light onto the back of the eye and because sight is so important, the International Electrotechnical Commission has developed exposure limits (i.e., safety limits, EL) for near-infrared light sources.

Christie Medical Holdings, Inc. had VeinViewer tested through a third-party certification group, the Canadian Standards Association (CSA). CSA International certification marks are intended to provide increased assurance of quality and safety.

To complete the testing, CSA tested VeinViewer using the prescribed methodology established by IEC against the established exposure limits. Among the 32 tests conducted on the instrument were several tests specific to near-infrared radiation.

VeinViewer passed all near-infrared tests by wide margins (table 1) and, more generally, passed all of the rest of the 32 expanded testing protocols.

These results demonstrate that VeinViewer has been tested by an independent third party and falls well below near-infrared eye safety exposure limits set forth by international committees.

Clinicians can be assured that the use of VeinViewer is not only safe for themselves, but also safe for their patients.