Persatuan Insurans Am Malaysia
Level 3, Wisma PIAM, 150, Jalan Tun Sambanthan,
50470, Kuala Lumpur.
P.O. Box 12555, 50782 Kuala Lumpur

CONTENTS

IMPORTANT NOTE:

This document consists of recommendations on minimum requirements and best practices based on the experience of insurance underwriters and loss control professionals in the insurance industry. The recommendations presented are what are deemed as the most suitable solution for the timber & furniture industry. The list of recommendations is in no way exhaustive. The Malaysian Timber Industry Board (MTIB) may consult PIAM on specific details.

PIAM shall not be liable or accept responsibility for any incidental, consequential or special damages arising from the use of this document or the implementation of recommendations.

Dated : 5th November 2012 (Version 1.0)
(For implementation w.e.f. 1st January 2013)

1.0 Scope

This document is a recommended guidelines of minimum requirements and best practices for the timber and furniture industry specially prepared by Persatuan Insurans Am Malaysia (PIAM) and on request by the Malaysian Timber Industry Board (MTIB). **The guidelines addresses the physical aspect of the risk only and acceptance of insurance cover is at the discretion of individual insurers.** The purpose of this document is to enable the various members of the MTIB to implement good loss control and management practices.

The guidelines are applicable to all MTIB members involved in the manufacturing, storage and retail of timber products including furniture. They have been designed to be easily understood and are presented in a simple to read table format.

The guidelines will, wherever possible, refer to;

- Malaysian Regulation and Statutory Requirements
- Established International Best Practice Codes

The guidelines are split into 2 main categories, i.e. **Minimum Requirements** and **Best Practise**. Minimum Requirements are those measures which are required to be implemented at the very least. Best Practises are those measures which are implemented to reach a high level of plant safety in accordance to established international best practise standards.

The guidelines are also classified as Priority Level 1, 2 or 3. The priority levels are based on level of importance and the time frame for implementation. Priority Levels are defined under Section 2.0.

It is recommended that the members and/or MTIB confer with BOMBA on all matters related to fire protection of their premises. This would encompass all timber related occupations whether retail, storage and manufacturing.

MTIB members are also encouraged to obtain the advice and technical input on all matters from their engineering consultants, specialist maintenance companies and plant & equipment designers/suppliers, wherever necessary.

There is some level of overlap between the various sections in these guidelines. As such, certain guidelines are repeated in the different sections. This is unavoidable and not unexpected as there are considerable interdependencies and linkages between each section. None of the activities are independent or separate from the others. It also allows MTIB and member companies to read or refer each section separately and without the need to read the entire document.

2.0 Terms and Definitions

A list of terms and definitions used in this guideline is described below.

Priority Levels are:

Level 1	Measures implemented in the short term. Within the control of ***MTIB Member Companies*** to address with minimal or not excessive capital expenditure involved.
Level 2	Measures implemented in the medium to long term. Often involves significant capital expenditure.
Level 3	Measures implemented would improve the overall safety and fire protection of ***MTIB Member Companies*** to a higher standard. May involve only procedural and organizational changes or minimal cost to implement.

Short Term is considered as less than 3 months, Medium Term as between 6 months to a year and Long Term anything longer than that.

Definitions

Flash Point - The **flash point** of a chemical is the lowest temperature at which it can vaporize to form an ignitable mixture in air. When an ignition source is applied to the chemical a fire will start.

Flammable Liquid - Definition and classification of flammable and combustible liquids are based on the NFPA 30. A flammable liquid is defined as a liquid whose flash point does not exceed 100°F/38°C, when tested by closed-cup test methods, while a combustible liquid is one whose flash point is 100°F or higher, also when tested by closed-cup methods.

Abbreviations

The abbreviations used in this document are:

PPE – Personal Protective Equipment
LFL – Lower Flammable Limit
UBBL – Uniform Building By-Law
FPS – Fire Protection System
RFT – Revised Fire Tariff
HPR – Highly Protected Risks
NFPA 30 – Flammable and Combustible Liquids Code
NFPA 86 – Standards for Oven and Furnaces
MSDS – Material Safety Data Sheet
OSHA – Occupational Safety & Health Act

3.0 Recommended Guidelines

The recommended guidelines are split into 10 sub sections (3.1 to 3.10) and summarised in the subsequent pages of this document. Each section deals with a different aspect of the operations.

3.1 Risk Management, Training and Awareness

Risk Management is the identification, analysis, assessment, control, avoidance, minimization, or elimination of unacceptable risks which any company in the timber/furniture industry faces. Unacceptable risks normally are the results of hazards which are inherent in the business. For the timber/furniture industry, it would mainly involve the spray painting operations, handling flammable chemicals and managing sawdust generated from sanding, cutting and other woodworking activities.

Every business needs to have a risk management strategy or plan in place. The scope and the level of detail of the plan would depend on the size of the organization and its own internal goals. Techniques to manage the risk fall into one or more of these four major categories:

- **Avoidance** – i.e. eliminate, withdraw from or not become involved
- **Reduction** – i.e. mitigate
- **Sharing** - i.e. transfer, outsource or insure
- **Retention** - i.e. accept

A good risk management strategy would have a combination of these approaches.

Training and awareness comes hand in hand with the plan. It is the organisation's duty to ensure that every employee is trained regularly and kept aware of the various risks and hazards in the operational activities. The introduction of new technology, use of new timber products or other chemicals (e.g. in the finishing process) must be also assessed to establish if new hazards are being introduced to the workplace.

There are many aspects to the risk management plan and the guidelines provided here alone would not be able to comprehensively deal with all of them. Key points are highlighted here and summarized in the following pages.

Areas	Recommended Guidelines	Priority Level
1. Smoking	A written company-wide Smoking Policy consisting of: • No Smoking zones at production, hazardous and storage areas • Proper signage i.e. “No Smoking” signs • Designated smoking areas • Action to be taken in the event of breach • Training & Awareness for new recruits	**Level 1**
2. Training programmes	a. Induction programme for new employees. b. Retraining for existing employees regularly.	**Level 3**
3. Safety Policy	An established safety policy must be in force. Management must be committed to enforcing that strategy in the workplace.	**Level 1**
4. Management Role & Functions	a. A pro-active approach must be taken with regards to fire and safety. b. A clearly designated unit or department to look into overall plant safety.	**Level 3**
5. Operator Training and Awareness	a. Operators are competent and alert at all times. b. Regular training of operators to maintain proficiency and efficiency. c. Operators have knowledge of the machines they operate. d. Operators are aware of the: • Explosion hazards • Sources of ignition • Handling of Flammable gases/vapours • Functions and controls and safety devices	**Level 3**
6. Safety/ Emergency Preparedness/ Evacuation/ Contingency Plan	a. A written safety/emergency preparedness/ evacuation/ contingency plan. b. Plan should be reviewed annually and updated.	**Level 1**

Note:

Minimum requirements are:

- Recommendation 1
- Recommendation 3
- Recommendation 5
- Recommendation 6

3.2 Operational Activities

Operational activities typically found in a timber / woodworking premises include cutting and sawing, milling, sanding, and laminating. Finishing processes are also carried out frequently within the same premises. Finishing normally involves spray painting, powder spray, coating and related work.

Spray painting operations including the curing process which normally involves the introduction of heat is specifically dealt with under **Section 3.3 Hazardous Activities**.

The operational activities generate woodchip and sawdust. Sparks can also be generated during the sanding and cutting operations, especially if the blades used are not regularly sharpened or from friction between moving metal parts.

The key to managing the risks from operational activities would be to ensure that the correct procedures in carrying out the work are followed through. There is a tendency to neglect or place less importance on proper and safe work practices, especially during peak order periods.

Other operational activities relate to the use of material handling equipment like forklifts which are required for moving and shifting materials (raw and finished goods) within the premises.

All operations are reliant on electricity, whether it is lighting for the factory or power to the various machines, ovens and other process equipment. Electrical fires are one of the highest causes of fires in factories. Given the high fire load in timber related occupations, an electrical spark can lead to a large fire loss. As such, safe use of electricity becomes an important aspect to consider under the overall risk management of the premises.

Activities	Exposures	Recommended Guidelines	Priority Level
1. Cutting & Sawing 2. Milling 3. Sanding	Generation of woodchip & saw dust. Fine dust produced creates a fire and explosion hazard	a. Separation of larger chip woods and finer sawdust. b. Provision of metal detectors to ensure that no foreign metal objects can enter the ducting of the dust extraction system.	**Level 1**
		c. A comprehensive dust collection / extraction. A proper design of the system based on the size and volume of chip woods & sawdust generated. Single or 2-stage cyclone separators, depending on conditions. It can be localised at the machine or centralised, depending on the situation.	**Level 2**
		d. Dust collector of non-combustible construction.	**Level 1**
		e. Spark detection systems where necessary.	**Level 2**
4. Laminating	Heat generated from the source of heating from the heated rollers, press machines & other hot surfaces of machines	a. Use of non-flammable adhesive materials.	**Level 2**
		b. Control of heat transfer fluids under pressure.	**Level 2**
		c. Safety devices to monitor temperature within the machine & cut-off heat.	**Level 1**
5. Finishing Operations	Fire inception hazard	Please see **Section 3.3 Hazardous Activities.**	

Activities	Exposures	Recommended Guidelines	Priority Level
6. All other operations that generate dust not already covered under items 1, 2 and 3	Dust explosions	a. Maintain good housekeeping. b. Surfaces are cleared off excessive dust.	**Level 1**
		c. Explosion protection consisting of a combination of spark detectors, automatic shutdown of machines, ducts and venting.	**Level 2**
7. Using electrical equipment	Electrical fires	a. Electrical wiring is checked regularly to ensure that insulation of cabling and wiring is in good condition. b. Loose connections are tightened immediately. c. Joints are to be well soldered. d. Ensure supply to equipment follows its rating.	**Level 1**
		e. Visual inspections at the following intervals : • Monthly for Light industrial Occupations. • Weekly for High Risk/Critical equipment. • Yearly for cables and plugs, extension leads, etc.	**Level 2**

Activities	Exposures	Recommended Guidelines	Priority Level
8. Material Handling Equipment	Impact damage	a) Forklifts should be suitable for the tasks required of them and be properly maintained. b) Speed limits imposed on forklifts.	**Level 1**
		c) Forklift site transport routes on good surfaces, with no obstructions and no blind spots. d) Forklifts drivers are trained-untrained drivers often cause accidents.	**Level 3**

Note:

Minimum requirements are:

- Recommendations 1(a) and (b)
- Recommendation 4 (c)
- Recommendations 6 (a) & (b)
- Recommendations 7 (a) to (d)
- Recommendation 8 (a)

3.3 Hazardous Activities

Hazardous activities arise as part of the operating activities of a factory or plant and cannot be avoided entirely. These activities are mainly limited to manufacturing operations, although in some instances they can be present in non-manufacturing occupations also.

Hazardous activities increase the risk of a fire occurring. As such, necessary care is to be taken when such activities are carried out. It is therefore critical that the minimum requirements provided in these guidelines are adhered to. Best practice requirements would be strongly recommended.

Activity	Exposures	Recommended Guidelines	Priority Level
1. Spray Painting (in Spray booths or in the open)	Flammable vapours from spray painting operations. They pose a fire and explosion risk.	a) Adequate mechanical ventilation should be provided. b) Spray booth should be in an enclosed area and separated from the rest of the factory area. c) Booths must be fitted with filtration and ventilation systems. d) Booths must be regularly checked and maintained by a team of trained personnel. e) Operate the spray booth according to manufacturer's instructions. f) Use spray booths for spray painting only and for no other activity.	**Level 1**
		g) Suitably constructed spray booths. Recommended that booths should be designed and built to comply with any local or internationally recognised standard. h) Only explosion proof/flame proof lighting fixtures to be installed.	**Level 2**

Activity	Exposures	Recommended Guidelines	Priority Level
2. All Other Spray painting plant and equipment apart from the spray booth (includes spray guns, compressors, pumps, ventilation systems and hoses)	Fire ignition & propagation risk.	a) Regularly carry out preventative maintenance on equipment. b) Always clean airless spray guns according to the manufacturer's instructions.	**Level 1**
		c) Ensure that purchasing specifications for new equipment cover all safety features. d) Use a pneumatic sander rather than an electrical one, or a high volume low pressure (HVLP) spray gun instead of a conventional compressed air one for touch ups.	**Level 3**
3. Battery Charging	Explosion Hazard (hydrogen released during charging)	a) Charging stations should be located in well-ventilated areas to prevent concentrations of hydrogen and oxygen from reaching volatile levels.	**Level 1**
		b) General or local ventilation can be provided by a fume hood or an exhaust fan.	**Level 2**
4. Welding Works	Sparks from welding works can ignite combustible materials in the vicinity.	a) Move all combustibles a safe distance away (35 ft/10.6m horizontal distance away). b) Work location is safe for Hot Works. c) Implement a Hot Work Permit Scheme. Please see **Section 3.6** also. d) Use of PPE.	**Level 1**
		e) Training of welders on use of their equipment & emergency procedures in the event of a fire.	**Level 3**

Activity	Exposures	Recommended Guidelines	Priority Level
5. Heating Systems e.g. Infra-Red Ovens	Fire inception & propagation hazard	a) Adequate ventilation including the provision of mechanical ventilation where natural ventilation isn't sufficient. • Sufficient supply of fresh air • Proper exhaust to outdoors (external) • Vapours in open don't exceed the LFL b) Control/Safety devices to ensure ventilation fans are operating when oven is used. c) Maintenance of Safety Devices – Regular Inspections and Service as per manufacturer's recommendations or best practice.	**Level 1**
		d) Avoid use of direct heating systems where possible, i.e. fuel burners.	**Level 3**
6. Steam Generating Equipment - Boilers	Explosion potential. Fire hazard where chip wood or sawdust is used as fuel.	a) Good facility design. b) Separation of boiler area from the production and storage areas.	**Level 1**

Activity	Exposures	Recommended Guidelines	Priority Level
7. Kiln Drying Operations	High fire hazard	a) Sufficient spatial separation from storage & production areas. b) Automatic control of temperature and humidity. c) Suitable construction (sound structurally).	**Level 1**
		d) Sprinkler systems within the kiln if necessary. e) Pressurised Hydrant systems at external areas close to the kiln.	**Level 2**
		f) Indirect heating preferred over direct heating methods.	**Level 3**
8. Use of PPE	Accidents and/or injuries could occur	a) Provide appropriate PPE depending on the situation & the nature of work involved. b) Keep PPE well maintained.	**Level 3**

Note:

Minimum requirements are:

- Recommendation 1
- Recommendations 2 (a) and (b)
- Recommendation 3(a)
- Recommendations 4(a) to (d)
- Recommendations 5(a) to (c)
- Recommendation 6(b)
- Recommendations 7(a) to (c)& (e)

3.4 Maintenance

Maintenance is a very important aspect of a plant's operations. For non-manufacturing occupations, maintenance is still important, although it would be limited to the building services. The general upkeep of the building(s) and services would apply to both manufacturing and non-manufacturing premises, i.e. factories, warehouses and furniture retailers.

Good maintenance practices results in better management of risks in the factory. Plant and machines if not maintained in good working order, can become a fire hazard. As an example, a leaking valve on tank containing a flammable chemical like toluene can cause a fire.

Good maintenance also benefits production. Machines would be performing at higher efficiencies (optimum) and downtime would be reduced. Major breakdowns could be eliminated altogether. Cost of regular maintenance is very much smaller in comparison to the cost of a major, unscheduled breakdown. This is an added incentive for MTIB members to practice a good level of maintenance.

There are 3 broad categories of maintenance practiced in the industry today, i.e.

- **Preventive** - an organised schedule covering regular and periodic maintenance
- **Predictive** – a schedule that is able to predict the failure of a component or plant and allows replacement to be made or the necessary remedial measure taken
- **Break down maintenance** or **Run to failure** – no maintenance until the machine breaks down or fails

Unfortunately, most plants in Malaysia practice the last method. Although it is the cheapest of the 3 methods in the short term, in the long term it is the costliest. This method of maintenance does not prevent any breakdowns or failure which often can result in a loss, affecting not only the failed machine (or component) but the entire plant. An example is an overheating bearing which damages the machine and causes a fire. It is recommended that MTIB members have either a preventive or predictive maintenance programme in place.

A good maintenance programme would also include annual overhauling of equipment, annual plant shutdowns (normally during long festive periods)**,** regular training and spares management.

Area/Item	Recommended Guidelines	Priority Level
1. Building	a) Maintain in good state of repair. b) All load bearing structures checked regularly.	**Level 1**
2. Plant & Machinery	a) Maintenance of electrical services. b) Condition of wiring insulation. c) Arcing switches replaced, etc. d) Regular inspection of all critical items, heating equipment like infra-red ovens, dryers, boilers, spray booths, etc. e) Maintenance of mechanical and moving parts, e.g. failure and overheating of bearings, worn belts, etc.	**Level 1**
	f) Checks on guards regularly. Misaligned ones and fairings around moving parts can cause sparks leading to a fire. g) Maintenance of cutting tools to ensure that they are sharp for their intended purposes. Reduces the fire risk as it produces less heat & sparks.	**Level 2**
3. Control & Safety Devices	Regular Inspections and Service as per manufacturer's recommendations or best practice. Items include limit switches, dampers, electrical interlocks, temperature controllers, electrical overload protectors.	**Level 2**
4. Preventive Maintenance Programme	a) For critical machinery in the plant. b) For all items of plant and machinery and building *utilities.	**Level 2**

*Utilities include electrical services, air-conditioning, steam, pneumatic systems and water.

Note:

Minimum requirements are:

- Recommendations 1(a) & (b)
- Recommendations 2 (a) to (e)

3.5 Housekeeping

Good housekeeping involves every phase of the operations in a timber/furniture factory and should apply throughout the entire premises whether indoors or outdoors. It is more than mere cleanliness. It requires orderly conditions, the avoidance of congestion, attention to such details as an orderly layout of the whole workplace, the marking of aisles, adequate storage arrangements and suitable provision for cleaning and maintenance.

Good housekeeping is a vital factor in preventing accidents which lead to injuries and damage to property. Where housekeeping is bad, fire is a constant hazard. It can be caused by many housekeeping problems such as:

a) **Spontaneous combustion** from oil-soaked rags used for cleaning greasy mechanical parts.
b) **Dust explosions** or **fires** from excess sawdust as a result of dust collectors not being properly or frequently cleaned.
c) **Fire** from piles of paper and other packing materials being allowed to accumulate.

In the timber/furniture industry, dust, dirt, chips, etc., are unavoidable. If they can't be collected as part of the process (e.g. by enclosure and exhaust methods) a way to clean them up is necessary. There is equipment for this. Vacuum cleaners are suitable for removing light dust and dirt. Industrial models have special fittings for cleaning walls, ceilings, ledges, machinery, and other hard-to-reach places where dust and dirt collect. Other than this, manual cleaning using brooms, mops, brushes, etc. go a long way to keep the premises clean and tidy, thereby reducing the fire risk hazard.

Activities/ Features	Exposures	Recommended Guidelines	Priority Level
1. General		a) Paint walls regularly. b) Have adequate lighting. c) Clean windows and do not allow accumulation of dirt & dust. d) Manage the tools used in the operations e.g. the cutting blades. Splash guards and drip pans should be installed wherever oil spills or drips may occur.	**Level 1**
2. Saw Dust Management	Fire inception & propagation hazard	a) Saw dust handling systems consisting of a combination of local exhaust systems, cyclones, dust extractors, etc. b) Wood dust cleared off from machines and floors. Please also see **Section 3.2 Operation Activities**	**Level 2**
3. Storage Arrangements	High Fire Load creates a fire propagation hazard. A congested workplace makes fire fighting equipment inaccessible.	a) Sufficient space between rows of stocks (aisles). Recommended at least 1m.	**Level 1**
		b) Palletised, rack storage is recommended, wherever possible. Free standing on the floor is discouraged.	**Level 2**
		c) If risk is sprinklered, storage heights to comply with sprinkler design codes.	**Level 1**
		d) Please also see **Section 3.6** for storage of hazardous and flammable chemicals.	**Level 2**

Activities/ Features	Exposures	Recommended Guidelines	Priority Level
4. Storage	Increases the fire load.	a) Adequate and convenient space for materials, stocks and tools. b) Never keep more stocks and materials than necessary near machines and provide proper facilities (such as bins, shelves, boxes, racks, etc.) in which to store them. c) Stocks of raw materials and finished goods properly stacked and arranged.	**Level 1**
5. Waste Removal	Increases the fire hazard risk.	a) Adequate facilities to prevent congestion and accumulation of waste. b) Provide convenient containers for scrap and waste. c) Educate employees to use them. d) Wastes and refuse removed frequently. Yard and building surrounds free of refuse. e) Surrounding/compound kept free of overgrown grass and vegetation.	**Level 1**
6. Fire Fighting Equipment	Delay the response to a fire.	a) All fire-fighting equipment is regularly inspected and kept in good working order. b) Fire doors and exits should be clear of obstructions and easily accessible. c) Safe and free passage to fire-fighting equipment and fire exits. d) Automatic alarms and other detection systems should be in good working order. Please also see **3.7 Fire Protection & Detection Systems (FPS)**	**Level 1**
7. Ventilation	Build-up of flammable vapour poses fire & explosion risk.	Good general ventilation plus local exhaust ventilation to remove flammable vapour in the air.	**Level 1**

Activities/ Features	Exposures	Recommended Guidelines	Priority Level
8. Walls	Increases the risk of property damage.	a) Of construction and materials that are easy to keep clean and in good repair. b) Walls free of unnecessary hangings. c) Stairs clean and well lit. Handrails and steps of sound construction and maintained in good condition.	**Level 1**
9. Floors	Increases the fire risk.	a) Free of oil, grease, etc. b) Spilt oil and other liquids should be cleaned up at once. c) Chips, shavings, dust and similar wastes should never be allowed to accumulate. They should be removed frequently, or never allowed to reach the floor, i.e. via a dust extraction system. d) Operating floors or work positions free of loose scrap, metal or other materials.	**Level 1**
10. Aisles	Accidents leading to damage to property and injuries. Property damage can be in the form of impact damage and fire.	a) Wide enough for traffic movements, marked off by floor lines from work positions and storage areas. b) Free of obstructions. c) Safe and free access to work positions. d) Aisles should be kept clean and clear and should never be used for “bottleneck” or “overflow’’ storage. Applies to passageways and emergency exits also. e) Aisle boundary markings should be drawn to show clearly the space which has been reserved for traffic. Markings should be sufficiently wide (a minimum of 30 mm) and of a colour to make them clearly visible. Paint or durable plastic strips can be used.	**Level 1**
11. Space		a) Sufficient room for the individual to work. b) Spatial separation between machines.	**Level 1**

Activities/ Features	Exposures	Recommended Guidelines	Priority Level
12. Materials Handling	Increases the risk of property damage.	Layout planned for materials flow, with efficient methods and equipment.	**Level 2**
13. Maintenance of Building and Plant	Increases the risk of property damage.	a) Maintenance of buildings and plant equipment. Clean and free of unnecessary material. b) Free of unnecessary dripping of oil or grease. c) Area around machines clean and free of rags, paper, etc. d) Lockers and cupboards clean and free of unnecessary material both on top and inside. e) Benches and seats clean and in good condition. f) Proper guards provided and in good condition. Please see also Section **3.4 Maintenance**	**Level 1**
14. The Human Factor or Element	Creates an unsafe work environment.	a) Where practicable, cleaning of the workplace should be the responsibility of special cleaning staff and not an additional job for employees engaged in production. b) Housekeeping practice should be part of the culture of the company.	**Level 1**

Note :

Minimum requirements are :

- Recommendation 4 (c)
- Recommendations 5 (a) and (d)
- Recommendation 6
- Recommendations 9 (c) and (d)
- Recommendations 10 (b) and (d)

3.6 Safe Work Practices

Safe work practices are an integral part of the risk management programme in any risk including furniture or timber related occupations.

Companies in the timber/furniture industry should establish Safe Work Practices for addressing significant hazards or for dealing with circumstances that may present other significant risks/liabilities for the company. Safe Work Practices should reflect the company's approach to controlling hazards.

Some regulations and international best practice guidelines and codes require employers to have written procedures/instructions for specific activities/conditions. The number of practices/procedures and the degree of detail will depend on the range of work activities the company performs. It is important that management is involved in the development of safe work practices and that they provide adequate training for workers who are to follow these practices.

- Objectives of the work permit system
- Management of the work permit systems
- Contents of the work permits
- Types of work permits required
- Human factors
- The skilled level of the work force

Activities/Features	Recommended Guidelines	Priority Level
1. Handling of Hazardous Chemicals	a) Use of MSDS. b) Electrical bonding of containers and nozzles during filling of flammable liquids. E.g. usage of metal straps for grounding.	**Level 1**
	c) Provision of bunds to contain any spillage or leakage. d) Leak detectors for gas and flammable vapours.	**Level 2**

Activities/Features	Recommended Guidelines	Priority Level
2. Storage of Flammable Chemicals	a) MSDS to identify the fire hazards of the chemicals used for production, cleaning, maintenance or stored in the premises for any other reason. b) Quantity of stocks to be kept at a minimum at all times. c) Storage in cool & dry place and not exposed to heat.	**Level 1**
	d) Paints, solvents and other materials with a flash point of below 32°C are to be kept in a separate building or special purpose built enclosure away from other materials. e) Provision of fire fighting systems within the storage areas.	**Level 2**
3. Hot Work Permit Systems	a) A written and detailed system in place and practiced. b) Checks to ensure compliance by outside contractors carrying out work within the premises. c) Department/designated person to supervise and coordinate the systems in place. Normally, the Safety Officer.	**Level 1**
4. Permit To Work 5. Tag Out System	a) A written and detailed system in place and practiced. b) The documents in the policy must include the type of work to be done, the foreseeable hazards, the precautions to take and control measures to be implemented.	**Level 3**
6. Safety of machines	a) Protection of moving parts – guards. b) Auto shut-off provisions. c) Emergency shut off by operators.	**Level 3**
7. Smoking Policy	a) None allowed within the plant/facility/storage area. b) Smoking confined to areas outside the plant or specifically designated. See also **Section 3.1** for details.	**Level 1**

Note :

Minimum requirements are:

- Recommendation 1 (b)
- Recommendation 3 (a)
- Recommendations 4 and 5
- Recommendation 7

3.7 Fire Protection & Detection Systems (FPS)

Fire Protection is the main defence for any operation in the event of a fire. The timber/furniture occupied premises, due to its nature of operations have inherent fire hazards present. The main raw materials and the finished goods are all combustible materials. This results in a high fire load. If spray painting is involved, flammable chemicals are present, increasing the fire risk hazard. As such, fire protection for the risk becomes critical.

There are 2 components to fire protection, i.e. active systems and passive systems.

Passive fire protection utilises fire compartmentalization of the premises through the use of fire rated walls and floors to stop or slow the spread of fire. This “buys” precious time for the fire brigade and the other facilities provided in the premises to respond to the fire. Fire doors are used at openings and emergency staircases. Normally, they are 1-hour rated at the minimum.

Organization into smaller fire compartments, consisting of one or more rooms or floors prevents or slows the spread of fire to other building spaces.

From a life safety point of view, passive fire protection allows more time for emergency evacuation of the building occupants.

Active fire protection consists of both manual and automatic fire protection systems. They consist of fire fighting facilities that respond when a fire situation occurs. Common examples include portable fire extinguishers, hose reels, hydrants, sprinklers and fire suppression systems. Human intervention is necessary, except in the case of automatic sprinkler systems and fire suppression systems.

It is recommended that a combination of both active and passive fire protection be used in protecting the premises.

First aid fire fighting equipment consists of active fire protection systems like portable fire extinguishers and hose reels. These are only useful when the fire is still at its initial/start up stage. Once the fire is fairly developed, they are useless. The hydrant and wet riser systems are most effective in controlling and extinguishing a fire. Other systems control the fire and prevent it from spreading. Mainly, they come in the form of sprinkler systems. The only exception is ESFR (Extra Suppression Fast Response) systems which are designed to control and extinguish fires. ESFR systems are costly to install and maintain. They are typically seen in HPR facilities and not common in timber related occupation.

Sprinkler systems commonly installed in timber occupations are the Ordinary Hazard (OH3) and Extra High Hazard (EHH) designs.

Fire Detection also falls within the FPS and consists of devices that alert of a fire situation. Heat and smoke detectors come under this category together with fire alarms. Fire detection systems are automatic and they are linked to the fire alarms. Some trigger fire fighting system like in the case of total flooding systems. Alarm control panels should be linked to the nearest Bomba stations.

All types of fire protection systems need to be designed according to accepted local or international standards. The various standards include:

- British Standard, BS
- Malaysian Standard, MS
- Other standards such as the Australian (AN), American (NFPA) and European Standard (EN).

The commonly used standard in Malaysia is the BS. Approximately 90% of all FPS in Malaysian risks are designed to meet the BS. The MS is a relatively new standard but is based almost entirely on the BS. Changes incorporated to adapt to the local conditions. It is recommended that the MS standard at the very least be used.

The insurance industry doesn't have its own standard but requires all FPS installed to comply fully and unconditionally to their original design, whether it is the BS, MS or some other standard.

The minimum requirements on FPS under Malaysian law are the Uniform Building By Laws (UBBL). Unfortunately, the minimum requirements alone are not sufficient to protect a timber/furniture occupied premises due to the high fire load and the presence of flammable chemicals. A more extensive fire protection system is required.

It is recommended that professional Fire Engineers are consulted on the level of protection that can adequately meet the risk present before a fire protection system is installed.

The only other regulatory requirement with regard to FPS is to protect the TNB electrical switchgear with total flooding and fire suppression systems. Normally, the suppression agent is Carbon Dioxide gas (CO_2) which is the cheapest and most common system available. However, their use is limited to only unmanned rooms only as CO_2 does not support life.

The level of fire protection would differ from occupation to occupation as there are differences in the fire load and the nature of fire and explosion risks present. As such, a warehouse or furniture retailer may require a less extensive system than a furniture manufacturer. Foam system may also become necessary if there is flammable chemical present. It is not uncommon to see 50kg mobile foam extinguishers provided at the areas around spray booths and where mixing of paints and solvents are undertaken.

The type of protection recommended for the various occupations in the timber/furniture industry is summarised in the following pages.

The recommendations below are minimum requirements

Type of Occupation	Type of FPS	Recommended Guidelines
1. Furniture Retailer	PFE	• Suitably located, distributed & accessible. • Dry Powder and CO_2 based on the hazard present.
	HReels	• Located & distributed throughout the premises.
	Hydrants	• Yard hydrants with public supply.
	Sprinklers	• Only is located in shopping malls.
	HD/SD	• Recommended for all locations with the exception of shop lots.
	Fire Alarm	• Recommended for all locations

PFE – Portable Fire Extinguisher
HReels – Hose Reels
HD/SD – Heat / Smoke Detector

Type of Occupation	Type of FPS	Recommended Guidelines
2. Manufacturing without any spray painting or powder spraying	PFEs	• Suitably located, distributed & accessible. • Dry Powder and CO_2 based on the hazard present.
	HReels	• Located & distributed throughout the premises.
	Hydrants	• Yard hydrants. Pressurised system encouraged.
	Sprinklers	• Recommended, especially if fire load is increased by high piled storage.
	HD/SD	• Recommended.
	Fire Alarm	• Recommended for all locations.
3. Manufacturing involving spray painting or powder spray	PFEs	• Suitably located, distributed & accessible • AFFF/Foam at areas where flammable chemicals are present - used or stored.
	HReels	• Located & distributed throughout the premises.
	Hydrants	• Yard hydrants, preferably with own pumps (pressurised system).
	Sprinklers	• Highly recommended. OH3 or EHH design.
	HD/SD	• Recommended.
	Fire Alarm	• Recommended for all locations with CMS link to nearest BOMBA station.

Type of Occupation	Type of FPS	Recommended Guidelines
4. Kiln Drying (KD) only	PFEs	• Suitably located, distributed & accessible • Dry Powder and CO_2 based on the hazard present.
	HReels	• Located & distributed throughout the premises.
	Hydrants	• Yard hydrants, preferably with own pumps (pressurised system)
	Sprinklers	• Recommended.
	HD/SD	• Recommended
	Fire Alarm	• Recommended for all locations with CMS link to nearest BOMBA station
5. Warehouse only	PFEs	• Suitably located, distributed & accessible • Dry Powder and CO_2 based on the hazard present.
	HReels	• Located & distributed throughout the premises.
	Hydrants	• Yard hydrants expected from public supply. Pressurised systems encouraged, depending on scale of operations.
	Sprinklers	• Recommended in risks with high piled storage.
	HD/SD	• Recommended.
	Fire Alarm	• Recommended for all locations with CMS link to nearest BOMBA station.

Type of Occupation	Type of FPS	Recommended Guidelines
6. Sawmills without KD facilities	PFE	• Suitably located, distributed & accessible • Dry Powder and CO_2 based on the hazard present.
	HReels	• Located & distributed throughout the premises.
	Hydrants	• Yard hydrants with public supply.
	Sprinklers	• Recommended.
	HD/SD	• Recommended.
	Fire Alarm	• Recommended for all locations
7. Logging yards	PFE	• Suitably located, distributed & accessible • Dry Powder and CO_2 based on the hazard present.
	HReels	• Located & distributed throughout the premises.
	Hydrants	• Yard hydrants with public supply.
	Sprinklers	• Recommended.
	HD/SD	• Recommended for all locations.
	Fire Alarm	• Recommended for all locations

3.8 Organisation, Systems & Procedures

Managing the fire and safety risk in a factory or commercial operation like a warehouse or furniture retailer must also involve the key aspect of organisation, system and procedures. A structured approach becomes necessary. In the event of an emergency, there must be teams trained and ready to respond.

This is often an area which is given less emphasis especially when priority is on other operations like production/manufacturing.

The recommendations below are minimum requirements

Description	Recommended Guidelines	Priority Level
1. Preventive Maintenance Schedule	To have a Preventive Maintenance schedule in place for all plant and machinery. It can be extended to include services and building utilities also.	
2. Safety Organisation	The formation of a Safety Committee and an organised structure involving senior management.	
3. Fire Fighting Teams	To have a Fire Fighting Team or an Emergency Response Team in place. Can comply with OSHA or RFT requirements.	
4. Fire Drills	To be carried out semi-annually or at the very least annually. Where a Fire Fighting team is in place, semi-annual drills are recommended.	
5. Security Management	a) An organised security arrangement consisting of either in-house trained security guards or outsourced services to Contracted Security Guard companies. b) Provision of emergency communication facilities, e.g. telephone, walkie-talkie & mobile phone provided for security guards. c) Closed circuit television.	

3.9 Design and Planning Considerations

Generally, this aspect is to be considered before the risk premises is constructed or the extension to the existing facility is built. It can also be used to plan the layout of a new production line or where an existing line needs to be expanded. It allows the company to plot its future in the business.

This aspect is important and should not be overlooked.

It is recommended that design engineers (civil & structural) and fire engineers/consultants are consulted before any construction work and fitting in of fire protection system is undertaken. The use of fire contractors who are unfamiliar with fire design standards and BOMBA requirements are discouraged.

Area/Item	Recommended Guidelines	Priority Level
1. Factory Layout	a) Good general layout for factory facilities. b) Adequate separation between buildings within premises. c) Connection between buildings should be purely as a walkway only and not used for storage of stocks and other materials. d) Process/manufacturing and storage areas to be separated if within the same building. e) Spray paint booths and storage of flammable items to be separated and preferably in a stand-alone building. Otherwise, to consider fire compartmentation.	**Level 1**
2. Fire walls	1. Wherever required, i.e. between hazardous and non-hazardous areas located within the same building. An example would be spray booths within the same building as the manufacturing and storage. 2. Fire walls to be designed in accordance to any internationally accepted standards. Fire walls should generally comply with 2-hour fire rating.	**Level 2**

Area/Item	Recommended Guidelines	Priority Level
3. Building construction	a) Buildings of suitable construction and of non-combustible materials to be used only. b) Generally, buildings should conform to Class 1B construction as per the RFT. Construction Class 2 is less favoured and only to be considered if there is a need for open sided extensions. Class 3 construction to be avoided. However, in the event timber material is used, it has to be appropriately manufactured to fit the purposes, in accordance to relevant and specific benchmarks as stipulated in 3.10. c) Where possible, columns or roof trusses should be of non-combustible material. d) Use of ventilation bricks for walls to be only considered if there is a need for good ventilation in the building. e) If mezzanine floors are to be constructed on single storey lofty structures, they are to be properly constructed and to ensure there is no cut off from fire protection services, e.g. sprinklers. Combustible construction material is to be avoided, even if for supporting structure only. f) For insulation purposes at roofs, use of any materials like polyurethane to be avoided totally.	**Level 1**
4. Communication between buildings	a) Ensure buildings do not communicate between each other via extensions which are then used for either manufacturing or storage activity. b) Building openings (for services, etc.) on fire rated structures are to be sealed with fire resistant materials.	**Level 2**

Note:

Minimum requirements are :

- Recommendations 1 (c) and (e)
- Recommendations 3 (b), (c) and (f)

3.10 Safety and Fire Audits

Fire Safety Audits are important as they set out a structured process of auditing fire and safety within the timber/furniture occupied premises against specific benchmarks. The benchmarks should include:

- the UBBL
- Malaysian or other accredited & recognized international Standards
- Requirements or recommendations of regulatory bodies including the Fire Brigade/BOMBA
- Codes of Practice used in the timber/furniture industry
- Manufacturers' Recommendations, especially where the machine uses heat, flammable chemicals & other hazardous substances
- Maintenance requirements on Fire Protection Systems (FPS) as provided under Section 9 of the Revised Fire Tariff (RFT)

The fire and safety audit would adequately gauge the effectiveness and suitability of installed fire and safety measures. The fire and safety audit should involve both written and practical testing. Adequate maintenance records should be compiled and retained.

The Fire Safety Audit will include a review of relevant maintenance records and provision of a comprehensive written report detailing any anomalies noted with detailed recommendations to overcome any deficiencies.

Features	Recommended Guidelines	Priority Level
1. Fire Audits	a. Audits to be carried out monthly, quarterly and annually. b. Compliance to UBBL of FPS provided at the premises. c. Maintenance of FPS • Fire Extinguishers • Fire Hose Reels • Sprinkler System • Automatic Fire Detection Systems • Fire Pumps d. Accessibility of FPS.	**Level 1**

Features	Recommended Guidelines	Priority Level
2. Fire Safety	a. Provision & location of Exit Signs. b. Emergency Lighting provided throughout the premises.	**Level 1**
	c. Fire and Smoke Compartments e.g. separation of hazardous activity from other areas of the plant/premises.	**Level 2**
3. Plant Safety	a. Plant & Machinery inspected regularly. Frequency based on priority & how critical the equipment is. b. All machines are provided with safety guards. c. Walkways marked and clear demarcation lines for machines. d. Staff trained in the safe & proper use of machines.	**Level 1**
	e. Noise levels maintained at safe levels. If necessary, noise reduction via low noise tooling or having noise enclosures wherever practicable.	**Level 2**
4. Electrical Safety	a. Safe use of Electrical Equipment. No overloading. b. Inspection of electrical systems / supplies. c. Visual inspection of wiring & their insulation. d. Maintenance of Power Systems. Adherence to JBE requirements on low voltage/medium voltage & high voltage switchgear. e. Emergency Standby Power Systems provided for emergency lighting, fire fighting & Safety/control items. Can include critical plant & machinery also.	**Level 1**
5. Material Handling	a. Staff are trained in manual handling of materials. b. Workbenches and machine tables set at comfortable height. c. Use of PPE in handling hazardous and flammable chemicals. d. Systems of work in place for the safe and careful handling of assembled furniture. e. Material handling equipment like forklifts inspected and maintained in good working condition.	**Level 1**
6. Housekeeping	General compliance to minimum requirements (Section 3.5) on the overall housekeeping level at manufacturing and storage areas.	**Level 1**

Features	Recommended Guidelines	Priority Level
7. Operator Safety	a. Suitable PPE, i.e. ear plugs where noise levels are excessive. b. Special training for working at height, at confined spaces, etc.	**Level 1**
8. Emergency Procedures	a. Written procedures on emergency procedures in the event of any incidents of fire, etc. Documentation in an organised form and stored in a safe place. b. A Private Fire Fighting Team provided, if required under OSHA. c. Fire drills carried out regularly (annually/six monthly).	**Level 1**
9. Hazardous Materials	To check on compliance to the usage & storage of flammable materials in accordance to internal requirements or the minimum requirements specified in this guidelines.	**Level 1**

Note:

Minimum requirements are:

- Recommendations 1
- Recommendations 2 (a) and (b)
- Recommendations 3 (a) to (d)
- Recommendations 4 (a) to (e)
- Recommendation 6
- Recommendations 8

4.0 Review

The Recommended Guidelines are subject to further review and update by PIAM. Reviews may be carried out annually or whenever deemed necessary by PIAM or its appointed Sub-Committee or Working Group.