



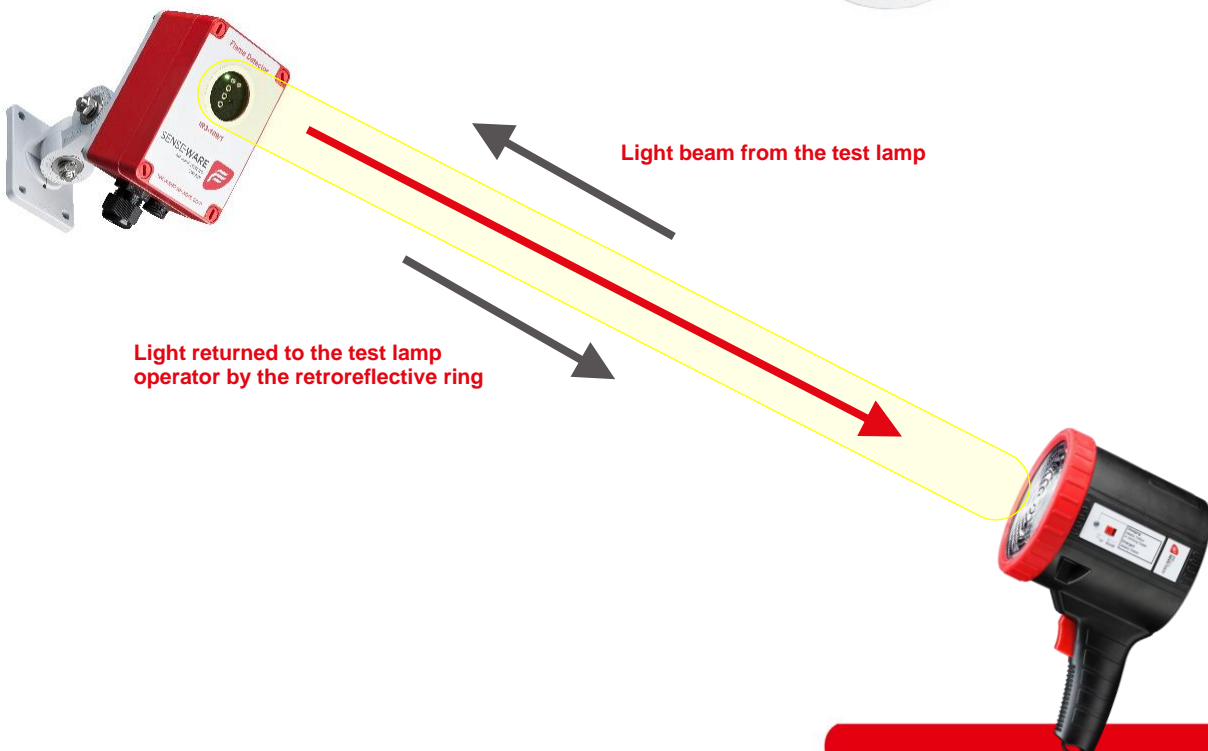
## Functional testing of a flame in sunlight with a test lamp

### Abstract

Many flame detectors are used in outdoor applications and therefore they may be illuminated by intense sunlight. Flame detectors are safety equipment, so they must be regularly functionally tested with help of a test lamp. If intense sunlight is illuminating the detector window, it is difficult to align the light beam of the test lamp correctly. Therefore Sense-WARE mounts a reflective ring around the detector window to enable convenient testing of the flame detector, despite the intense sunlight.

### Problem Statement

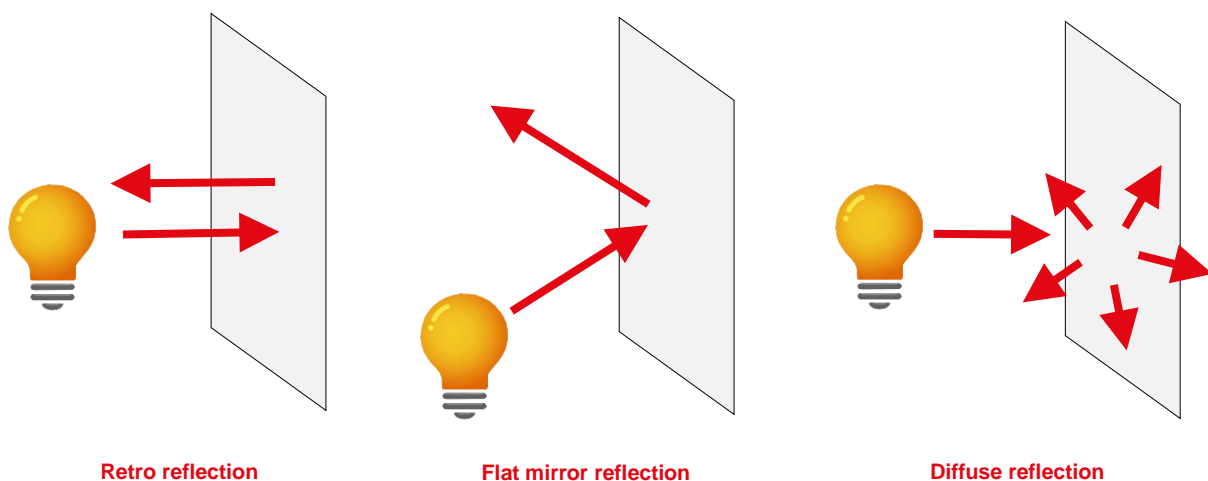
Functional testing of flame detectors with a test lamp, emitting a beam of visible light, may be difficult if a flame detector in an outdoor application is illuminated by intense sunlight.



## Background

In this section is explained how a retroreflective ring around the detector window is a convenient feature, when testing flame detectors. A retroreflector is a device or surface that reflects light back to its source with minimum scattering. This works at a wide range of angle of incidence, unlike a flat mirror, which does this only if the mirror is exactly perpendicular to the wave front, having a zero angle of incidence. Being directed, the retroreflector's reflection is brighter than that of a diffuse reflector. In figure 1 is visualized what the differences is between retro reflection, mirror reflection and diffuse reflection.

The fact that a retroreflector reflects the light back to its source makes this physical phenomenon useful, enabling more convenient functional testing of flame detectors in intense sunlight. During functional testing with help of a test lamp, light reflected by the retroreflector ring is returned to the operator of the test lamp and is visible as a bright ring of light. Therewith the operator of the test lamp directly known how he should align the test lamp.



**Figure 1**  
Types of reflection

## References

1. <https://en.wikipedia.org/wiki/Retroreflector>
2. [https://www.3m.com/3M/en\\_US/scotchlite-reflective-material-us/industries-active-lifestyle/active-lifestyle/how-retroreflection-works/](https://www.3m.com/3M/en_US/scotchlite-reflective-material-us/industries-active-lifestyle/active-lifestyle/how-retroreflection-works/)

## Conclusion

In outdoor applications, illumination of a flame detector by intense sunlight may make it difficult to do functional testing of flame detectors with help of a test lamp. The retroreflective ring, which is a standard feature on Sense-WARE flame detectors solves this problem. Light reflected by the retroreflector ring is reflected to the operator of the test lamp and is visible as a bright ring of light. Therewith the operator of the test lamp directly known how he should align the test lamp.