

1 Scope

This technical report provides guidance on the safe use of fiber optic systems and their constituent parts producing or guiding visible, near infrared, or mid infrared (maximum wavelength of 10 μm) radiation in Class I hazardous (classified) locations. Hazardous (classified) locations are described in the *National Electrical Code (NEC)*. Limiting levels prescribed in this document apply only to the minimum levels of optical power, optical power density, and optical energy needed to ignite explosive gas atmospheres. In apparatus where optical energy is transduced to electrical energy, the limiting values for the electrical energy must be determined from relevant standards for electrical apparatus (e.g. ANSI/ISA-12.00.01-2002 (IEC 60079-0 Mod)).

2 Purpose

At this time there is minimal awareness of the potential risk associated with optical ignitions even though fiber optics have been used for at least 20 years in hazardous (classified) locations. One purpose of this technical report is to inform industry of potential ignition hazards associated with the use of fiber optic systems in explosive gas atmospheres. The technical report is also intended to suggest engineering and installation practices to reduce the ignition hazard from fiber optic systems in Class I locations.

3 Definitions and figures

In the context of this technical report, the following definitions apply.

3.1

absorption:

the conversion of electromagnetic wave energy into another form of energy, for instance heat.

3.2

beam diameter (or beamwidth):

the distance between two diametrically opposed points where the irradiance is a specified fraction of the beams peak irradiance. [IEV 731-01-05]

NOTE — Most commonly applied to beams that are circular or nearly circular in cross section.

3.3

beam strength:

a general term referring to an optical beam's power, irradiance, energy, or energy density.

3.4

combustible dust layer:

accumulation of combustible dust sufficient to pose a smoldering hazard.

3.5

core:

the central region of an optical fiber through which most of the optical power is transmitted. [IEV 731-02-04] (See Figure 1.)