

## 1.3 Dome lighting

Shadow-free lighting is a special form of reflected-light lighting, in which diffuse light falls onto the test object from all directions. This can be used to create lighting that is completely free of shadows. To achieve this effect, light from the light source does not fall directly on the object. The light rays are directed at a dome-shaped reflector, which reflects these onto the test object from all directions. The cupola-shaped reflector gives this type of lighting its name: dome lighting.

This lighting scenario can be usefully compared to the light on a cloudy day. On a bright but cloudy day, it can occasionally seem as if light is coming from all directions at once. The exact location of the sun is not clear. Here, the clouds are acting as both a diffusor and a reflector, and creating homogeneous, omnidirectional lighting. No shadows are cast outside.

**Dome lighting is especially suitable for:**

- Surface finish inspection, even on convex objects
- Inspection of diffuse but strongly reflecting and mirror-like surfaces
- Assembly, type and position detection
- Printed material inspection
- Code scanning
- OCR/OCV



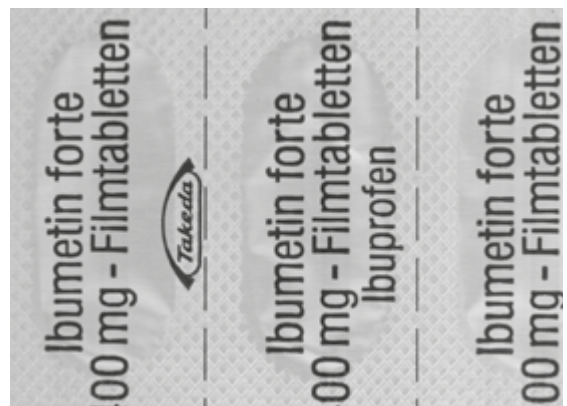
Video can be viewed at <https://iimag.de/en/lumimax/useful-facts/videos/video-dome-lights.html>

Shadow-free lighting is especially suitable for the high-quality imaging of glossy surfaces with a complex structure. One example use is creating homogeneous lighting for highly reflective packaging with buckling and irregularities, so as to enable print quality inspection.

The limitation when using this type of lighting is the working distance. To ensure shadow-free illumination, this distance must be kept as short as possible. Convex and globe-shaped objects may even need to be fully enclosed by the lighting setup.



Back of a tablet blister pack – reflected light



Back of a tablet blister pack – dome lighting

Influence of the lighting angle

Wavelengths

Optical filters

Flash vs. continuous

Fluorescence applications

Lighting systems for the reading and verification of codes

Lighting technology for shape-from-shading