

# Augmented, Virtual and Mixed Reality Equipment Safety



Solutions

Safety. Science. Transformation.™



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**Enhance and demonstrate the safety of your innovative augmented, virtual and mixed reality (AR/VR/MR) devices to gain consumer confidence and protect your brand reputation.**

Advances in 5G and Wi-Fi 6 technologies combined with more affordable and compact devices and an influx of skilled software developers are driving rapid innovation and adoption of AR/VR/MR products. In fact, the market is expected to reach \$93 billion (USD) by 2027, growing at a compound annual growth rate of 40.1%.<sup>1</sup>

Entertainment content — especially gaming — is the biggest driver of consumer adoption of this technology. However, various use cases for professional use are emerging, such as in healthcare, education and training. Moreover, with the advent of the metaverse, enhanced social networking experiences are now possible with more affordable AR/VR/MR devices and advances in 5G and Wi-Fi 6 technologies that can support a more immersive experience.

1. "Global AR/VR/MR Market Insights," SkyQuest, <https://skyquestt.com/report/ar-vr-mr-market>



## With market growth comes safety concerns

With the growth of these products, such as head-mounted and holographic displays and VR simulators, manufacturers and developers are challenged to balance design and innovation with user safety. There are unique safety hazards related to the use of an AR/VR/MR headset that require addressing, such as the effects of visually induced motion sickness, visual opacity (luminous transmittance, spectral transmittance for road use and relative visual attenuation quotient for visibility of signs and signals), flicker, skin compatibility, heat exposure to the eye, biomechanical stress, mechanical robustness and optical occlusion (affecting spatial perception).

These hazards present a need for consistent safety standards that can help manufacturers mitigate the unique safety risks associated with such products.

UL Solutions can help AR/VR/MR product manufacturers demonstrate the safety of their products and support the global launch of their innovative devices to comply with standards such as:

- UL 8400, the Standard for Virtual Reality, Augmented Reality and Mixed Reality Technology Equipment
- IEC/UL 62368-1, the Standard for Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements

UL 8400 is the world's first safety standard dedicated to VR/AR/MR equipment. With our deep technical expertise, UL Solutions can help VR/AR/MR product manufacturers:

- Demonstrate the safety of their VR/AR/MR products to protect their brand reputation and build consumer trust
- Confirm that their products comply with standards and regulations for their target markets
- Bring innovative products to market faster
- Enhance product quality by optimizing performance and reliability
- Differentiate their products from those of their competitors

# Why UL Solutions?

UL Solutions built the world's first XR safety laboratory, equipped with state-of-the-art test instruments to address UL 8400, covering not just safety tests but also performance and user experience (UX) considerations. Our testing capabilities include:

- Chromaticity and chromaticity uniformity
- Color registration error
- Distortion of virtual image
- Eye-box based on Michelson contrast
- Flickering/strobing
- Focal distance (dioptré)
- Luminance and luminance uniformity
- Measurement of inter-camera distance (ICD)
- Motion-to-photon latency
- Optical alignment
- Pixel angular density
- Rest frame jittering
- Spatial frequency response (SFR), aka modulation transfer function (MTF)
- Transmittance, luminous spectrum, twilight or road lighting, and visibility for signs and signals

We help manufacturers understand evolving safety risks, demonstrate due diligence, protect brand reputation, and navigate market requirements to gain consumer confidence and launch innovative AR/VR/MR products to the global marketplace. Our comprehensive range of testing and certification services for your products and add-on auxiliary equipment includes:

- Electromagnetic compatibility (EMC) testing
- Energy efficiency verification
- Global Market Access
- Marketing Claim Verification
- Optical radiation testing and evaluation
- Performance, ergonomic, and UX testing
- Wireless device testing

We have deep technical expertise and involvement in the industry and maintain strong affiliations with industry associations like the VR/AR Association.

To learn more about how you can partner with us to demonstrate the safety of your VR/AR/MR products, visit us at [www.UL.com/VRAR](http://www.UL.com/VRAR) or contact us at [www.UL.com/contact-us](http://www.UL.com/contact-us)



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