

Laboratory Fume Hood Automatic Fire Detection and Extinguishing Systems



FIRETRACE SYSTEMS ARE ONLY AVAILABLE FROM FIRETRACE INTERNATIONAL AND ITS AUTHORISED PARTNERS. THE FIRETRACE BRAND NAME IS ONLY APPLICABLE TO GENUINE FIRETRACE SYSTEMS.
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Firetrace International
15678 N. Greenway-Hayden Loop
Suite 103
Scottsdale, AZ 85260 USA
Tel: (480) 607-1218
Fax: (480) 315-1316
E-mail: firetrace@firetrace.com
www.firetrace.com

Firetrace Expertise The Firetrace Solution

Firetrace has over twenty years experience protecting Fume Cabinets from fire. In that time our expertise in design and installation has grown and we have saved many installations from possible devastating fire. Firetrace systems are installed worldwide and are specified by the world's leading Pharmaceutical Companies.

In a recent series of fires in university labs in the UK, Firetrace has repeatedly saved the day.

While it is common for Firetrace to receive reports of successful suppression almost daily, we have recently seen an unusually high number of reports from university laboratories. Since December we have seen six reports of fume hood fires: two at Southampton University, three at Oxford University and one at York. In each case Firetrace performed flawlessly, saving the fume cabinet and the lab from extensive damage.

Dear Firetrace,

I would like to say how pleased our Chemistry Department is that we used Firetrace in our solvent fume cupboards. The week before Christmas one of our students made a mistake in setting up one of our stills and unfortunately while distilling the unit went up in flames. Before he had time to panic the Firetrace took over and the fire was out. The result was that not only the department was saved but the fume cupboard as well. Having had a major fire in the department in the past this proved to us to be a very good investment and we will consider having it in all our new fume cupboards.

Yours thankfully,
T Chamberlain
Chemistry Department
University of York

Firetrace's systems are uniquely suited to protect fume cabinets from the danger of fire. The proprietary Firetrace Detection Tubing is installed behind the baffles. As a result, fire can be quickly detected and suppressed regardless of where it begins in the fume cabinet. With more than 10,000 units protected, Firetrace is the leading choice for fume cabinet fire suppression worldwide.

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Flexible Design – Ultimate Protection

Firetrace is available with both manual release options and pressure switches to automatically shut off fuel or sound an alarm in the events of a discharge. Firetrace works with a variety of suppression agents to suit the environment and work performed in the fume cabinets including; HFC-227, CO2, dry chemical powder, Novec 1230, water and foam.

In two of these incidents a heater caught fire. Lab attendants saw the fire yet before they could retrieve a fire extinguisher the Firetrace system had already operated and suppressed the fire.

FIRETRACE

AUTOMATIC FIRE SUPPRESSION SYSTEMS

**“...not only was the
department saved but
the fume cupboard as
well.”**

**“...before he had time
to panic, the Firetrace
took over and the fire
was out.”**

Firetrace International

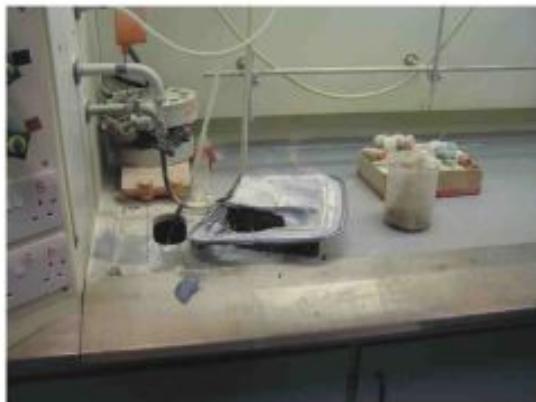
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Firetrace Newsflash February 2005

Southampton University

Suffers two fires in a month

In both instances hot plates have overheated causing a solvent fire but fortunately both laboratory fume cabinets were protected by Firetrace automatic fire protection systems. On one occasion a laboratory assistant witnessed the incident, but reported that when he returned seconds later with a hand extinguisher the fire was already out.



Laboratory Manager Dr. Kinerson said 'Thanks to the quick reaction of our Firetrace systems. Damage was limited to a few components and a bit of a spring clean. Had the fire spread into our extract ducting, we could have lost the entire laboratory'

International

Hyden Loop
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5260 USA

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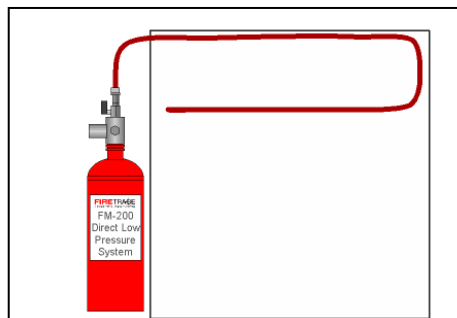
www.firetrace.com

About the unique Firetrace Technology

Firetrace is unique because we use a proprietary tube to detect a fire (Firetrace Detection Tubing). The tube has been tested to the highest standards set down by globally respected test houses such as UL and FM, independently tested and verified by Oxford University, UK. In fact Firetrace is the only company in the world able to supply Firetrace Detection Tubing and to supply a tube that has been extensively tested and approved.

The Fire Detection Tubing acts as a linear heat detector along its length and is set to activate at a temperature of approximately 100°C. Once the Fire Detection Tube (FTD) has detected a fire we can use Firetrace to extinguish fires in two ways. This gives us an amazing capability to handle all kinds of Fume Hood fire applications. There are two types of Firetrace System.

The Firetrace Direct Low Pressure (DLP) System



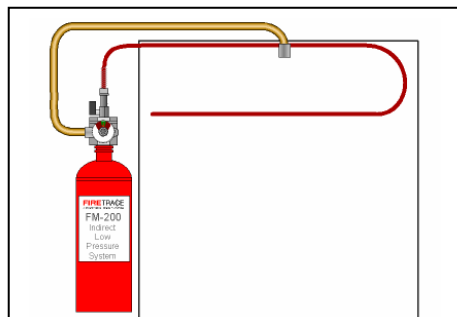
The Firetrace "Direct" System uses the Firetrace Tube to do three things at once.

1. Detect a Fire
2. Release Extinguishing Agent through the Tube onto the fire.
3. Extinguish the Fire.

On contact with Fire or heat at approx 100°C the tube will rupture delivering Extinguishant directly onto the seat of the fire extinguishing it rapidly.



The Firetrace InDirect Low Pressure (ILP) System



The Firetrace "InDirect" System uses the Firetrace Tube to detect a fire and release the extinguishing agent through carefully positioned pipework.

1. Detect a Fire
2. Release Extinguishing Agent through diffusion pipework or hoses to flood an enclosure.
3. Extinguish the Fire.

On contact with Fire or heat at approx 100°C the tube will rupture delivering Extinguishant through diffuser pipes or hoses and nozzles, flooding the enclosure with extinguishing agent and extinguishing the fire rapidly.



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Many Types of Fire Extinguishing System in One!

Because Firetrace systems have the unique ability to be configured as either Direct or Indirect Systems it means that we can offer our customers the capability to protect different kinds of Fire Hazards located in and around laboratories. [Electrical Control Cabinets, Warehouse Vehicles, Solvent Stores, IT Equipment and more](#) can all be protected with Firetrace systems! This flexibility and adaptability is a unique Firetrace benefit.

Design Principles

When designing Firetrace automatic fire extinguishing systems there are many aspects to be taken into consideration namely, the size of the fume cupboard, the typical airflow rate (face velocity) and the type of fume cupboard. The main types of fume cupboard are as follows bench top, step in, walk in with removable work bench, walk in without work bench or walk in with fixed work bench.

There are three main rules that must be considered when deciding which Firetrace automatic fire extinguishing system is most suited to any fume cupboard.

Rule 1

If the internal height from the work bench to the ceiling of the fume cupboard is over 1.2 metres then the fume cupboard must be protected using an Indirect Firetrace system.

Rule 2

If the internal volume of the fume cupboard is greater than 1.0 cubic metre then the fume cupboard must be protected using an Indirect Firetrace system.

Rule 3

When fitting Indirect Firetrace automatic fire extinguishing systems you should allow for additional low level diffusers if the internal height from ceiling to the floor of the fume cupboard is greater than 1.5 metres. This is to ensure that the extinguishant reaches the lower level of the fume cupboard before the extraction draws it out.

The reasoning behind these rules is that in fume cupboards with an internal height of 1.2 metres or over would require a considerable size fire to create enough heat to initiate a Direct Firetrace system.

This is because the Firetrace automatic detection tube can only be fixed around the ceiling of the fume cupboard with the Direct low pressure Firetrace system. The flame and heat from a fire at low level within the fume cupboard could potentially be drawn up behind the baffle board and into the extract duct without being detected by the Firetrace automatic detection tubing that is only fitted to the underside of the soffit in front of the baffle board.

If a large fire was to occur the resultant up draft caused by the convection of the fire combined with the extraction airflow would create a combined up draft that would prevent extinguishing medium from reaching the base of the fume cupboard and extinguishing the fire.

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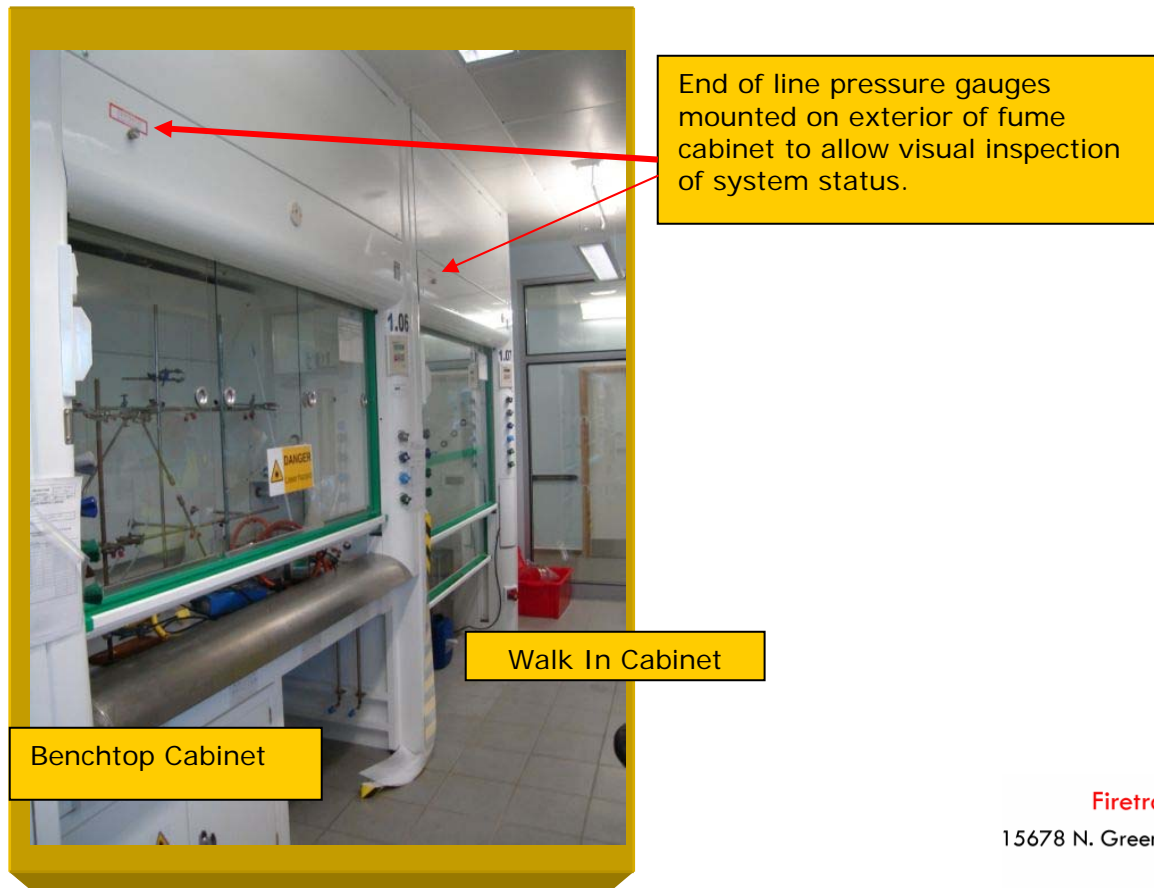
Design Principles (Cont'd)

In a Direct low pressure Firetrace system the extinguishing medium is discharged through the Firetrace automatic detection tubing that only has a 4mm internal diameter, so the flow rate of the extinguishant is relatively slow and the direction of discharge is dependant on how the heat/flame affected the Firetrace tubing during detection.

The Indirect low (Powder) and high pressure (CO2) Firetrace systems have Firetrace automatic detection tubing routed both around the soffit in front of the baffle board as well as behind the baffle board at both high and low level, *this means a fire will be detected quickly* where ever it starts with in the fume cupboard.

The Indirect low pressure Firetrace system also has a minimum of two hard plumbed diffusers with 6mm internal diameter steel Bundy tubing feeding each diffuser, and the diffusers are directionally aimed to diffuse the extinguishant effectively throughout the fume cupboard.

Fume cupboards that are higher than 1.5 metres have additional low level diffusers installed to ensure the extinguishant is delivered adequately throughout the fume cupboard even though there may be a substantial airflow updraft .



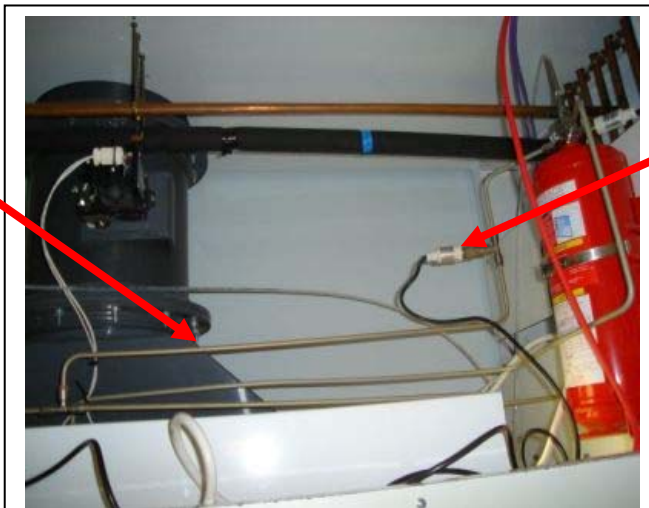
Design Principles (Cont'd)

The cylinders are normally installed as close to the Fume Cabinets as possible. The ideal location is in the top where space is found nearby the extract system. The cylinders can be installed remotely if required but we suggest the max distance is kept as short as possible.



Firetrace cylinder, distribution pipe, gas gone pressure switches stored in top space of fume cabinet.

8mm Anodised Steel Gas Distribution Pipe carries discharged gas to diffusers installed in the fume cabinet.

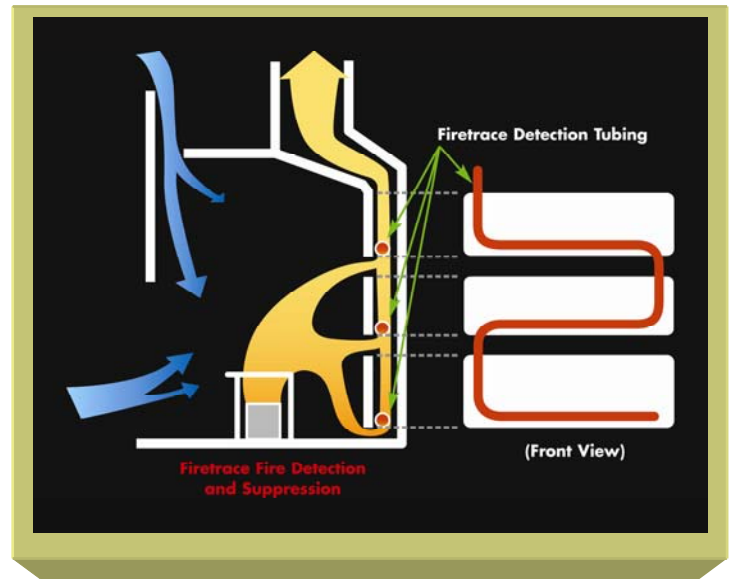
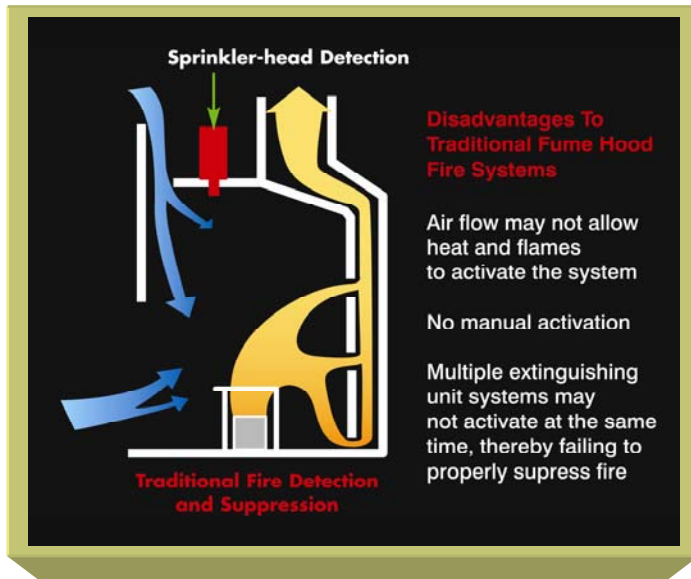


Gas Gone Pressure switch sends a signal to BMS, Fire Alarm Control Panel and can be used to shut down any equipment as required.

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System Activation



Automatic Actuation

The strategic placement of the Firetrace Detection Tube in consideration of the expected airflow means that heat is carried to the FDT enabling quick detection. Systems using Sprinkler Bulb Type detectors are far slower to detect fire because heat is typically drawn away from the quartzoid bulb..

Automatic Actuation

The Firetrace Detection Tube is located behind the baffle (when present) in strategic placement to quickly detect heat from any fire in the fume hood..



Manual Actuation

Optional Manual Actuators (as above) can be installed onto the front of the Fume Cabinet. This enables the Fume Cabinet operator to instantly operate the system in the event of a fire such as caused by a solvent spillage



Post Discharge Functions

Low Pressure Switches can be installed in the Detection and Discharge lines. This item enables an electrical circuit that can be used to integrate the Firetrace System into the Fire Alarm or Building Management System.

Post Discharge

Firetrace recommends that the Fume Cabinet Airflow is not turned off in the event of a fire. The airflow rate must be understood and the information used when designing the quantity of extinguishing agent required for the system.

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Genuine Firetrace Detection Tube

At the heart of every Firetrace™ System is the unique Firetrace Detection Tube. Firetrace Detection Tube is **only** manufactured by Firetrace International and supplied by its authorized partners. No other tube is allowed to use the Firetrace brand name.

Only Firetrace Detection Tube has been rigorously tested by reputable globally significant third parties. Beware of poor quality imitators. If in doubt ask for test data on the tube executed by globally recognized bodies. Below we provide with pride the data relating to the unique Firetrace detection tube.

Technical Description:

Firetrace Detection Tubing (FDT) is a linear, pneumatic, fire detection device that responds to a combination of the heat and radiant energy from a fire. The response time of the FDT can be changed by altering the pressure placed within the FDT. The FDT is non-porous, so it can contain internal pressure for an extended time. The FDT is also resilient to most common chemicals or substances. The FDT is made of an inert, non-conductive blend of proprietary resins, then extruded using a special process to assure that the tubing is non-porous. FDT is available in outside diameters of 4mm, 6mm, 8mm and 12.5mm. The 6mm OD x 4mm ID is the standard product. The standard color is red.

Technical Characteristics:

Detection temperature:

With an internal pressure of 150 psi (~10 bar) = approximately 212°F (100°C)

(Detection temperature will vary as you vary the internal pressure)

Hydrostatic burst pressure:

Minimum burst pressure is 75 bar (~1,100 psi)

Typical burst pressure is 88 bar (~1,300 psi)

Size tolerances:

All FDT must meet the following tolerances: +0.1mm/-0.2mm

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Leakage rate:

The FDT passed the Underwriters Laboratories and Factory Mutual Research long term leakage tests.

Twelve sample systems, each with 52 feet of FDT were weighed and then placed in a secure storage area. The maximum allowable leakage rate was 0.0075 ounces leakage over a period of one year. Each quarter of a year, 4 random samples were selected and weighed. At the end of the full year, all twelve samples were weighed. There was no measurable leakage. The FDT passed the test.

Exposure to UV radiation:

Samples of FDT, each 12 inches in length, were subjected to the UV Light and Water Test in accordance with ASTM 154 utilizing the UVB 313 Lamp. Test duration was 1000 hours. Following this test, the samples were examined for cracking or deterioration. None was found. These same samples were then subjected to a hydrostatic test of six times the normal operating pressure ($150 \times 6 = 900$ psi) of the tubing for a period of one minute. There was no burst or leakage as a result of this test. Pressure was then raised to 1000 psi for a period of one minute with no burst. Each sample was then raised to burst pressure. Average burst pressure of the twelve samples was 1200 psi.

Aging Test:

A total of twelve samples of FDT, each twelve inches in length, were subjected to an air-oven aging test for 180 days at 212°F (100°C). Following this test, the samples were examined for cracking or deterioration. None was found. These same samples were then subjected to a hydrostatic test of six times the normal operating pressure ($150 \times 6 = 900$ psi) of the tubing for a period of one minute. There was no burst or leakage as a result of this test. Pressure was then raised to 1000 psi for a period of one minute with no burst. Each sample was then raised to burst pressure. Average burst pressure of the twelve samples was 1200 psi.

30 Day Extreme Temperature Leakage Test:

A total of twelve fully charged FIRETRACE™ Indirect systems, charged with FM-200™ Clean Extinguishing Agent and superpressurized with nitrogen to 150 psi and including 24 inches of detection tubing (also charged to 150 psi) were exposed to the temperature extremes, 0°C (32°F) to 54.44°C (130°F), for a period of 30 days. A total of six charged systems were exposed to 0°F and six charged systems were exposed to 130°F. Weight (in grams) was recorded before and after the test. There was no loss of weight noted of any of the samples at the end of the test. Following this test the systems were discharged with a standard propane torch impinging on the FDT. System actuation was within two seconds and in each case, discharged as intended.

Electrical Properties:

Volume resistivity:	1014	(per DIN 53481)
Dielectric strength:	40 kV/mm	(per DIN 53481)

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Compatibility with common chemicals:

Results of chemical testing of Firetrace tubing undertaken by Oxford University

<u>Solvent</u>	<u>Vapour</u>	<u>Liquid</u>
Ether	no action	loss of black type/slightly
harder		
THF	no action	loss of black type/slightly
harder		
Toulene	no action	slightly harder
Ethyl acetate	no action	no action
N-methylmorpholine	no action	loss of colour
Petrol	no action	no action
Acetone	no action	no action
Methanol	no action	no action
Dichloromethane	no action	no action
Triethylamine	no action	loss of black type
Chloroform	no action	no action
Pyridine	no action	slight loss of colour
Acetyl chloride	no action	slight attack
Sodium hydroxide	no action	no action
Dimethylformamide	no action	slight attack
Acetonitrile	no action	loss of black type
Butyl ethyl ether	no action	loss of shine on surface
Carbon tetrachloride	no action	loss of black type
Benzene	no action	no action
Benzyl bromide	no action	pitted the plastic
T-butanol	no action	no action
Trifluoroacetic acid	plastic attacked	soup
Formic acid	no action	soup
Dimethyl sulphoxide	no action	hardened plastic
Acetic anhydride	no action	no action
Diglyme	no action	no action
Trimethylsilyl chloride	no action	no action
Styrene	no action	hardened plastic
Methyl acrylate	no action	hardened plastic
Disopropylamine	no action	hardened plastic
Nitric acid 70%	eaten away	soup
Hydrochloric acid 35%	eaten away	soup
Acetic acid/hydrogen bromide	eaten away	soup
Thionyl chloride	eaten away	not quite soup
Phosgene in toluene	no action	slightly harder plastic
Ammonia 35% aqueous	no action	no action
Hydrogen peroxide	no action	plastic softened

All chemicals were in contact with the tubing for five days (vapour and liquid)

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Transparent Tube

Based on above results concerning exposure of standard Firetrace Detection Tube (coloured red) to certain chemicals over long periods of time it was noticed that whilst the tube retained functionality that the dyes in the special polymer became affected in some instances.

We recommend that the Firetrace™ Detection Tube used in Fume Cabinet applications is transparent (dye free version) so that it does not become discoloured or faded over time. As an additional benefit this clear transparent tube is discreet and not easily noticed in the laboratory and is thus more aesthetically pleasing. It provides exactly the same high quality functionality as the standard red tubing but without the dye.



Clear / Transparent tube installed on ceiling of a fume cupboard showing the cross over installation pattern in front of the air extraction duct.

Gas Diffuser Nozzle (type depends on extinguishing agent used).

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Installation of Firetrace Detection Tube

Firetrace Detection Tube is the most important part of the Firetrace Fire Suppression System. Once its performance and approvals have been taken into account it is of utmost importance that it is installed in the most effective and efficient manner.

Firetrace has conducted countless tests on countless types of fume cabinets with different extinguishing agents in the course of its 20 years.

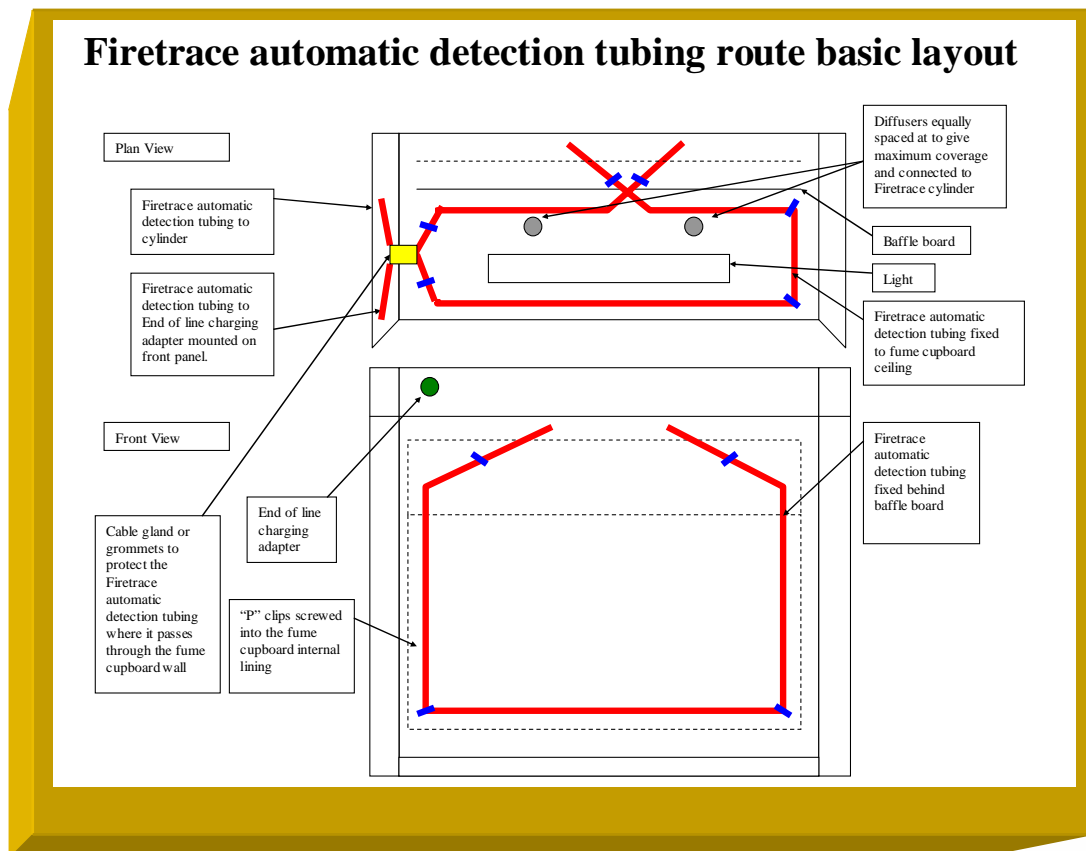
It is vital when protecting critical assets such as fume cabinets that the installation is conducted according to strict criteria. The positioning of the Firetrace Detection Tube within the fume cabinets is extremely important as this will be our long term fire detection medium.

Care needs to be taken that the tube is located to: -

Be as close to a possible fire risk as possible without being exposed to constant contact with aggressive chemicals in liquid phase.

The Firetrace Detection Tube must be located in areas within the fume cabinet that cross the primary air flow channels to ensure that any heat is forced to come into contact with the tube ensuring that any fire is detected as quickly as possible.

On the following sheet we provide information how Firetrace Detection Tube should be installed to provide premium protection on the basic different types of fume cabinet.



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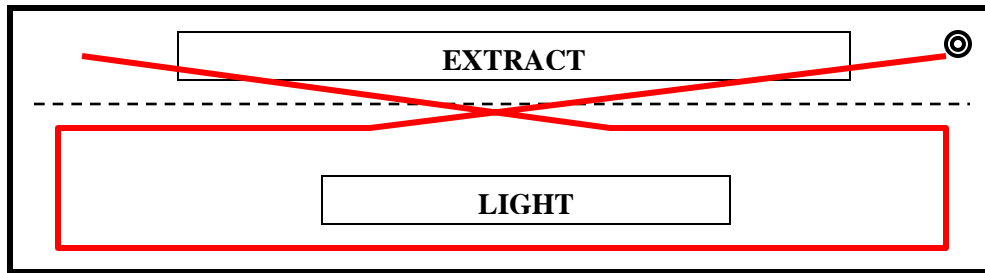
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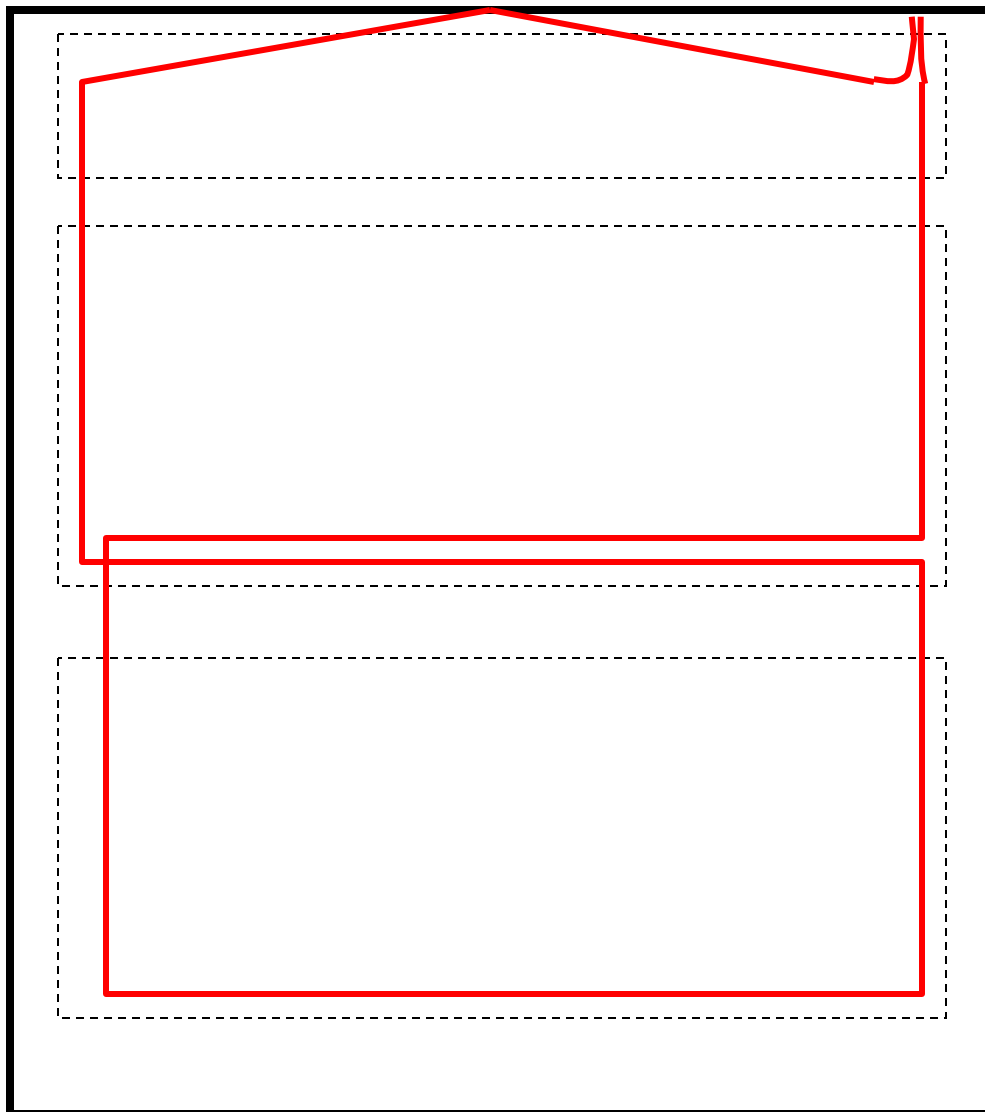
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View of
Roof
from
inside



Baffles

Walk in
Fume
cupboard
With
removable
Workbench

Detection
tube

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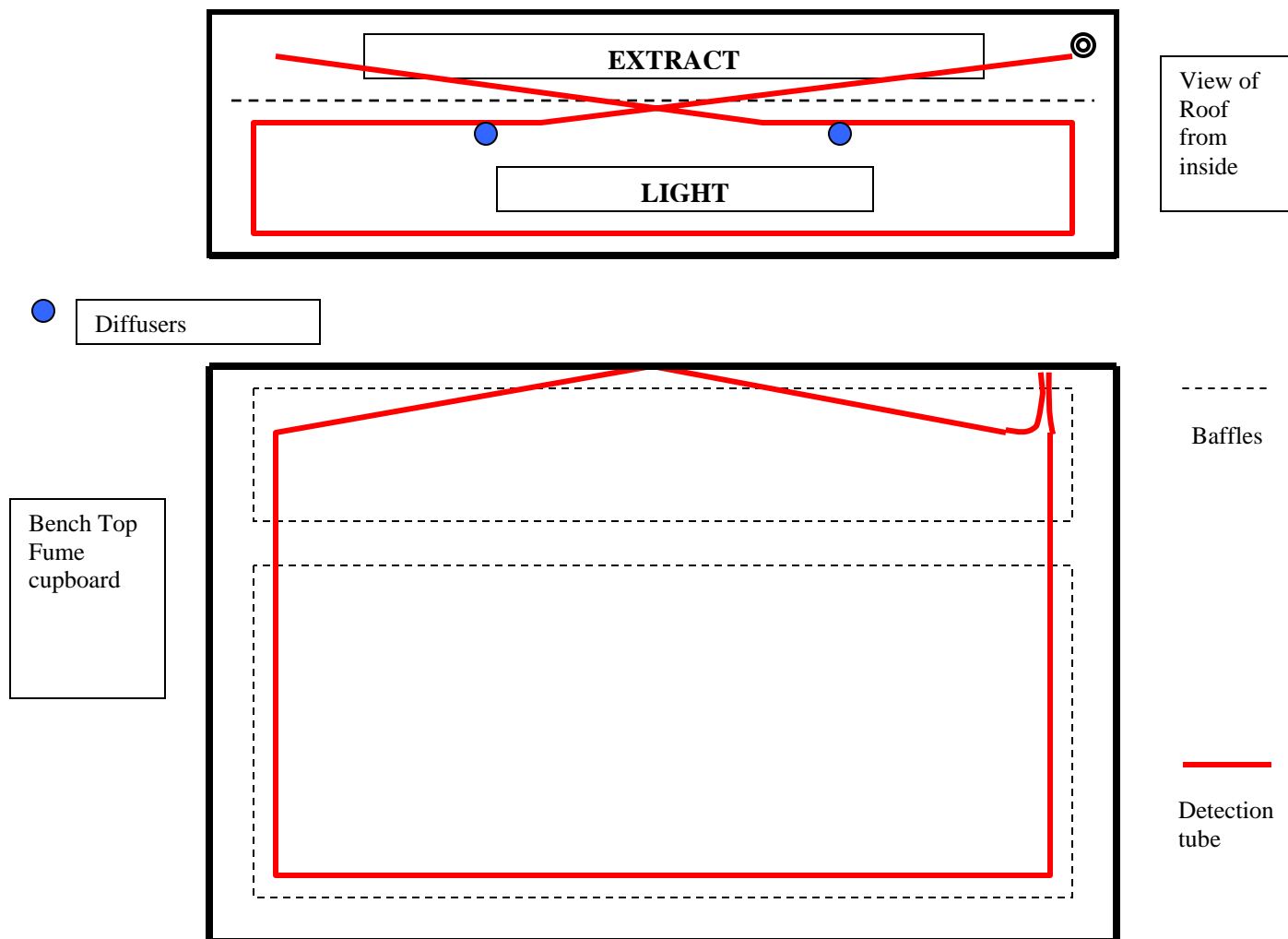
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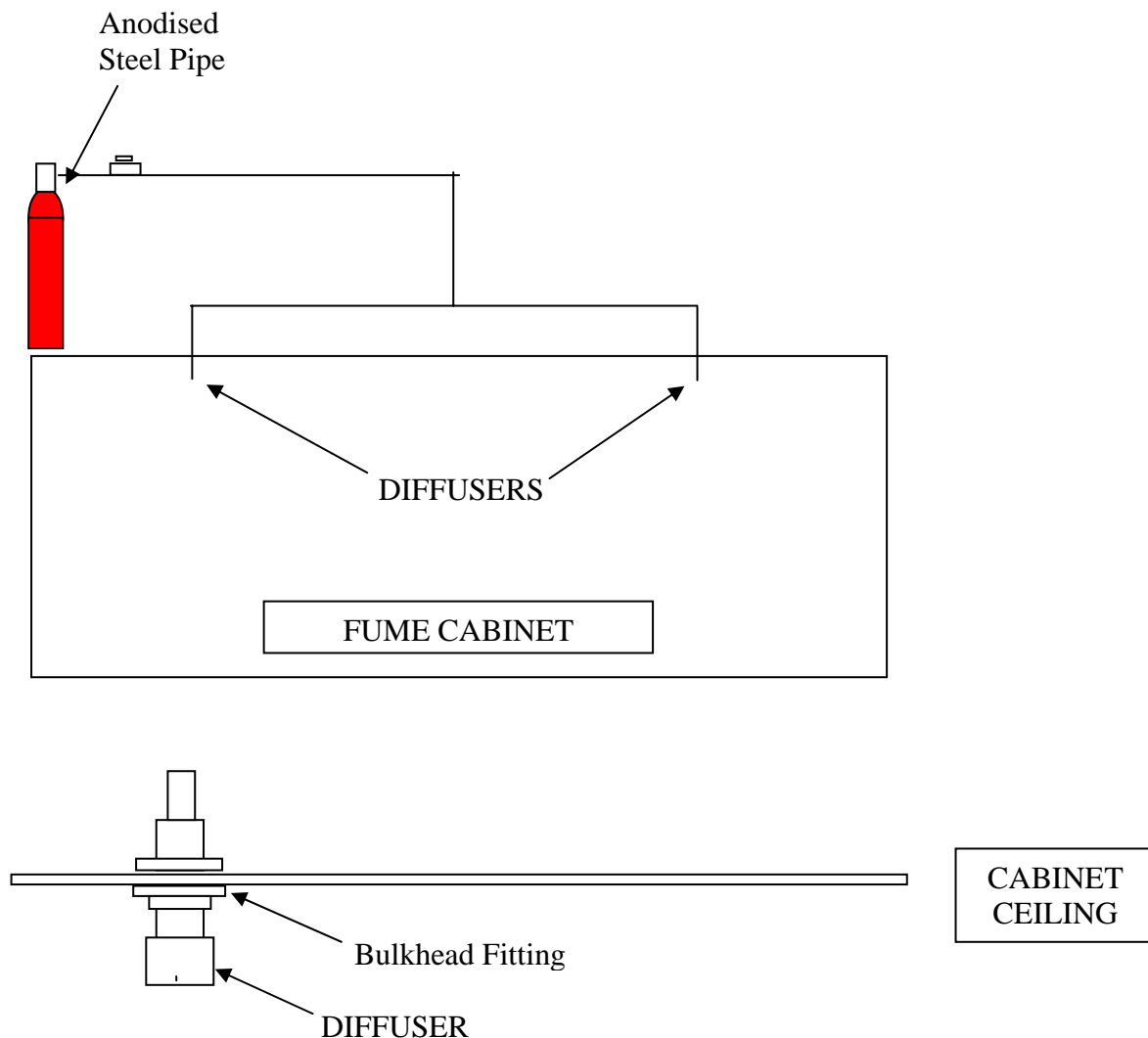
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Bench Top Cabinet Typical Tube Layout
Bench Top Fume Cabinet Typical Tube Layout



FIRETRACE INTERNATIONAL
TYPICAL BENCHTOP FUME CABINET
DISCHARGE PIPEWORK DESIGN – CO2



INSTALLATION

Firetrace International prides itself on the quality and depth of expertise in carrying out installations and after sales service.

Many of our installation engineers have over ten years Firetrace Factory experience and have between them installed systems onto many thousands of Fume Hoods.

A well executed installation by experienced engineers is the difference between a quality installed system that is leak free, requires little maintenance and most importantly will detect and extinguish a fire quickly and reliably.

The best installers for Firetrace are the inventors and manufacturers of Firetrace Suppression Systems and their factory trained partners. Because we invented the technology over 20 years ago we have developed an extremely high quality installation method experience.

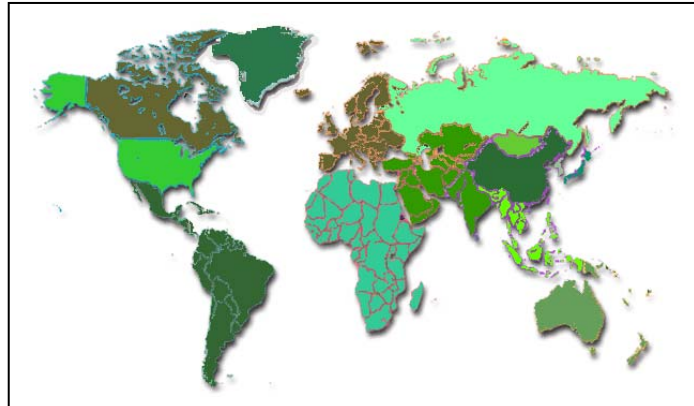
All our installation engineers have been fully trained and most have over ten years experience working in conditions requiring the most strict health and safety and installation practices.

All our engineers have worked directly with all the leading Pharmaceutical companies in the UK, Europe, Middle East and USA.

Service Contracts

Ongoing service and system maintenance contracts can be offered to all our customers.

Global Organisation



Firetrace Fire Detection and Suppression Systems are supplied and supported globally through a network of factory trained specialist distributors. Please contact us with any question or query you may have.

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Patents and Trademarks

Firetrace Patents owned by Firetrace International

Firetrace Detection Patent No. Europe. 923032650. USA. 5276433.
Pyroplug Patent No. 2292850. Magnetic Switch Patent No. 2322449.
Several Patents Pending

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Success breeds imitation. There are some companies that try to sell inferior systems under the name "Firetrace". Genuine Firetrace systems are comprised of cylinder, valve, all components and genuine Firetrace Detection Tube sourced only from a Firetrace factory.

Imitation products do not have globally recognised approvals, test data, 20 years field track history. Genuine Firetrace Detection Tube has been pressure and leak tested in year long tests by a globally recognised test authority proving genuine FTD integrity and reliability. Imitation products can not match this.
If the entire system (cylinders and accessories) isn't manufactured by Firetrace then it isn't a Genuine Firetrace System.

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