

Business Case: Installation of Combined Standpipe and Sprinkler Systems

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

Why a Sprinkler System is a Good Investment

Being ready to effectively fight fire in a company reduces the risk of monetary losses from operational shutdowns, loss of material and damages to production facilities. At the same time, lowering the fire risk may improve a company's reputation among stakeholders and enable them to renegotiate better insurance premiums in the future.

Advantages of a sprinkler system at a glance:

- Immediate response to fire outbreaks, reduced smoke and heat damages
- Works without requiring the people at hand to know what to do
- Reductions in insurance premiums can be negotiated
- Enhancing 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 industry¹. 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.

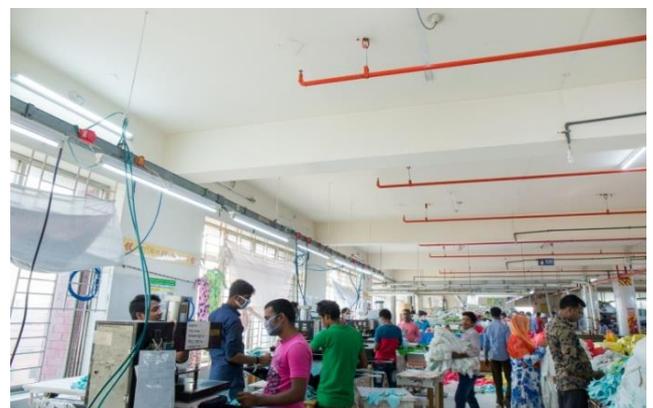
There are several methods available for protecting factory buildings from fires and stopping the spread of fires before they can damage properties and risk lives. The most commonly used technical solution is a combination of fire extinguishers, smoke detectors and alarms.

Another method is to use fire sprinkler systems. Heat activated sprinkler systems will instantly switch on as soon as a blaze begins. Sprinkler systems are able to quickly deal with a fire, ensuring that property damage is minimal and significantly reducing the risk to life and health of the people in the factory.

Given the heavy traffic in many industrial clusters, the fire brigade may not be able to quickly reach a factory once alerted. In this regard, a sprinkler system gives the fire services more time to arrive by reducing the risks of the fire spreading. Experience from around the world shows that fires in buildings with sprinkler systems have usually been suppressed before the fire brigade arrives at the location. One additional advantage of sprinkler systems is that these do not rely on people being on-hand to operate extinguishers or knowing what to do. Instead, fire wardens can focus on ensuring smooth evacuation of the premises as well as the rescue and care of injured workers. Furthermore, buildings which are protected by a dedicated fire sprinkler are considered inherently safer and may qualify for reductions in insurance premiums. Experience shows that insurance premiums can be reduced by 5% to 45% after installing a fire sprinkler system².

The expected direct and indirect benefits for installing combined standpipe and sprinkler systems usually outweigh the estimated costs of implementing the system, leading to a pay-back period on the investment of between 3 to 15 years.

Detailed information about the cost and benefits of installing a combined standpipe and sprinkler system can be found on the next page, followed by a case study example on page 3. Technical details on the installation and implementation process as well as legal requirements and possible means of financing can be found on pages 4 to 5.



Sprinklers equipped at every factory floor of Divine Textile Ltd.

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

²City of Scottsdale (1997), Automatic sprinklers - a 10 Year study

Protect Your Buildings, Lower Your Costs

The installation of active firefighting systems not only protects your staff and saves lives, it also is connected to a range of direct and indirect benefits for your company

Direct Benefits

Reduced heat and smoke damage	Since sprinkler systems suppress the spread of fire quickly, the damage to goods in process and installations will be less than with other firefighting approaches.
Reduced risks of fatalities and injuries to staff/workers on-site	Since sprinkler systems effectively suppress fire without delay, there is sufficient time is available to evacuate employee from the premises in case of a fire. This also reduces the probability of people getting injured, in turn reducing the risk paying out compensation and medical costs.
Improved compliance with regulations and buyer requirements	The installation of standpipe and sprinkler systems is one of the requirements set out by the National Initiative as well as several other organisations (see legal requirements). Non-compliance with these requirements can lead to the termination of all business activities with the respective supplier's factories. Installations and retrofits that go beyond the current requirements to fight or protect against fire also reduce the need for future retrofits.

Indirect Benefits

Better standing with international buyers	International buyers prefer suppliers that go beyond the legal requirements in their country and exceed their own expectations. This is because lower fire risks in your company imply lower business risks for international buyers.
Enhanced Security	A sprinkler-controlled fire decreases the demands on your on-site fire warden system and/or security forces, minimizing intrusion opportunities.
Better business returns	Studies have shown that companies that rate higher on ESG (Environmental, Social, and Governance) indices show higher profitability and / or business performances and are better at managing risks and opportunities ³ .

In addition to these benefits mentioned above, you may also benefit from lower insurance premiums, since lower risk will also put you in a better bargaining position. As per international practices, insurance underwriters may take into account the reduced risks and adjust the insurance premiums once your insurance is up for renewal. Around the world, 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 sprinkler protection is combined with features like smoke detection, 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, there are already initial discussions taking place with representatives from the Insurance Association along these lines, and they are looking into the possibility of similar reduced insurance premiums for adequately protected (low-risk) build-

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

ings. In cases when such an approach is accepted, the installation of active fire-fighting systems might help you to renegotiate insurance premiums in the future and make corresponding cost savings.

Calculating the Cost of a Sprinkler System

The cost of a complete sprinkler system depends on many factors, such as the building type and construction, availability of public water supply, and the degree of hazard of the occupancy. A cost comparison of 16 suppliers for standpipe and sprinkler systems in Bangladesh provides these estimates of installation costs⁴:

- Sprinkler system: BDT 1,375/m² for a UL listed product and BDT 1,184/m² for non-UL listed products.
- Standpipe system: BDT 968/m²
- Combined sprinkler and standpipe system: BDT 2,260/m²

In addition to the installation cost, companies need to take into consideration annual maintenance costs of approximately BDT 50,000 – 60,000⁵.

Indicative average investments needed for implementing the respective retrofit by unit:

Type of Investment	Required amount	Approx. Costs (BDT)
Fire pump	2 per building	30 lakh – 43 lakh ⁶
Risers/pipes	n.a	2,500 – 4,900 per m
Standpipe hose connections	1 per stairway and level	33,700 per set for class III assemble
Zone control valves	1 per zone	63,000 per piece
Water flow alarm device	1 per riser	16,900 per piece
Sprinklers	See i.e. NFPA 13 ⁷	330 – 670 per piece
Pipe installation works	n.a.	700 per m
Hose assemble or valve installation works	n.a.	3,370 per piece
Pump set up works	n.a.	92,600 per pump set
Testing and commissioning	n.a.	33,700
Further long-time costs	n.a.	56,224 per year
Approx. total cost		~ BDT 2,260/m²
Estimated pay-back period		1-15 years

⁴ACCORD (n.d.). Estimated Costs for Common Fire Safety Equipment. Available online at: <http://bangladeshaccord.org/wp-content/uploads/Estimated-Costs-Fire-Safety-Equipment.pdf>

⁵ Average cost calculated using data from: BRE Fire Conference (2015). A cost benefit analysis for sprinklers in tall buildings

⁶ Cost for complete UL or FM certified pump set consisting of 1 diesel pump, 1 electric pump and 1 jockey pump

⁷ Flemming, Russel P. (n.d.). Automatic Sprinkler System Calculations

Case Study Spotlight: Divine Textile Ltd, Dhaka, Bangladesh

Description of the Factory

Divine Textile Limited (Unit-2) is one of 14 factories belonging to the Divine Group, a vertically integrated textile manufacturer. The factory's main production processes include spinning, yarn dyeing, knitting fabric dyeing, finishing, printing and production of garments. The factory covers over 23,200 square metres, employs 2,000 people and has a production capacity of 900,000 pieces per month.



Implemented Measures

In the textile industry, nearly all materials are flammable to some degree and fire is a constant threat. While fire prevention is important, accidents sometimes happen and in-house fire wardens and professional fire fighters need the right systems in place to stop the fire spreading and minimise the damage. Since the first 10 minutes are crucial for controlling a fire, having an active firefighting system in place is a worthwhile investment.

After an initial analysis of the fire hotspots in the factory, the Divine Textile management team realised the need to invest in their factory's fire safety. Consequently, Divine Textile invested in several active and passive firefighting components. **To be able to locate a potential fire quickly, Divine Textile installed 158 smoke detectors, 194 multi-sensor detectors, 7 heat detectors and 11 beam detectors across the entire building.** This investment was complemented with 65 fire alarms, 28 horns and 37 strobes with horns to provide acoustic and visual alarm signals in case a fire breaks out. To ensure the smooth and safe evacuation of their employees, Divine Textile further installed emergency lights and emergency exit signs. These investments are of paramount importance to ensure that employees are evacuated as quickly and safely as possible in the case of a fire outbreak.

With regards to active firefighting, Divine Textile Ltd. Unit-2 installed a sprinkler system that can be activated via a central controlling unit. Additionally, 388 fire extinguishers (ABC, CO₂& foam) and 31 hose reels were installed to allow the designated fire wardens to fight the fire.

Moreover, the entire firefighting system is inspected on a quarterly and annual basis with two separate checklists to ensure reliability at all times. All details of the firefighting system are documented and recorded according to the requirements of the Accord on Fire and Building Safety in Bangladesh. Qualified engineers carried out the entire installation using imported quality components. The retrofit was implemented in 2015 and took 3 months to complete.

As an additional measure to react more quickly and effectively to possible fire outbreaks, Devine Textile Limited appointed and trained an **internal firefighting team, equipped with fire helmets, gas masks, heat gloves, lock cutters, fire hooks, blankets, etc.**

Furthermore, all employees are trained for facing fire accidents and 37 evacuation plans are displayed around the premises, showing evacuation routs and fire mustering points.



Fire numn house at Divine Textile Ltd.

Investments and Savings

The total initial investment for Divine Textile Ltd.(Unit 2) was approximately BDT 2.6crore. Since the fire-fighting system was installed in 2015,there have been no accidents due to fire.



In-house fire wardens on a drill at Divine Textile Ltd.

Features of Combined Standpipe and Sprinkler Systems

Installed in buildings in a vertical position, a standpipe system is a rigid network of water pipes that fire hoses can be connected to. This allows the manual application of water in cases of fire. A standpipe can be considered to serve the same purpose as a fire hydrant in a building.

Combined systems provide a pipe that is able to supply both the hose connections and the automatic sprinklers, thereby reducing the need for the installation and use of multiple water pipes.

Standpipe and sprinkler systems are essential for effective fire-fighting and have a major influence on reducing fatal accidents and high damages to properties and goods.

Legal and Other References in Bangladesh

- In accordance with international good practices, all new and existing buildings and structures where the highest occupied floor is more than 10 m (33 ft) above grade shall be equipped with standpipe systems.
- In every building that falls under these above criteria, a Class 1 standpipe hose connection shall be installed in all stairwells on each floor level (also including roofs that can be occupied).
- Class II standpipe hose connections (40 mm) shall be installed for use by trained personnel but are only required if the building is not protected with automatic sprinklers.
- All standpipe systems have to be installed in accordance with NFPA 14.
- Standalone standpipe systems shall meet the BNBC⁸ requirements or NFPA 14⁹. Automatic sprinkler protection has to be installed throughout all portions of new and existing high-rise buildings that have occupied floor greater than 23 m (75 ft) above the finished grade.
- Existing buildings greater than 2 storied that have non-rated construction, shall not exceed 2,000 m² (22,000 sq. ft.) area per floor unless automatic sprinkler protection is provided throughout the building.
- Both standpipe and sprinkler systems require fire pumps which have to be installed as per NFPA 20.
- The minimum wall thickness of steel pipes shall be in accordance with NFPA 13¹⁰.
- When water flow from the automatic sprinkler system is activated, the fire alarm system should also automatically be activated.

Key Steps Required for Implementation

Experience shows that it takes approximately one year to install and implement a combined standpipe and sprinkler system (including planning, design and corrective measures).

To ensure the successful implementation of a combined standpipe and sprinkler system on a factory's premises, the following steps should be taken into consideration¹¹:

- Determine the location and number of risers and sprinklers required for the system using NFPA 101 and NFPA 13.
- Prepare and submit the standpipe and sprinkler design to the institution in charge of monitoring (e.g. ACCORD, Alliance or National Initiative). If the installation work is done without reviewed designs, the system might not be recognized.
- Locate hose connections and vales throughout the building using NFPA 14 requirements.
- Determine both capacity and residual pressure requirements for the standpipe system using NFPA 14.
- Add the sprinkler allowance for partially sprinklered buildings. Though buildings should be fully sprinklered, this step applies to jurisdictions where complete sprinkler coverage is not required.
- Locate sprinklers and size distribution piping as per NFPA 13 and according to the manufacturer's installation instructions. Figure 7-2.3.1.2 of the 1999 edition of NFPA 13 and corresponding figures in NFPA 231 and 231C contain area/density curves from which the designer can select a design area and density appropriate for the occupancy hazard classification.
- If a water supply tank is required to meet the capacity requirements of the system, the tank has to be sized as per NFPA 13 for the appropriate duration. (Refer to NFPA 22: Standard for Water Tanks for Private Fire Protection for installation requirements)
- If the water supply is through the city mains, use NFPA 24: Standard for the Installation of Private Fire Service Mains and Their Appurtenances to design the water supply piping. Determine the available static and residual supply pressures at the main from a hydrant test (defined by NFPA 291: Recommended Practice for Fire Flow Testing and Marking of Hydrants).
- Size the fire pump to meet the pressure and flow requirements and design the pump room to comply with NFPA 20 Standard

Availability of materials in Bangladesh

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

A detailed list of available local suppliers can, for instance, be found in the Practical Remediation Guidance document provided by the Accord for Fire and Building Safety¹².

Nature of services required to support the implementation

- Sprinkler system design by third party experts and consultants
- Installation services by external installation service providers

⁸ Housing and Building Research Institute (2015), Bangladesh National Building Code

⁹ NFPA 14 (2016). Standard for the Installation of Standpipe and Hose Systems

¹⁰ NFPA 13 (2013), Standard for the Installation of Sprinkler Systems

¹¹ Matthew Roy (2006), Designing Combined Standpipe and Sprinkler Systems

¹² ACCORD (2015). Practical Remediation Guidance. Available online at: <https://bangladeshaccord.org/wp-content/uploads/Practical-Remediation-Guidance.pdf>

- Maintenance services either by factory engineers or external service providers
- Workers training

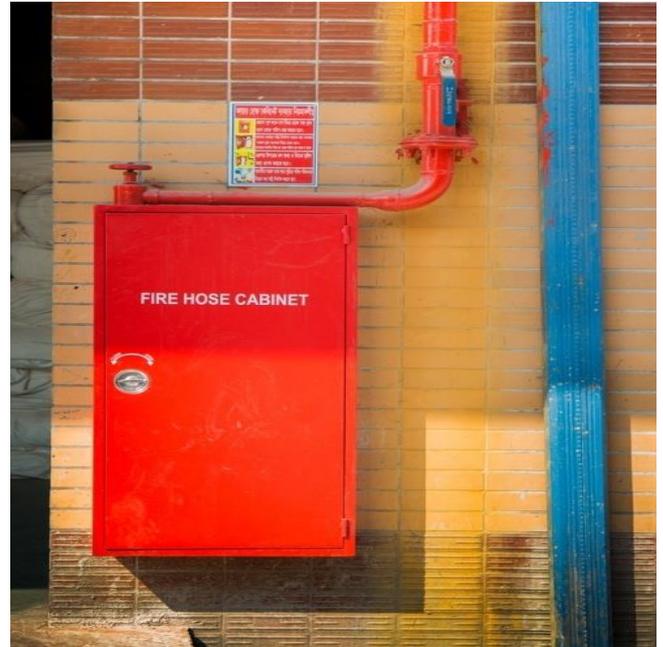
Sources of technical support/expertise

For further technical details and guidance regarding active fire-fighting systems, please consult the following resources:

- NFPA 14 (2016). Standard for the Installation of Standpipe and Hose Systems
- NFPA 13 (2013). Standard for the Installation of Sprinkler Systems
- Housing and Building Research Institute (2015), Bangladesh National Building Code
- ACCORD (2015). Practical Remediation Guidance.
- ACCORD (2014). Fire safety for existing RMG buildings
- ILO (2017). Towards Improved Fire and Building Safety in Bangladesh

Possible Sources of Financing

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



Hose pipe cabinet at Divine Textile Ltd.



Fire Hydrant at Divine Textile Ltd.

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



Zone Control Valves to control Sprinklers waterflow or malfunctions at the factory floor of Divine Textile Ltd



The entrance of the factory floors of Divine Textile Ltd. Is equipped with fire resistant and firefighting equipment