HAZARDOUS AREA
POTENTIAL FOR FIRE

Select the solution

from the extensive range of

SHARPEYE FLAME DETECTORS

Play it safe... Specify

SPECTREX INC.

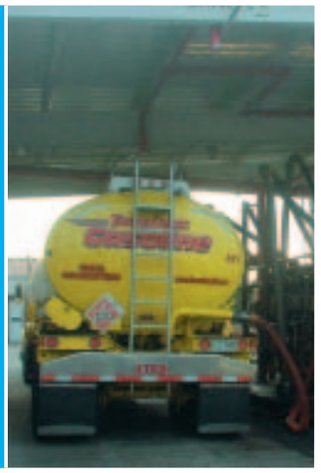
World Leader in Optical Detection Technology

The Risk

THE RISK

Industries involved in manufacturing, processing, storage or transportation of flammable material are constantly in need of reliable and fast response fire detection systems.
The smaller the fire when detected, the easier it is to extinguish. In this respect, fire detection systems, especially optical flame detectors, are the most powerful devices in firefighting, thanks to their ability to detect a small fire from a long distance.
Designing a sensitive optical flame detector is far from simple. These detectors often operate in industrial environments containing many radiation sources that could impair detector performance and even cause false alarms. Moreover, in many applications flame detectors are required to withstand harsh environmental conditions and still maintain their entire envelope of performance.

TYPICAL FLAME DETECTION APPLICATIONS INCLUDE:



- **OIL AND GAS** - exploration, production, storage and offloading
- **OFFSHORE** - fixed platforms and FPSOs
- **ONSHORE** - refineries, loading terminals, pipelines
- **PETROCHEMICALS** - production, storage and shipping facilities
- **TANK FARMS** - floating and fixed-roof tank farms
- **CHEMICALS** - production, storage and transportation
- **WAREHOUSES** - flammable materials storage
- **POWER GENERATION** - pump areas, generator rooms, turbines
- **PHARMACEUTICAL INDUSTRY**
- **AUTOMOTIVE** - manufacturing, paint spray booths
- **SEMICONDUCTORS** - wet bench operations
- **AIRCRAFT** - hangars, commercial and military
- **EXPLOSIVES & MUNITIONS** - handling and storage
- **PRINTING** - solvent handling, presses, drying processes
- **WASTE DISPOSAL** - incineration, processing and storage of flammables

DEFINE YOUR PROBLEM...

Planning and installing flame detectors requires consideration of the nature of the fire, the protected area, environmental conditions, detector capabilities and limitations and user expectations. For instance, is it more important to select a detector that alarms a few seconds faster or a detector that has superior immunity to false alarms?

HOW TO DEFINE YOUR PROBLEM

Let's look at how to define your problem and the various issues that need to be considered, including:

- All fuels that present a fire hazard
- Min. fire size(s) to be detected
- Max. detection distance required
- Speed of response
- All sources of nuisance radiation
- Environmental conditions

FUEL TYPES

An assessment must be made of which fuels present the greatest fire hazard, e.g. whether they are hydrocarbons or non-organic, liquid or gaseous. This will determine the appropriate type of flame detector. Potential sources of false alarm must also be considered as well as environmental factors such as the presence of oil mist, grease and extreme weather / environment.

FIRE SIZE AND MAXIMUM DETECTION DISTANCES

Detector sensitivity and range are related to fire size. Detector performance is normally specified in relation to a standard 1 ft² (0.1m²) gasoline pan fire. The detector can then be defined in terms of the distance from which it can detect this fire and the corresponding response time. The definition of fire size depends on the type of fuel:

- **Liquids** – defined by pan fire of 1 ft² (0.1m²)
- **Gases** – defined by a plume flame with 20" (0.5m) height; 8" (0.2m) width
- **Solid fuels** – defined by weight, size and pre-ignition configuration

The following table lists typical detection distances for different types of SharpEye Flame Detectors and for a range of fuels

		IR3[1]	MI-1	UV/IR[2]	UV[3]	IR[4]	Hydrogen[5]
Fuel	***Fire size***	***Maximum sensitivity / Range ft (m)***					
Gasoline	1 ft² (0.1m²) pan fire	200 (60)	133 (40)	50 (15)	50 (15)	50 (15)	–
n-Heptane		200 (60)	133 (40)	50 (15)	50 (15)	50 (15)	–
Diesel Fuel		150 (45)	90 (27)	37 (11)	37 (11)	25 (7.5)	–
JP5		150 (45)	100 (30)	37 (11)	37 (11)	37 (11)	–
Kerosene		150 (45)	100 (30)	33 (11)	37 (11)	37 (11)	–
Alcohol (Ethanol)	1 ft² (0.1m²) pan fire	150 (45)	100 (30)	25 (7.5)	37 (11)	25 (7.5)	62 (19)
IPA (Isopropyl Alcohol)		150 (45)	100 (30)	25 (7.5)	25 (7.5)	25 (7.5)	–
Methanol		100 (30)	80 (24)	25 (7.5)	25 (7.5)	25 (7.5)	26 (8)
Methane	20" (0.5m) Plume fire	66 (20)	40 (12)	16 (5)	40 (12)	37 (11)	–
LPG (Propane)		66 (20)	40 (12)	16 (5)	40 (12)	37 (11)	–
Hydrogen		–	–	16 (5)	50 (15)	–	100 (30)
Silane	12" (0.3m) Plume fire	–	–	15 (5)	30 (10)	–	–
Polypropylene Pellets	8" (0.2m) Ø pan fire	16 (5)	16 (5)	16 (5)	20 (6)	13 (4)	–
Office Paper	1 ft² (0.1m²) pan fire	66 (20)	60 (15)	13 (4)	20 (6)	20 (6)	–

[1] 20/20I, 20/20SI, 20/20XI and 20/20CTIN-CTIP [2] 20/20L-LB and 20/20ML [3] 20/20U-UB and 20/20MU
[4] 20/20R and 20/20MR [5] 20/20H and 20/20SH
– Does not detect

Where WHERE SHOULD FLAME DETECTORS BE LOCATED?

CAN THE DETECTOR SEE THE FIRE?

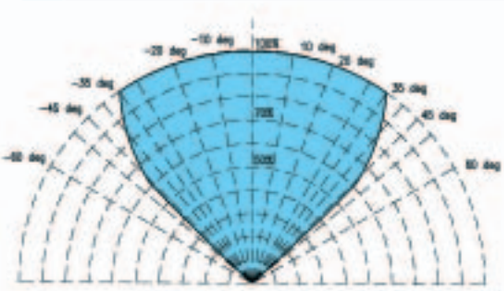
The detection range of any flame detector is influenced by how it is installed. Try to put yourself in the detector position and experience what the detector 'sees'.

A good rule is that the detector should be located at twice the height of the highest object in the area. Keep in mind that an optical detector needs a clear view and covers the objects and area that need protection with easy access for periodical maintenance.

Watch out for 'shadows' - you can usually avoid them by locating another detector in an opposite corner. This also provides a degree of redundant cover should the other detector become blocked.

⚠ **Avoid having potential false alarm sources, such as flares, within the cone of vision of the detector.**

CONE OF VISION



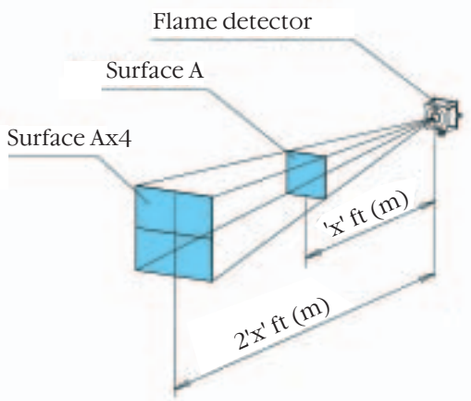
The typical cone of vision for a Triple IR (IR3) detector

Most flame detectors have a 3-D cone of vision of about 90° (see note*), at ±45° around the central axis. Point the detector downward at a 45° angle and it 'sees' both downward and forward (and catches the least amount of dirt).

Because sensitivity diminishes at the edges of the cone of vision, there may still be blind spots in your design. The detector would still respond but the fire would need to be larger, perhaps up to four times that needed at the center axis.

** Most SharpEye detectors have a 90° horizontal, 90° vertical cone of vision (except the M series which is 100° and our CCTV version where the vertical video view is 65°).*

INVERSE SQUARE LAW



Since both sensitivity and range are related to fire size, if the detector is placed further away from (or closer to) the fire source, the detectable fire size will vary according to the inverse square law*. So, doubling the detection distance results in only $\frac{1}{4}$ of the radiant energy reaching the detector; or conversely, for the same response time, the surface area of the fire then needs to be 4 times larger!

For example, if a standard UV/IR detector, capable of detecting a 1 ft² (0.1m²) fire at 50 ft (15m), is located at 100 ft (30m) detection distance, the minimum fire then needs to be 4 ft² (0.4m²). Conversely, at a 15 ft (5m) range, a fire of only 0.1 ft² (0.01m²) would operate the alarm.

**This calculation cannot be used indefinitely. As distance increases, factors such as water vapor, cold CO_2 and flame flicker have more impact.*

ENVIRONMENTAL CONDITIONS

SharpEye detectors are designed and approved for ambient temperatures from −40°F (−40°C) to +160°F (+70°C) - there's even a version for +185°F (+85°C). All our detectors are tested to IP66/67 (NEMA 6P) for weather resistance and we do extensive military standards testing for shock, vibration, humidity and temperature.

Despite this, it is important and good practice to try to locate detectors in reasonable environmental conditions - and we will work with you to help ensure that.

Select ...SELECT THE SOLUTION

Each of the Spectrex flame detector families uses one or more of the Ultraviolet (UV) and/or Infrared (IR) techniques. However, each family is recommended only for specific applications, usually determined by evaluating to what extent false alarms could create problems.

Detector	Applications	Advantages	Disadvantages
Single Infrared (IR)	• Hydrocarbon fires • Indoors	• Moderate speed • Moderate sensitivity • Unaffected by solar radiation • Low cost	• Subject to false alarms (in the presence of flickering IR sources)
Single Ultraviolet (UV)	• Hydrocarbon fires • Hydrogen, Silane, Ammonia and other hydrogen-based fuel fires • Metal fires • Indoors	• High speed • Moderate sensitivity • Unaffected by solar radiation • Unaffected by hot objects • Low cost	• Subject to false alarms from UV sources (arc welding, electrical sparks, halogen lamps) • Blinded by thick smoke, vapors, grease and oil deposits on the detector window
Dual Band UV/IR	• Hydrocarbon fires • Hydrogen, Silane, Ammonia and other hydrogen-based fuel fires • Metal fires • Indoors and outdoors	• Moderate speed • Moderate sensitivity • Low false alarm rate • Unaffected by solar radiation	• Affected by specific UV/IR ratio created by false stimuli • Blinded by thick smoke, vapors, grease and oil deposits on the detector window
Triple IR (IR3)	• Hydrocarbon fires • Indoors and outdoors	• Moderate speed • Highest sensitivity • High immunity to false alarms • Longer detection range • Unaffected by solar radiation	• Affected by IR sources only at short range in certain rare fire scenarios
CCTV (IR3+Video)	• Hydrocarbon fires • Indoors and outdoors	• Color video picture • More information about the hazard • Provides record of the protected area before, during and after fire scenario • Automatic switching of video upon flame detection • Moderate speed • Highest sensitivity • High immunity to false alarms • Longer detection range • Unaffected by solar radiation	• Affected by IR sources only at short range in certain rare fire scenarios
Hydrogen	• Hydrogen fires	• Detects Hydrogen flames • Longer detection range • High immunity to false alarms • Unaffected by solar radiation	• Not to be used for Hydrocarbon fire detection

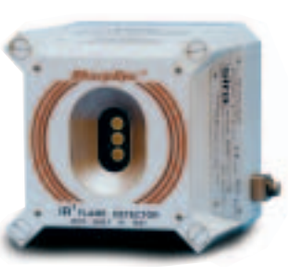
Choose CHOOSE THE SHARPEYE MODEL

SharpEye Flame Detectors operate reliably in the harshest conditions and are self - contained, stand-alone units designed for direct connection to external devices such as alarm systems or automatic fire extinguishing systems.

SharpEye Flame Detectors offer unmatched performance and reliability and include the world's leading Triple IR (IR3) patented technology, enabling detection of small fires, with enhanced immunity to false alarms, at distances up to 200 ft (60m). The SharpEye range also includes the world's fastest UV/IR flame detector (less than 5 msec response) with superior immunity to false alarms.

- All the explosion-proof SharpEye flame detectors are approved to ATEX and FM standards. Additional approvals include CSA, GOST-R and GOST-K approvals.
- All SharpEye detectors carry a 3-year warranty and have an MTBF of 100,000 hours.
- A full range of Mini-SharpEye detectors, the “M” series, is available for low-cost industrial applications.

SHARPEYE TRIPLE INFRARED (IR3) FLAME DETECTORS



Triple IR - Optical Flame Detector with advanced spectral analysis

CCTV - IR3 detector with integral color video camera

Mini IR3 - compact, light and low power IR3 flame detector

Latest IR3 - with heated optics for reliable operation in severe environments

Spectrex’s range of ‘latest generation’ SharpEye Triple IR (IR3) flame detectors offers high sensitivity and long-range detection, as well as the highest immunity to false alarms. We offer a number of IR3 versions to suit all applications and provide early warning of flaming fires.

Key benefits

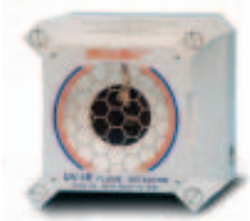
- Highest immunity to false alarms
- Extended detection distance of up to 200 ft (60m)
- High sensitivity

The patented Triple IR (IR3) circuit design scans for oscillating IR radiation (1 to 10 Hz) in the spectral bands ranging from 4.0 to 5.0 microns. This highly advanced detector uses programmable algorithms which check the ratio and correlation of data received by the three sensors.

The extended range of IR3 flame detectors means that fewer detectors are required to cover a specific area. This results in substantial savings on the cost of equipment and installation.

CHOOSE THE SHARPEYE MODEL

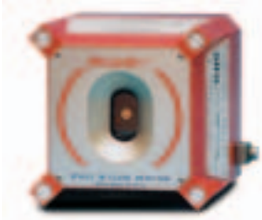
ULTRAVIOLET + INFRARED (UV/IR) FLAME DETECTORS



The 20/20L-LB, Combined Ultra Violet/Infra Red (UV/IR) optical flame detector employs a solar blind UV sensor coupled with a narrow band IR sensor to provide excellent detection sensitivity combined with enhanced immunity to false alarms (solar blind). The detector has a 20 msec response to saturated signal.

Designed to detect hydrocarbon based fuel fires, hydrogen, hydroxy-fuels, metals and inorganic fires.

SINGLE INFRARED FLAME DETECTOR



The 20/20R Single-IR flame detector incorporates advanced flame analysis tools to provide early warning of flaming fires involving organic materials (hydrocarbon fuels and vapors).

The detector contains an infrared sensor and optical filter with maximum sensitivity to the CO_2 emission band and improved immunity to false alarms from environmental sources of IR, including sunlight and IR projectors.

FAST RESPONSE FLAME DETECTORS

Certain applications require very fast response times with short detection distances.

Fast IR3

The 20/20FI Detector is a version of the Triple IR (IR3), modified for high-speed flame detection with the highest possible immunity to false alarms for industrial applications such as painting and solvent manufacturing. The 20/20FI offers a fast response time of 0.2 -1 sec at a range of 6.6-33 ft (2-10m).

Fast UV/IR

The 20/20F, UV/IR High-Speed Detector is designed to meet two important requirements: fast response time (less than 5 msec) and high reliability (immunity to false alarms). Over 20,000 of these detectors have been protecting armored vehicles and other military applications, with proven performance, durability and reliability.

HYDROGEN FLAME DETECTOR

The Hydrogen Flame Detectors 20/20H, 20/20MH and 20/20SH have been specifically designed for the detection of hydrogen flames. The optical sensors and special filters have been carefully selected to ensure the greatest degree of spectral matching to the hydrogen flame emission and the lowest degree of matching to non-fire stimuli.

The detector has applications in a wide range of industrial and commercial facilities that use hydrogen fuel cells, hydrogen gas generators and hydroxy-fuels.

Note: *The hydrogen flame detector is NOT designed to detect hydrocarbon fires.*

ULTRAVIOLET (UV) FLAME DETECTOR

The 20/20U-UB, UV detector responds to high-energy UV radiation emitted by fires and by explosions at the moment of their ignition.

Flame is typically detected within 3 sec for a 1 ft^2 (0.1m^2) pan fire.

The detector is particularly useful for detecting flames from fuels such as: hydrogen, hydrides, ammonia, silane and other inorganic fuels.

The detector utilizes a special logic circuit that helps prevent false alarms caused by solar radiation.

Note: *It is important to note that the occurrence of random UV radiation from sources such as lightning, arc welding radiation and solar radiation cause false alarms in UV detectors.*

'M' SERIES - MINI FLAME DETECTORS

For a low cost - solution, in areas where Ex approvals are not required, the latest 'M' Series is a range of mini IR3, UV/IR, UV and IR flame detectors that are low power and housed in compact and light, yet rugged, stainless steel or GRP plastic enclosures.

SPECTREX PROVIDES A RANGE OF ACCESSORIES TO ENSURE THAT YOUR SHARPEYE FLAME DETECTORS ARE INSTALLED AND OPERATED CORRECTLY

SWIVEL MOUNTING BRACKETS

The Swivel Mounting Brackets provide accurate directional selection for optimum area coverage.

LONG RANGE FIRE SIMULATORS

Spectrex Long Range Fire Simulators are specifically designed to test the operation of the various SharpEye Optical Flame Detectors.

The Fire Simulators emit radiation in a unique sequential pattern corresponding to and recognizable as fire by the specific SharpEye Flame Detectors. This allows the detectors to be tested under 'real' fire conditions without the associated risks of an open flame. A specially designed beam collimator is used for extended range applications to help where access to the detector is difficult, thus avoiding costly access work, scaffolding, etc.

LASER POINTER

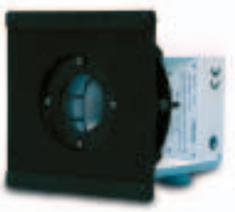
The Laser Detection Coverage Pointer evaluates detector coverage on-site. The device is an add-on accessory that enables designers and installers to optimize detector location and assess the actual coverage of installed detectors.

The device is universal and can be used with all SharpEye Optical Flame Detectors.

AIR SHIELD

Air Shield allows connection of compressed air line to prevent particle build-up on window.

HIGH TEMPERATURE DUCT MOUNT



Designed to allow flame detection in ducts where high temperatures exist. Comprises a special duct mount arrangement and heat sink.

Spectrex Flame Detector Solutions for High Risk Industries
Talk to us about your problem…
We can usually offer at least one solution.

SEE OUR SEPARATE DATASHEETS FOR DETAILS ON SPECTREX LINE OF PRODUCTS

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