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## Flame Detector Selection

- Current Models Line-Up and Characteristics
- Comparison of Different Flame Detectors
- Fire Size and Maximum Detection Distances
- Recommended Types of Fire Detectors

### Current Models Line-Up and Characteristics

Model Number	Type of Detector	Built-in Test (BIT)	Detection Range* ft (m)	Response Time (Typical)	Description
20/20U	UV	No	50 (15)	3 sec.	UV detector (including a high-speed special model) for indoor applications, detects organic and inorganic flames.
20/20UB	UV	Yes	50 (15)	3 sec.	As above with automatic or manual BIT for verifying lens cleanliness.
20/20L	UV/IR	No	50 (15)	5 sec.	Dual UV/IR for detection of organic and inorganic flames for indoor and outdoor applications.
20/20LB	UV/IR	Yes	50 (15)	5 sec.	As above with automatic or manual BIT for verifying lens cleanliness.
20/20F	UV/IR	No	20 (6)	Max. 5 msec	UV/IR High Speed Flame Detector with its ultra fast response and high reliability, immune to false alarms.
20/20R	IR	Yes	50 (15)	5 sec.	Single IR Detector contains an infrared sensor and optical filter that provides maximum sensitivity to the CO <sub>2</sub> emission spectral band.
20/20I	Triple IR (IR3)	Yes	200 (60)	5 sec.	The Triple IR (IR3) offers two to three times the detection distance of any conventional IR or UV/IR detector and the highest immunity to false alarms.
20/20SI	Triple IR (IR3)	Yes	200 (60)	5 sec	The Triple IR (IR3) offers two to three times the detection distance of any conventional IR or UV/IR detector and the highest immunity to false alarms.
20/20XI	Triple IR (IR3)	Yes	200 (60)	5 sec.	The IR3-XI incorporates all the features of the 20/20I in a new EExde, stainless steel housing with heated optics and a fast connection to I.S. handheld unit for function set-up, troubleshooting and maintenance.
20/20FI	Triple IR (IR3)	Yes	33 (10)	0.2-1 sec.	Triple IR High Speed Model for industrial applications.
20/20CTIN & CTIP	CCTV - IR3	Yes	200 (60) & 100 (30) using Video Image	5 sec.	The SharpEye CCTV Flame detector is a self-contained, triple spectrum optical flame detector that incorporates a video color camera.

Model Number	Type of Detector	Built-in Test (BIT)	Detection Range* ft (m)	Response Time (Typical)	Description
20/20MI	Triple IR (IR3)	Yes	133 (40)	5 sec.	Specially designed for industrial applications featuring the Triple IR performance in a compact design with 80% less power consumption.
20/20ML	UV/IR	Yes	50 (15)	5 sec.	Special compact design for industrial application UV/IR flame detector.
20/20MR	Single IR	Yes	50 (15)	5 sec.	Special compact design for industrial application Single IR 50ft (15m) flame detector.
20/20MU	UV	Yes	50 (15)	5 sec.	Special compact design for industrial application UV flame detector.
20/20H	Triple IR (IR3)	Yes	100 (30)	5 sec.	Special design for detection of invisible hydrogen fire.
20/20SH	Triple IR (IR3)	Yes	100 (30)	5 sec.	Special design for detection of invisible hydrogen fire.
20/20MH	Triple IR (IR3)	Yes	80 (26)	5 sec.	Special design for detection of invisible hydrogen fire.

\* 1ft<sup>2</sup> (0.1m<sup>2</sup>) pan fire

### Comparison Between Various Types of Flame Detectors

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.

Optical Detector	Applications	Advantages	Disadvantages
Single Infrared (IR)	<ul style="list-style-type: none"> <li>Hydrocarbon fires</li> <li>Indoors</li> </ul>	<ul style="list-style-type: none"> <li>Moderate speed</li> <li>Moderate sensitivity</li> <li>Unaffected by solar radiation</li> <li>Low cost</li> </ul>	<ul style="list-style-type: none"> <li>Subject to false alarms (in the presence of flickering IR sources)</li> </ul>
Single Ultraviolet (UV)	<ul style="list-style-type: none"> <li>Hydrocarbon fires</li> <li>Hydrogen, Silane, Ammonia and other hydrogen-based fuel fires</li> <li>Metal Fires</li> <li>Indoors</li> </ul>	<ul style="list-style-type: none"> <li>High speed</li> <li>Moderate sensitivity</li> <li>Unaffected by solar radiation</li> <li>Unaffected by hot objects</li> <li>Low cost</li> </ul>	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's window

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Optical Detector	Applications	Advantages	Disadvantages
Dual Band (UV/IR)	<ul style="list-style-type: none"> <li>Hydrocarbon fires</li> <li>Hydrogen, Silane, Ammonia and other hydrogen-based fuel fires</li> <li>Metal Fires</li> <li>Indoors and outdoors</li> </ul>	<ul style="list-style-type: none"> <li>Moderate speed</li> <li>Moderate sensitivity</li> <li>Low false alarm rate</li> <li>Unaffected by solar radiation</li> </ul>	<ul style="list-style-type: none"> <li>Affected by specific UV/IR ratio created by false stimuli</li> <li>Blinded by thick smoke, vapors, grease and oil deposits on the detector's window</li> </ul>
Triple IR (IR3)	<ul style="list-style-type: none"> <li>Hydrocarbon fires</li> <li>Indoors and outdoors</li> </ul>	<ul style="list-style-type: none"> <li>Moderate speed</li> <li>Highest sensitivity</li> <li>High immunity to false alarms</li> <li>Longer detection range</li> <li>Unaffected by solar radiation</li> </ul>	<ul style="list-style-type: none"> <li>Affected by IR sources only at short range in certain rare fire scenarios.</li> </ul>
CCTV (IR3+Video)	<ul style="list-style-type: none"> <li>Hydrocarbon fires</li> <li>Indoors and outdoors</li> </ul>	<ul style="list-style-type: none"> <li>Color video picture</li> <li>More information about the hazard</li> <li>Provides record of the protected area before, during and after fire scenario</li> <li>Automatic switching of video upon flame detection</li> <li>Moderate speed</li> <li>Highest sensitivity</li> <li>High immunity to false alarms</li> <li>Longer detection range</li> <li>Unaffected by solar radiation</li> </ul>	<ul style="list-style-type: none"> <li>Affected by IR sources only at short range in certain rare fire scenarios.</li> </ul>
Hydrogen	<ul style="list-style-type: none"> <li>Hydrogen fires</li> </ul>	<ul style="list-style-type: none"> <li>Detects the Hydrogen invisible flames</li> <li>Longer detection range</li> <li>High immunity to false alarms</li> <li>Unaffected by solar radiation</li> </ul>	<ul style="list-style-type: none"> <li>Not to be used for hydrocarbon fire detection</li> </ul>

### Fire Size and Maximum Detection Distances

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

Fuel	Fire size	IR3 <sup>(1)</sup>	MI-1	UV/IR <sup>(2)</sup>	UV <sup>(3)</sup>	IR <sup>(4)</sup>	Hydrogen <sup>(5)</sup>
		Maximum sensitivity/Range ft (m)					
Gasoline	1 ft <sup>2</sup> (0.1m <sup>2</sup> ) pan fire	200 (60)	132 (40)	50 (15)	50 (15)	50 (15)	-
n-Heptane		200 (60)	132 (40)	50 (15)	50 (15)	50 (15)	-
Diesel Fuel		150 (45)	89 (27)	36 (11)	36 (11)	25 (7.5)	-
JP5		150 (45)	100 (30)	36 (11)	36 (11)	36 (11)	-
Kerosene		150 (45)	100 (30)	36 (11)	36 (11)	36 (11)	-
Alcohol (Ethanol)	1 ft <sup>2</sup> (0.1m <sup>2</sup> ) pan fire	150 (45)	100 (30)	25 (7.5)	36 (11)	25 (7.5)	63 (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)	36 (11)	-
LPG (Propane)		66 (20)	40 (12)	16 (5)	40 (12)	36 (11)	-
Hydrogen		-	-	16 (5)	50 (15)	-	100 (30)
Silane	12"(0.3m) Plume fire	-	-	16 (5)	33 (10)	-	-
Polypropylene Pellets	8"(0.2m) Ø pan fire	16 (5)	16 (5)	16 (5)	20 (6)	13 (4)	-
Office Paper	1 ft <sup>2</sup> (0.1m <sup>2</sup> ) pan fire	66 (20)	50 (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) 20/20UJB and 20/20MU

(4) 20/20R and 20/20MR

(5) 20/20H and 20/20SH

- Does not detect

### Recommended Types of Fire Detectors

Fire Source	UV <sup>(a)</sup>	IR <sup>(b)</sup>	UV/IR <sup>(c)</sup>	IR3 <sup>(d)</sup>	Hydrogen <sup>(e)</sup>
Gasoline	1	1	1	1	4
Diesel Fuel	2	2	2	2	4
N-Heptane	1	1	1	1	4
Kerosene	2	2	2	2	4
JP8/JP4/JP5	2	2	2	2	4
Alcohol (Ethanol)	2	2	2	2	2
LNG/LPG	2	3	3	3	4
Hydrogen	2	4	3	4	1
Hypergolic Fuel	2	4	3	4	1
Petrochemicals	1	1	2	1	4
Metals	2	4	3	4	4
Propellants (Black Powder)	1	3	2	3	4
Textiles (Cotton)	3	3	3	3	4
Aromatic Solvents	2	2	2	2	4
Wood, Paper	3	3	3	3	4
Bonding Glue Substances	2	2	2	2	4

(a) - 20/20U-UB, 20/20MU

(b) - 20/20R, 20/20MR

(c) - 20/20L\_LB, 20/20ML, 20/20F

(d) - 20/20I, 20/20SI, 20/20XI, 20/20MI, 20/20FI, 20/20CTIN/CTIP

(e) - 20/20H, 20/20SH, 20/20MH

1 - 100%-75% of the detector sensitivity.

2 - 75%-50% of the detector sensitivity.

3 - 50%-25% of the detector sensitivity.

4 - Not suitable.