

# Business Case: Installation of Passive Fire Fighting Systems

## Support to Safety Retrofits and Environmental Upgrades in the Bangladeshi Ready-Made Garment (RMG) Sector

### Why a Passive Fire Fighting System is a Good Investment?

Early fire detection and quick evacuation of personnel are key to reducing the risk of injuries and fatalities, minimising the loss of goods and materials, as well as avoiding severe damage to production facilities. At the same time, lowering the fire risk may improve a company's reputation among stakeholders and enable them to negotiate better insurance premiums in the future.

#### Advantages of a passive fire fighting system at a glance:

- Immediate response to fire outbreaks, reduced smoke and heat damages
- Reduced risk of fatalities and injuries to employees on-site
- Possible to negotiate reduction in insurance premiums
- Enhances workplace safety, attracts skilled workers and international clients

Since the fire at Tazreen Fashions Ltd. 2012, over 140 incidents of fire have been reported in Bangladesh's textile and garment industry<sup>1</sup>. As fires are not uncommon in factories, it is essential to put appropriate fire protection systems in place to ensure the safety of your employees and property. Not only do these systems increase safety, they also help to minimise damages and associated costs in cases when a fire cannot be prevented.

There are several methods available for protecting factory buildings from fires and stopping fires before they can damage properties and goods. The most commonly used technical solution is the installation of smoke and heat detectors combined with visible and audible alarm systems. Although smoke alarms do not prevent fires, they provide early warnings of small fires, making it easier to stop them from spreading or even to extinguish them. As a result, buildings with alarms report significantly fewer injuries and deaths, and substantially less damage of property and goods in cases of fire.

<sup>1</sup> SolidarityCenter: <https://www.solidaritycenter.org/wp-content/uploads/2017/04/Bangladesh.Fire-Chart.April-2017.pdf>

In addition to fire detection and alarm systems, passive fire-fighting systems also include sufficient means of escape, along with fire doors, unobstructed aisles and corridors, and exit stairways and ramps. These measures ensure the quick and safe evacuation of all workers in cases of fire or other emergencies, and therefore drastically reduce the risk of injuries and fatalities.

Buildings protected by a dedicated passive fire fighting system are considered inherently safer and therefore may allow the owner to negotiate reduced insurance premiums. Experiences from around the world show that insurance premiums can be reduced by 5% to 45%<sup>2</sup>.

Depending on the range of installed measures and the overall building hazard, the expected direct and indirect benefits of installing a passive fire-fighting system usually outweigh the estimated costs of its implementation, which in most cases results in a pay-back period of one to five years.

Detailed information about the cost and benefits of passive fire fighting systems can be found on the next page, followed by a case study example on page 3. Technical details regarding the installation and implementation process, legal requirements and possible means of financing can be found on pages 4 to 5.



Fire Training Room at 8<sup>th</sup> floor of Iris Garments Ltd.

<sup>2</sup> City of Scottsdale (1997), Automatic sprinklers - a 10 Year study

## Protect Your Buildings, Lower your Costs

The installation of passive fire fighting systems not only protects employees and saves lives; it provides a range of additional direct and indirect benefits for your company

### Direct Benefits

Reduced risk of a spreading	Early detection of fires can help to control and prevent the spread of fires, thereby significantly reducing the damage to goods, property and equipment.
Reduced risk of fatalities and injuries to employees on-site	Early fire detection and alarm systems in combination with means of egress allow a timely evacuation of employees in case of a fire. This will reduce the probability of people getting injured, in turn resulting in lower risk of payment of compensations and medical costs.
Better compliance with regulations and requirements of buyers	The installation of fire detection and alarm systems as well as adequate means of escape are required by the National Initiative as well as several other Organisations (see legal Requirements). Non-compliance with the defined requirements will/can lead to the termination of all business activities with the respective supplier's factories. Installations and retrofits in the area of passive fire fighting which go beyond the current requirements enable companies to reduce the need for future retrofits.

### Indirect Benefits

Better standing with international buyers	International buyers prefer suppliers which meet not only the legal requirements of the country but also their own expectations. Lower fire risks in a company imply lower business risks for the international buyer.
Better business returns	Studies have shown that companies that rate higher on ESG (Environmental, Social, Governance) indices show higher profitability and / or business performances and are better at managing risks and opportunities <sup>3</sup> .

In addition to these benefits mentioned above, you may also benefit from a lower insurance premium, since lower risk will also put you into a better bargaining position. As per international practices, insurance underwriters may take into the account the reduced risks and adjust the insurance premiums once your insurance is up for renewal. In the international context, depending on the design of the system and the areas to be protected, the discounts can range from 5% to up to 45%. The higher discounts are usually only available when the fire protection system is combined with features such as sprinkler protection, regular monitoring, installation of fire extinguishers and deadbolt locks. Such insurance savings might also depend on the fire resistance and occupancy risk level of the building.

In Bangladesh first discussions with representatives from the Insurance Association are already taking place along these lines

<sup>3</sup> MSCI : <https://www.msci.com/www/research-paper/foundations-of-esg-investing/0795306949>

looking into the possibility of similar reduced insurance premium for adequately protected (low risk) buildings. In case such an approach is accepted, the installation of a passive fire fighting systems might help you to renegotiate insurance premiums in the future and realise corresponding savings.

## Calculating the Cost of a Sprinkler System

The cost of a complete passive fire fighting system depends on factors such as the building type and construction, type of installed smoke or heat detectors, and the degree of hazard related to the occupancy (e.g. number of employees). Previous experience with these systems in Bangladesh has shown that the average cost of a complete passive fire protection system for a medium sized company (31,500 square meters; 3,250 employees) is approximately BDT 2.5 crore.

In addition to the installation costs, annual operation costs for fire detection systems of around BDT 7 lakh have to be taken into consideration.

### Average investments needed to install a passive fire fighting system

Type of Investment	Approx. cost (BDT)	Required amount
Smoke detector	2,100 /Unit	0,33 per m2
Multi detector	2,950 /Unit	0,33 per m2
Heat detector	1,940 /Unit	0,33 per m2
Beam detector	54,700 /Unit	1 per 100 x 10m width area
Open area smoke detector	92,616 /Unit	1 per 150 x 30m area
Manual alarm initiation devices	3,200/ Unit	e.g. NFPA 72
Notification appliances (e.g. bells, horns, sirens)	3,370/ Unit	
Fire alarm control units	2.10 – 5.47 lakh/ Unit	
Batteries (secondary power supply)	12,629/ Unit	
Wiring	84/ m	n.a.
Labour	4.2 – 8,4 lakhs	n.a.
Routine maintenance	4,840/ per visit	n.a.
<b>Approx. total costs</b>		<b>2.5 crore</b>
<b>Estimated amortization period/ Pay back period</b>		<b>1 to 5 years</b>



**Fire door of boiler room**

## Case Study Spotlight: IRIS Fabrics Ltd, Gazipur, Bangladesh

### Description of the Factory

The IRIS Group is a knit garment manufacturer producing lingerie and sweater items. The group has a full range of five production facilities, located in three different places. Iris Fabrics Ltd is one of the units in Gazipur, which started its business operations in 1997.

The monthly production capacity of the facility is 24 tonnes of fabric. The factory consists of two single-storey buildings and one nine-storey building, spreading over 31,500 square meters. Iris Fabrics employs 3,250 workers at its premises.



### Emergency exits and staircase of Iris Fabrics Ltd.

### Implemented Measures

IRIS Fabrics conducted an initial assessment to identify fire hotspots, and then implemented a set of passive fire-fighting measures:

- Protection of the building structure by replacing walls with fire retardant walls. Installation of 68 fire doors to staircases, boilers and other relevant structures.
- Installation of a fire detection system consisting of 950 smoke detectors, 100 heat detectors, 300 multi-detectors, 80 manual call points, 120 input/output modules, 120 sounders and 12 sounders with flash. The complete fire detection system was provided with 2hr fireproof cables.
- Provision of a protected escape route marked with reflective pathway marks for each floor.
- Installation of emergency lamps to assure emergency illumination, even in the event of power outages.
- Allocation, communication and display of emergency evacuation plans and fire assembly points for each section throughout the factory.
- Installation of fire dampers to limit the spread of fire and smoke.
- Use of fire resistive grade accessories for cabling and ducting works.
- Development of fire safety training and provision for all employees on a regular basis to promote appropriate behaviour in the event of fire. To further increase aware-

ness regarding fire safety, a monthly fire and safety awareness programme is conducted for selected personnel.

- Training for 14 people to become fire fighters with the Bangladesh Fire Service and Civil Defence.
- It was assured that all components comply with the National Fire Protection Association standards. (Fire detection system - NFPA 72, Fire hydrant system - NFPA 14, Sprinkler system - NFPA 13, Fire pump - NFPA 20, Fire water reservoir - NFPA 22).
- To ensure the reliability of the system at any time, inspections of the passive fire fighting system are conducted on an annual basis. Waterflow through the sprinkler system is checked weekly and once a month the system is tested with a heat gun.

In addition to the passive fire fighting system, the following active fire fighting components were installed as part of the same project:

- The building was equipped with a fire hydrant system consisting of a pillar hydrant as well as a Class I, Class II and Class III Standpipe system.
- An automatic sprinkler system was installed throughout the building.

All details of the fire fighting systems are documented and recorded according to the Bangladesh Accord of Fire and Building Safety. Qualified engineers carried out the entire installation using imported quality components. The retrofit was done in 2016, and it took three months to complete the installation.



### Fire Fighting Training

### Investments and Savings

The initial investment for the system was BDT 2.5 crore and annual operation costs amount to BDT 7 lakhs. Since the retrofit was completed no fire accidents have occurred; the breakdown time due to fire hazards was recorded as zero.

## Features of Passive Fire Fighting Systems

The main feature of passive fire fighting systems is the automated fire alarm system consisting of automatic initiating devices (e.g. smoke detector, heat detector, sprinkler water flow) that in the event of fire, activate alarms and occupant notification devices throughout the building.

Fire detection and alarms systems are supplemented by means of egress, a continuous and unobstructed way of exiting the building from any point via a public way. Means of egress usually consist of three parts: exit access<sup>4</sup>, exit<sup>5</sup>, and exit discharge<sup>6</sup>. Further structural exit elements can include exterior exit stairs or exit passage ways— an exit component that is separated from other interior spaces of a building or structure by fire-resistance-rated construction and opening protections, and provides for a protected path of egress in a horizontal direction to the exit discharge or the public way.



**Fire Fighting Equipments**

## Legal and Other References in Bangladesh

In accordance with international good practices, all new and existing buildings and structures may be equipped with an automatic fire alarm and detection system. When complete automatic sprinkler protection is provided through out a floor with water-flow devices designed to initiate the alarm notification, smoke and fire detection devices can be eliminated through out that floor.

Automatic alarm systems shall be activated upon initiation of any of the following: manual alarm box, water flow alarm, or two or

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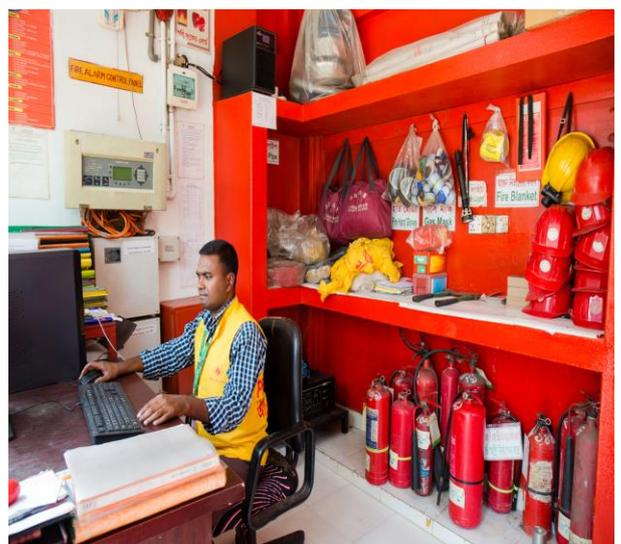
<sup>4</sup>Exit access is the path from any location within a building to an exit.

<sup>5</sup>An exit is typically a door leading to the outside or, in a multi-storey building, an enclosed exit stairway.

<sup>6</sup>Exit discharge is the path from the exit to the public way. A public way is a space that is permanently deeded and dedicated to public use, most often a street or lane.

more automatic smoke or fire detection devices. Notification shall be provided through out the building for total evacuation. Existing partial evacuation systems have to be replaced.

- The maximum occupancy load for any building storey should not exceed 500 people if only two exits are available and 1,000 people if three exits are available.
- Furthermore, each occupant must be provided with at least 4mm of egress width for exit doors. Therefore, if the exit door is 32 inches wide, a maximum of 200 occupants can egress through that door.
- All exits must be separated by at least half the length diagonally across the room. In buildings equipped through out with automatic sprinkler protection, exits in each room should be separated by at least a third the length diagonally across the room.
- Exit doors should lead to an exit stair enclosure, or directly to the exterior of the building. Egress routes should not pass through adjacent rooms and should not pass through hazardous areas (such as kitchens, storage rooms, loading docks, etc.). Exit doors must not be equipped with locking hardware that would allow an occupant to be locked inside the room or space. Exit doors should also not be equipped with secondary locking devices, such as a deadbolt or slide bolt. It should be possible to open any designated exit door using a single motion, without the use of a key, tool, or special knowledge. Travel distances from any point in the building to the closest exit should not exceed 45 minutes. This distance may be increased to 60 minutes if the building has a complete automatic fire detection system, portable fire extinguishers, and standpipe system or 122m if a complete automatic sprinkler system, automatic fire alarm system, and portable fire extinguishers are provided.



**Fire Fighting Control Room**

### Requirements for the minimum width of structural elements<sup>7</sup>:

Structural element	Fire resistance rating
Exit doors (existing)	0.8m
Exit doors (new)	1m
Aisles	0.9m
Corridors	1.1m
Stairs (existing)	0.9m
Stairs (new)	1.5m
Stair landing (existing)	0.9m
Ramps	1.1m



*Fire Fighting Equipments*

### Key Steps Required for Implementation

Past experiences have shown that the implementation of a passive firefighting system takes approximately three months (including planning and design).

To ensure the successful implementation of a passive fire-fighting system, please take the following steps into consideration:

- Determine the location and number of smoke and heat detectors, as well as audible and visible alarm devices as per BNBC Part 4 Section 4.4 and NFPA 72.
- Prepare drawings of the fire alarm and detection system as per NFPA 72 and submit them to the Chief Safety Inspector for review prior to the installation.
- Install the fire alarm and detection system according to the drawings.
- Until a central station monitoring service or direct connection to the Fire Service and Civil Defense can be set up, a person shall be assigned to contact the fire department in the event of fire alarm activation. A notification device shall be located in a constantly attended location to alert this person

### Availability of materials in Bangladesh

<sup>7</sup>Accord Building Standard (2014). Part 6 section 6.5

The required materials can be sourced via local or international traders for fire safety and sprinkler equipment.

A detailed list of available suppliers can, for instance, be found in the Practical Remediation Guidance document provided by the Accord for Fire and Building Safety.

### Nature of services required to support the implementation

- Engineering assessment and system design by third party experts or consultants
- Installation of fire detection and alarm system, fire doors and fire hydrants by factory engineers or installation service providers
- Maintenance services can be carried out by factory engineers
- Workers training

### Sources of technical support/expertise

For further technical details and guidance regarding passive firefighting, please refer to the following resources:

- NFPA 72 (2010). National Fire Alarm and Signaling Code
- ISO 7240-19 (2015). Fire detection and alarm systems
- ACCORD (2014). Fire safety for existing RMG buildings

### Possible Sources of Financing

SREUP credit line could be a good source of financing for such an investment.

Main Feature of SREUP Credit Line	
Loan Type	Normally Term Loan
Discount	Provision and possibility of 10% discount from loaned amount
Loan Tenure	3-5 years in general and in special case up to 7 years
Loan Limit	Normally up to 1 Million Euro and can be increased up to 3 Million Euro in special cases
Interest Rate	7% p.a. (maximum)
Grace period. Debt: Equity Ratio. Repayment	All issues are subject to agreement between borrower and lender



*Fire Bell at Iris Fabrics Ltd*

**Conclusion :** Some pictures of equipments shown here.



**Emergency Exits and Staircase at IRIS Factory**



**Bird Window at IRIS Factory**