

Chapter Nine: Fire Safety

9.1. Introduction

In the garment industry, most deaths from fire are due to the inhalation of smoke or from workers falling to their death from multi-story factories as they try to escape. Tragically there have been a number of garment factory fires in which large numbers of workers have died. Some of these tragedies have reached the national and international press and the poor publicity has impacted on the Brands as they try to maintain their market share. As a result, the compliance officers who monitor the Brands' Code of Conduct are looking closely at the whole issue of fire safety. In Cambodia at the present time, there are no regulations dealing with fire safety. Although there is a national Fire Department, which has the authority to deal with fire safety, it appears at the present time that they do not have national standards or benchmarks to guide their work³.

9.2. Core Information

When you are trying to improve fire safety in your factory, it is essential to carry out a risk assessment in which you look at the chances of a fire occurring and the dangers that a fire poses to the workforce. A number of organisations which deal with the issue of fire safety have proposed a basic five step strategy in fire risk assessments, namely:

1. Identify potential fire hazards;
2. Identify those workers most at risk in the case of a fire;
3. Evaluate the risks and, most importantly, implement any improvements that are needed;
4. Record findings and actions taken; and
5. Constantly keep the assessment under review and implement changes as necessary.

Let us look at these steps in more detail as they relate to garment factories. Many of the steps may seem obvious but any walkthrough workplace inspection will reveal a number of potential fire hazards.

Identify Potential Fire Hazards

Basically we are looking for any

- sources of ignition;
- sources of combustible material; and
- processes in the workplace that could be a fire hazard.

There are many potential sources of ignition in a garment factory, including faulty electrical wiring (see section 8 on electrical safety); friction caused by poor machine lubrication/ maintenance; and, hot irons not being used/stored correctly. It is not difficult to identify combustible material – look at the materials being used, the

³ Personal communication from Tun Sophorn, Programme Assistant, ILO Garment Sector Working Conditions Improvement Project, 2003.

cardboard boxes, the waste on benches and floors, the chemical solvents and oils, the furniture, the fabric of the building, etc. Namely, anything that burns is fuel for a fire (see picture 50 and 51).

Picture 50: Fuel. Look at these poorly stored flammable liquids next to boxes, paper and other combustibile material.



Picture 51: Look at these flammable chemicals being stored in direct sunlight.



Identify Those Workers Most at Risk

If there is a fire in your factory, the priority is to save lives – in other words, evacuate the building of all workers (except those who are qualified to deal with the fire). Putting out the fire is secondary to saving workers' lives. It is essential that you look at the means of detecting fires in the factory and giving warning signals as well as the routes of escape for all workers. When a fire starts it can spread rapidly through the building and workers can very quickly be overcome by heat and smoke. For this reason it is important to plan for all eventualities, including how all workers can be warned that a fire has started (even temporary workers or outside contractors, visitors, customers, etc.) and then how they can escape. Look carefully at those workers who may be furthest away from any doors and see if their exit routes are clear at all times and how long it would take them to evacuate the factory in case of an emergency.

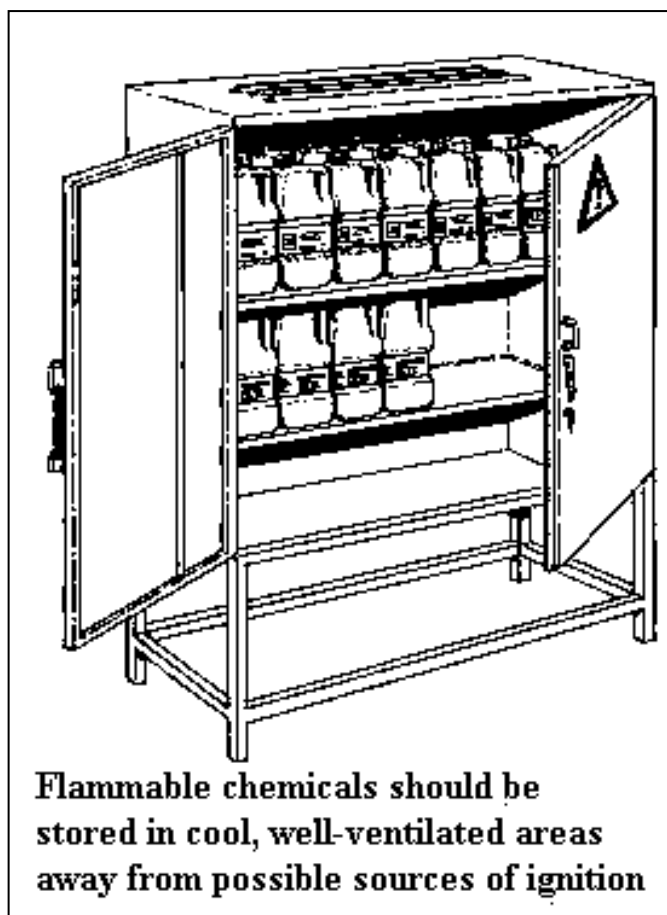
Evaluate the Risks and Implement the Improvements

It may sound like common sense but one of the most obvious ways of reducing the risks of a fire breaking out, is to **remove any sources of ignition and reduce any combustible material**⁴. For example:

- make sure that all electrical wiring is in good condition and that all fuses and circuit breakers are of the correct rating;
- make sure that all machines are well maintained and regularly lubricated;
- make sure that irons do not overheat and that they are placed only on flat, stable, insulated surfaces;
- make sure that there is “good housekeeping” in the factory so that all waste is removed on a regular basis;
- try to ensure that there is not an excessive build up of stock;
- make sure that any combustible materials (boxes, paper, raw materials etc.) are stored correctly and away from flammable liquids;
- make sure that all flammable chemicals are stored in a cool, fire resisting cabinet away from any possible sources of ignition (see figure 21). Quantities of flammable liquids in the workplace should be kept to the minimum required for that shift and kept away from escape routes (in other words, don't keep excessive amounts of chemicals in the workplace);
- make sure that any rags or cloths that are used to mop up or apply flammable liquids are disposed of in metal containers with lids and removed from the workplace at the end of the shift;
- operate a no smoking policy throughout the workplace except in safe, designated areas;
- repair or replace furniture with fire-resistant materials where possible;
- if a new factory is being built or a new extension is being added, try to ensure that fire-resistant materials are used in the construction as far as possible.

⁴ Oxygen is also a vital component for all fires. Without oxygen, a fire cannot start. However oxygen is always present in the air, so removing/reducing it is difficult. Windows and doors that are not essential for ventilation or escape in case of emergency can be closed (NOT locked).

Figure 21:



All factories should have **arrangements for detecting fire and giving warnings** to workers to evacuate the building as soon as possible. Speed (but not panic) is essential so that the evacuation is orderly and is completed before any escape routes are blocked by the fire and/or smoke. Traditionally, in smaller, single story garment factories, workers have relied on their sense of sight and smell to raise the alarm, either by shouting “fire” or by ringing some sort of alarm bell/s. In some cases, basic smoke detectors can be strategically placed and can send out alarm signals in case of fire. These smoke detectors should be of good quality, interlinked to provide coverage of the entire workplace and powered by the mains electricity with battery back-up in case the mains supply is cut off or damaged in the fire. In certain cases, a heat detector type may be more effective than smoke detectors as for example in dusty environments. Remember that all false alarms cost money but they cannot be ignored just in case they are the real thing. Accordingly, it is essential to seek advice from the Fire Department or companies that deal with fire safety as to the best type of detector and alarm system to suit your factory.

In larger factories, especially those based on many floors, a more sophisticated type of detector/alarm system is required. As a minimum, such factories should have an electrical (+ battery back-up) warning system with manually operated call points. However, it is better to install an effective, reliable automatic fire detection/warning system in which case there is no need for workers to manually raise the alarm (see picture 52). Of course, such systems can be expensive but cost next to nothing when

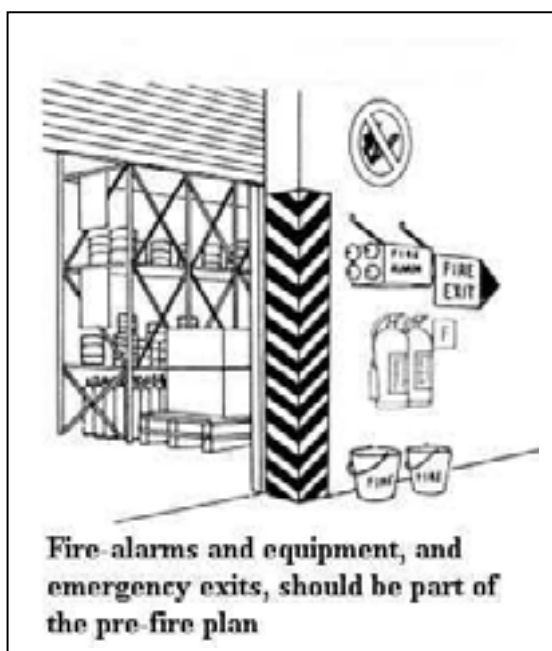
compared to the losses of a factory fire. Sadly, many factory owners may not be willing to invest in such systems especially where the buildings are old and not particularly suited to running a garment factory.

REMEMBER:

The fire alarm must be loud enough and positioned correctly so that ALL workers in the factory can hear it. You must also consider the case of any workers who are suffering from noise-induced hearing loss.

Picture 52:

Fire alarms, fire extinguishers, emergency lighting, and fire exit signs in a garment factory – a model of best practice.



Once a fire has been detected and the alarm given, the workers should evacuate the building/s by a **safe means of escape** in an orderly, well-rehearsed manner. Such evacuations should be instilled into the workers' minds through repeated fire drill practices so that there is no panic with everyone running for different exits. They should know instinctively which exit to head for and where to assemble outside and be checked off so that no one is left/unaccounted for in the building.– in other words they should know their safe means of escape. This is often easier said than done as workers rush to escape as the workplace fills with smoke. In fact it is the smoke that kills most workers in factory fires.

Obviously, the layout of the factory is fundamental when planning sufficient means of escape. It is normally reckoned that every floor or large room should have at least two exits and that these are kept **unobstructed and unlocked!** Look very closely at picture 53.



Picture 53: This picture was taken in a dark, gloomy, garment factory in the Caribbean. If you look carefully you can see a blocked fire extinguisher and a totally blocked door. Look again – not only is it blocked, it is locked with a padlock! There is no way that this constitutes a safe means of escape! The key was kept in the manager’s office at the other end of the building – according to the manager it was kept there for security reasons. Just because this case study comes from another part of the world, there is no reason for complacency amongst Cambodian managers. Think about your factory – are all the doors unobstructed and unlocked?

All escape routes must be clearly signposted with direction arrows and well-lit with a back-up power supply⁵.

In small, single-story factories, the normal entrance/exit doors may be sufficient as a means of escape because the time and distances needed to reach safety on the outside are relatively short. In larger, multi-story factories, other arrangements exist whereby:

- once the alarm is raised, the whole factory is evacuated at the same time – this is sometimes referred to as *simultaneous evacuation*;
- alternatively, workers who are most at risk are evacuated first, followed by the others – this is known as *two stage evacuation*. The principle is to avoid

⁵ *Emergency escape lighting* is part of the emergency lighting system that comes into play when the electricity supply to the normal lighting fails. This ensures that the means of escape can be safely and effectively used at all times – even when a fire takes out the electrical supply.

congestion on the escape routes. In some cases, workers on the floor where the fire is located, *and those from the immediate floor above*, are evacuated first followed by other floors one by one.

At the time of writing, the Cambodian authorities do not have any specific guidelines on fire safety. In order to assist managers to meet some of the main principles for escape routes, here are some of the basic guidelines⁶ published by the UK Health and Safety Executive (amongst others) that may help:

- To ensure that the time available for workers to escape is sufficient, it is suggested that the distance of the escape route from the work area to the storey exit should not exceed:
 - *Where more than one escape route is provided*
25 metres in high fire-risk areas (e.g. the ironing section);
45 metres in normal fire-risk areas (e.g. the sewing section);
60 metres in low fire-risk areas (e.g. pattern design/making area).
 - *Where there is only a single escape route provided*
12 metres in high fire-risk areas;
25 metres in normal fire-risk areas;
45 metres in low fire-risk areas.

REMEMBER – these distances will not be suitable for workers with certain disabilities. In such cases, special arrangements will have to be introduced.

- Not only must there be adequate numbers of exits correctly sited, they must be of suitable widths for the number of workers to escape safely in the case of an emergency. It isn't just a case of the exits being unblocked and unlocked, they must be wide enough so as not to cause a bottleneck. Similarly, corridors and passageways should also be wide enough to allow the free flow of workers in case of fire. It is estimated that
 - a doorway of no less than 750 mm. in width is suitable for up to 40 workers per minute to escape through;
 - a doorway of no less than 1 metre is wide enough for up to 80 workers;
 - where more than 80 people per minute are expected to use an exit, the minimum exit width should be increased by 75mm. for each additional group of 15 workers; and
 - corridors/passageways should be not less than 1 metre wide. If corridors are long (more than 45 metres), they should be divided into equal parts separated off from each other by close-fitting fire doors, thereby limiting the distance workers would have to travel to escape smoke-filled passageways.

⁶ The UK Home Office, the Scottish Executive, The DoE (Northern Ireland) and the HSE have produced an excellent publication – *Fire Safety, an employer's guide* (1999) which contains information on fire risk assessment and helps the reader to identify safeguards.

- Stairways should obviously be wide enough to allow the escape of workers in the case of an emergency. They should not be less than a meter wide in most cases and should be *protected* by fire-resisting doors and partitions⁷. It is suggested that:
 - an unprotected stairway should link no more than two floors in a factory and those floors are not linked to another floor by an unprotected stairway;
 - a single, protected stairway may be suitable provided it serves no more than 3 floors above, or one floor below, ground level;
 - access to these stairways must be clearly visible and signposted from any part of the floor it serves;
 - where there is an external stairway, any door or window opening directly onto the stairway or within 1.8 metres horizontally or 9 metres vertically should be fire-resisting. In this way the escape stairway doesn't get blocked by the flames/smoke emitted from these openings.
- Doors should open outwards and must never be locked or obstructed. Where the door has to be kept shut for security reasons, the door should be fastened with a single form of release device such as a push bar and all workers should know how to operate it in case of an emergency.
- All emergency exits and routes must be clearly signposted with directional arrows (both written and in picture form as some workers may not be able to read) throughout the factory;
- All escape routes must be well-lit so that workers can see their way out safely with emergency lights at key places such as, at each exit; at corridor intersections; on staircases; next to steps.

All too often, fires do break out in garment factories despite all efforts to minimise the risks. When this happens you need to have the appropriate type of **fire-fighting equipment** and the skills to operate it without endangering the lives of those who use the equipment and fellow workers. In most cases, this involves the provision of strategically placed, portable fire extinguishers with suitably trained workers to operate them. In larger factories this may be backed up with fire hoses/reels, fire blankets or even sophisticated automatic sprinkler systems.

Fires are normally classified as follows:

- Class A: fires involving solid materials – usually organic material such as wood, paper, material etc. These can be dealt with by water, foam or multi-purpose powder fire extinguishers;
- Class B: fires involving liquids or liquefiable solids – such as paints, oils and fats. In these fires it is best to use foam, carbon dioxide or dry

⁷ A *protected stairway*- is one which is adequately protected from fire in the adjoining area by fire-resisting construction (internal walls, doors, partitions, ceilings etc) and either leads to a final exit or along a protected route to a final exit.

powder types of extinguishers (see picture 54). Carbon dioxide extinguishers are suitable for fires involving electrical equipment – **NEVER** use water on electrical fires;



Picture 54: Here is a dry powder extinguisher suitable for type B and C fires as it says on the side of the cylinder. Look at the state of the extinguisher, covered with dust. It is difficult to tell from the dial at the top if it is still operational or needs servicing. Note that there are no signs to clearly show its presence.

- Class C: fires involving gases – again as shown in the picture, dry powder extinguishers can be used on this type of fire;
- Class D: fires involving metals – none of the above extinguishers would be suitable for these fires. These are unlikely to occur in the garment industry; and
- Class F: fires involving cooking oils and fats – again these are not particularly relevant for the situation in a garment factory. As with class D fires, specialist advice should be sought if, after you have carried out a fire risk assessment, you consider that these may be a problem.

As far as garment factories are concerned, Class A fires are the most common. Accordingly, the factory should have sufficient numbers of suitable extinguishers that are prominently located around the workplace, especially on escape routes and near exit doors and accessible. They should be in good condition and regularly serviced with records kept. Look at the following pictures of fire fighting equipment – the problems are obvious:

Picture 55: A fire extinguisher that is in an unsafe condition. It will never work and workers would be best advised not to touch it.



Picture 56: A blocked fire hose/reel. How are workers supposed to reach it in the case of a fire?

Pictures 57: A blocked extinguisher, how are you to reach it in case of fire? Two extinguishers hidden under a workbench.



Having assessed the workplace, developed an action plan, and bought all the fire fighting equipment, how do you know that it will all work in case of a fire. Obviously you need to **maintain and test** all the safety measures and equipment on a regular basis. For example, all alarms and extinguishers should be checked weekly by management and have full services by the competent authority on an annual basis. Managers/supervisors should check daily that access to emergency equipment, routes of escape, doors etc., are not blocked or locked. In other words you have to test the system to make sure that it works – you cannot wait until a fire breaks out to test the system! In the event of a fire, workers need to know what to do, and this involves **training in fire safety**. The factory manager must have an emergency plan in place which establishes the procedures to be followed to ensure that the workplace can be safely evacuated. The emergency plan must cover **all** workers in **all** locations as well as any visitors to the factory. Key areas of the plan include:

- The action workers should take if they discover a fire;
- How fellow workers will be warned throughout the factory;
- How the workplace will be evacuated safely – identification and maintenance of escape routes (any special arrangements for disabled workers);
- Where workers should assemble after they have safely evacuated the building and procedures for checking them off to ensure that no one is left inside the factory;
- The means for fire fighting – details of the number, type and location of fire fighting equipment (extinguishers, hoses/reels etc.) and the training of special fire-fighting teams amongst the workers (see picture 58);
- The regular training of all workers (especially new workers) in fire safety;
- The locations of main electrical and water supplies;
- Details of how to contact the emergency services such as the Fire Department;
- Details of areas of any special dangers to alert the Fire Department – e.g. any dangerous chemicals stored in the factory and their location;
- The regular testing of the emergency plan – fire alarms, fire drills, fire-fighting by specially trained groups of workers, emergency lighting;

Picture 58: In some garment factories, workers have been trained specifically in fire fighting, especially in the use of equipment. These workers form fire-fighting teams on each floors/section of the factory. They are easily identified by badges so that every worker knows who they are.



It may sound obvious BUT, regular testing of your emergency plan is essential. Don't leave the testing until it is a real emergency!

Record Your Findings and Actions

In order to ensure that all your plans are effective, you need to keep details of any actions taken to improve fire-safety and regular checks to ensure that the improvements are maintained. When testing the system, you must record details about fire drills, such as:

- date of the fire-drill;
- evacuation times;
- the nature of the drill;
- any observations/remedial action required (e.g. have evacuation times improved/got worse?).

Such records will help you to review/fine tune your whole emergency plan.

Review and Revise

Any emergency plans may have to change as changes are introduced into the factory. You may have taken on more workers; you may be using new processes or chemicals; you may have a new extension to the factory; some of your key fire-fighting workers may have left the company; and so on. Just as your business is in a constant state of flux, so must be your plans. You must constantly review and revise your plans in the light of any such changes.

9.3. Checklist on Fire Safety

	Yes	No	Action Required
Does the factory have any kind of fire safety certificate?			
Is the factory regularly inspected by the competent authority which issues the certificate?			
Does the factory have an emergency plan in case of fire or other emergency? NB. It should cover evacuation routes, assembly areas, fire extinguishers and first aid locations, tel. numbers for fire brigade and hospital etc.			
Are all workers familiar with the emergency plan, trained in its use and regularly involved in testing it?			
Are the procedures to be followed clearly indicated throughout the factory and in a format and language that the workers can understand?			
Are there regular evacuation drills and alarm tests to evaluate the effectiveness of the emergency plan?			
Are records of the drills and tests maintained and available for inspection?			

9.3. Checklist on Fire Safety (continued)

Can existing means of detection (eg smoke detectors) discover a fire quickly enough to raise the alarm in time so that all workers can escape to a safe place?			
Can the fire alarm be heard clearly throughout the entire factory even when initiated from any single point?			
If the alarm system is electrically powered, does it have a back-up power supply?			
Do all workers know how to operate the fire alarm system?			
Are there clear instructions, strategically placed, reminding workers on how to operate the fire alarm system?			
Are there enough fire exits and in the correct location for all workers to escape in the case of an emergency? (eg at least 2 on each floor)			
Are the type and size of the exits suitable and sufficient for the number of workers?			
In the event of a fire, could all available exits be affected or will at least one route remain available?			
Are all escape routes easily identifiable, free from obstructions and clearly illuminated?			
Have all workers been trained in using the means of escape?			
Are all exit doors unlocked and designed to open outwards?			
Are the extinguishers suitable for the type of fire (eg class A & B) and of sufficient capacity?			
Are there sufficient extinguishers sited throughout the factory?			
Are the right type of extinguishers located close to the fire hazards and can users gain access to them without exposing themselves to risk?			
Are the locations of extinguishers and fire hoses clearly identified and unobstructed?			
Have key personnel been trained in the correct use of these extinguishers and fire hoses?			
Are the fire extinguishers fully charged and inspected weekly?			
Are the fire extinguishers etc fully checked and tested annually by an external competent authority?			
Are there workers on each floor of the factory who have been specifically trained in fire fighting?			

9.3. Checklist on Fire Safety (continued)

Do these fire fighters wear identifying clothes so that all workers know who they are?			
If the factory has an automatic sprinkler system does it have a separate water supply and is it tested regularly?			
Have warning signs been placed on all elevators/lifts indicating that they must not be used in case of fire?			
Is smoking prohibited in all working areas and "No Smoking" signs posted clearly and prominently throughout the factory?			

9.4. Summary

Every year, a number of workers die in garment factory fires – many more are injured. The cost to the injured, the family and society is immeasurable. The cost to the factory may be catastrophic – the business may well have to close. Even if your factory is not gutted by the fire, the poor publicity may make the Brands think twice about placing any orders with your company. Modern companies in the garment industry do everything they can to prevent fires breaking out, and, if they do, have procedures in place to evacuate the factory and fight the fire. This involves undertaking a complete fire risk assessment of the factory and developing/ implementing an action plan.