

A DEMONSTRATION ON WORKING OUT FIRE SAFETY MANAGEMENT SCHEMES FOR EXISTING KARAOKE ESTABLISHMENTS IN HONG KONG

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ABSTRACT

How fire safety management schemes (FSMS) can be worked out to ensure safety in existing karaoke establishments is demonstrated in this paper. A FSMS should include the normal maintenance schedule for all passive building construction and fire services installation; staff training; and the action to be taken in case of a fire accident. The importance of carrying out fire safety management is emphasised with the details of implementing the scheme listed out. Proactive planning to fire prevention and active response to all potential fires in a karaoke establishment are pointed out for drafting actual operation procedures. Different management schemes with three action levels are recommended for different karaokes ranked by a fire safety ranking system proposed earlier. A normal operation mode and an emergency mode should be worked out with actions to be taken listed. For personnel management, a fire safety manager should be appointed. The duties to be carried out have to be designated carefully as staff without appropriate training and knowledge would not improve the situation.

1. INTRODUCTION

A tragic arson karaoke fire in 1997 [1] has aroused the need to improve the fire and public safety of karaoke establishments in Hong Kong (now the Hong Kong Special Administration Region HKSAR). A "Consultation paper on licensing control of karaoke establishments" [2] regarding the provision of fire safety was issued in February 1998 to solicit public opinions before implementing it as a code. Karaoke Establishments Bill [3] was read the first time on 15 March 2000 and has been advanced to be read the second time in the Legislative Council. If it is allowed to be read the third time, it will be passed as a new code. Its objective is to control and safeguard fire and building safety in karaoke establishments by way of a licensing system.

The special features of small clustered cubicles with long and narrow passages found in karaoke establishments were spelt out. It was also pointed out that the general fire safety provisions cannot adequately address the fire risk associated with the special closed-cubicle layout and unique mode of operation of karaoke establishments. Therefore, additional fire safety requirement is required. Partition walls separating the cubicles from the main corridors are required to have a fire resistance period of at least one hour. However, this has to be investigated further as the fire resistance [4] is for describing the stability, integrity and thermal insulation of the building elements under a fire. For the internal partitions which are not expected to

perform load-bearing function, flame spreading is the most important fire aspect. This requirement does not appear in any local regulations on building fire, apart from the test on surface flame spread following the British Standard BS 476 [5]. But full-scale burning tests [e.g. 6] for the entire component such as a sandwich panel, not just part of it, should be considered for describing the flame spreading phenomenon.

Research on fire safety aspects of karaokes was carried out at The Hong Kong Polytechnic University for providing 'quality teaching'. However, the results are not yet good enough for drafting fire safety codes as full-scale burning tests on karaoke boxes have not yet started. The outputs so far include [7-10]:

- Fire codes review.
- Field survey on fire safety provision in existing karaokes.
- Fire safety ranking system for existing karaokes.
- Estimation of heat release rates for fires in a karaoke box.
- Simulation of fire environment in a karaoke fire.
- Evacuation pattern in karaokes with different configuration.

At the moment, the most important part is the fire safety management. Without good fire safety management, even a karaoke with provision of fire

safety complied with the regulations is not necessarily safe under an accidental fire.

From the results of two surveys carried out in May 1998 and December 1999, the fire safety levels of 45 karaoke establishments were rated [8]. A fire safety ranking system FSRS1 [9,10] based on four main attributes was proposed to investigate how far the fire safety provisions in existing karaokes deviate from the requirements in new codes [2,3,11-14]. Proper fire safety management [15] should be implemented in those karaokes with unsatisfactory control on risk analysis factors, building fire safety construction, and active fire protection systems or fire services installations (FSI). A specific Fire Safety Management Scheme (FSMS) for a designated karaoke establishment should be worked out to ensure a safe environment for the general public, and the fire management strategies have to be implemented by well-trained staff throughout the life span of business. They should monitor the daily operation of the establishments and also ensure prompt and appropriate actions to be taken in emergency situations.

2. FIRE SAFETY MANAGEMENT

The importance of having good management to reduce the number and effects of accidental fires has become widely recognised in the fire safety community [15]. For example, in BSI-DD240: Part 1: 1997 "Fire Safety Emergency – Part 1: Guide to the application of fire safety emergency principles" [16], fire safety management is considered as both critical and integral to successful fire safety engineering design. Although a preliminary FSMS for karaoke establishments has already been proposed [9], the details of implementing such a scheme by the personnel management structure are still not being emphasised. As stated in the literature [e.g. 15,17,18], fire safety management is regarded as a very broad job having a role over the whole life cycle of the structure. This includes the pre-planning, design and fire safety engineering, construction, approvals and certification, commissioning and hand-over stages of the project. Moreover, it monitors the day-to-day operation, training, inspection and maintenance. It should also be carried out during any refurbishment, extensions or change of use. Further, it has a role when the building is empty, under demolition and whenever a fire happens. A good fire safety management is therefore necessary for life safety during the lifetime of the building, both as its own discipline and also as an essential element within any fire safety engineering design.

The objective of fire safety management as stated in the literature [15-18] is to prevent fires and ensure that if a fire does occur, it can be quickly brought under control before any significant damage is caused. It also requires the management of the building to consider the possibility of a fire at the design stage of new buildings and as part of the normal operation when the building is in use. The management should have a clear and well-defined policy for fire safety and should take a number of steps to put this policy in action. There are also some important provisions to be considered as reviewed [19]:

- A responsible fire safety manager should be appointed.
- Staff should be trained for surveillance of premises when open to the public and for taking specified actions on the occurrence of a fire such as rescuing occupants, protecting properties and assisting the fire brigade.
- An action plan should be prepared with well-defined duties for the staff such as reporting immediately to the fire brigade in case of fire and using extinguishers to suppress the fire sources.
- A maintenance schedule for all fire services installations, and heat generating equipment such as cookers should be prepared.
- Regular fire drills should be held.

Certain aspects of fire safety planning and management schemes are absolutely universal and similar [20]. Therefore, a single scheme should be executed to suit all aspects concerning the special characteristics of karaoke establishments. Some essential elements such as the basic structures of the scheme, roles of fire safety managers in proactive and reactive safety management, emergency evacuation procedures and also, general training requirements may be the same for all karaoke establishments. However, the uniqueness of a scheme applicable to a particular karaoke establishment is affected by an integration of numerous and complicated factors.

Every karaoke establishment has its own design, construction, location in the building, size, layout, style, decoration, fire load, occupancy level, building services installations, division of responsibilities and business practice. Therefore, the FSMS should include all the minimum absolute requirements for the karaoke establishment but be specific to include highly precise information and details addressed by the operational organisations with on-site determination according to the particular site situations and facilities of a distinct establishment.

A comprehensive scheme is necessary to completely cover all the fire safety related aspects in a karaoke establishment such as governing the amount of fire load, limiting the occupant load, providing a full evacuation plan for the entire establishment and also ensuring proper maintenance of FSI. Further, it should be up-dated frequently to reflect the actual situations such as any addition, demolition and renovation of the building construction, building services systems and changes in personnel in the management structure of the establishment [20]. Continuous co-operation among different government departments, the karaoke industry and even customers from the general public is also essential to ensure the scheme being implemented successfully.

The concept of carrying out the scheme is not simple. When working it out in detail, the scheme should be designed with strategy which works under local conditions as listed in the general guidance notes for indoor air quality [21]. Thorough consideration and systematic organisation is required for it to be unique, comprehensive and up-dated. A successful FSMS is of paramount importance to make significant changes in protecting the lives of occupants and properties and also reducing the financial loss resulted from fires. This paper demonstrates how such a scheme can be run systematically and focuses microscopically on the details of the processes of proactive planning to fire prevention and active response to all potential fires in a karaoke establishment.

3. FIRE SAFETY CONCERNS IN KARAOKE ESTABLISHMENTS

For implementing fire safety management in karaokes, special characteristics should be investigated. The following are some situations that may occur if fire safety management is not being carried out in the establishments.

On the building features:

- Karaokes usually have similar patterns of long corridors within the establishments. This will confuse the occupants and they may easily get lost in the maze of identical rooms and corridors in some undistinguishable karaoke environments. If the karaoke staff are not familiar with the environment and fail to direct the customers in case of fires, customers may be trapped.
- Karaoke rooms are usually covered with furnishings and linings on the walls and carpets on the floor. As smoking is allowed in karaoke establishments, if fire retardants

[22] are not used, those materials may be ignited easily.

- There are specific statutory requirements on the fire resistance [4] and surface flame spread [5], but not the fire behaviour of the materials used for buildings and decorations. Even though there are some requirements set in the Consultation Paper [2], investigation works are insufficient to back-up the requirements. In particular, full-scale burning tests have to be considered [6].
- The problem of building evacuation is made complicated by the fact that many karaoke establishments are in basements up to 3 levels below ground level or up high in some high rise buildings. In such cases, normal access through lifts will not be the appropriate means of evacuation in fires.
- Not every karaoke is governed by statutory requirements such as those stated by the Buildings Department (BD). This may result in dead-end situations in karaokes. Therefore, careful attention should be paid to those areas. Proposal of any reconstruction works should also be submitted to the related government departments for permission to continue the business.

On the control of risk factors:

- The storage of combustible materials and liquor inside the karaokes may lead to an excessively high fire load density (FLD) in the establishments. They should be stored properly.
- There is no control on the use of furniture materials at the moment. However, furniture fires should be watched carefully.
- Karaoke establishments are likely to be overcrowded, particularly during weekends and public holidays. If the occupants are not dispersed in the appropriate proportions and evacuated in phases when fire happens, there may be overloading of evacuees in a particular exit or in narrow corridors that may lead to hindrance to exits.
- Transient customers are usually unfamiliar with the environment of the establishment. If a fire is allowed to develop, there is a high possibility that the occupants would get into a panic and run madly in the maze to find their ways to escape. This will lead to chaotic situations with people stepping on each other if no fire safety officers are assigned to manage the situation.
- Though there are no sleeping risks in the karaoke establishments generally, people may

get drunk and then become not very conscious. If fire occurs, dizzy drunkards may have slow response to go to the evacuation routes.

However, there are also good points to consider:

- Karaokees are partitioned into small compartments which may help to confine the fire. However, these boxes are also closely linked together and this will give faster fire spreading rate. Whether the partition is rated with appropriate fire resistance might not help.
- Central control of unused program can be used as a good vehicle for telling customers what to do in case of fire, and instruct them how to evacuate the building as soon as possible.

In view of the above, fire safety management introduced in karaoke establishments must eliminate all the bad points and keep the good points for providing fire safety. With a properly planned FSMS, the key problems discussed earlier can be solved and the occurrence of these situations can be minimised or even prevented.

4. FIRE SAFETY RANKING

A fire safety ranking system FRS1 was proposed for existing karaoke establishments [10]. Attributes are grouped into four areas as the key parameters for local fire safety requirements that are important in fire risk analysis; passive building construction governed by the BD; FSI required by the Fire Services Department (FSD); and a newly proposed fire safety management. They are selected based on professional judgement with reference made to the local requirements on fire safety taken care of by the BD and FSD [e.g. 11-14]. This is used to study how far the fire safety provision of an existing karaoke deviates from the expected requirements.

From the results of two field surveys [8], 45 karaokes are ranked according to the proposed system. The first part of the ranking system on FLD and occupant load factor (OLF) is considered to be acceptable for most of the karaoke establishments. The second part of the ranking system on the building structures and constructions cannot be modified easily because it is very expensive and inconvenient to carry out building renovation works and construction works in the establishments as this will lead to suspension of business during the refurbishment, which in turn will lead to serious loss in profit. Concerning the third part of the ranking system, space constraints in existing establishments make it difficult to upgrade the installed FSI such as the fire detection systems.

When considering only the first three attributes of the ranking system, the total points would be 15. The 45 karaokes surveyed [8] would score points ranging from 5 to 10 as shown in Table 1. If there is proper fire safety management, the score can be pushed up by 5 points. Karaokes with upgraded fire safety management would then have scores from 10 to 15 points out of 20 points in the FRS1.

Proper fire safety management should give a karaoke with high ranking if it can control the other attributes on risk analysis factors, building fire safety requirements, and FSI. Therefore, the most appropriate action is to immediately enhance fire safety management by appointing a fire safety manager in the establishment.

5. ACTION LEVELS FOR FIRE SAFETY MANAGEMENT

Since there are different fire safety provisions in different karaokes, different levels of fire safety management are recommended. In this paper, three action levels are proposed in the FSMS for existing karaoke establishments with different FRS1 scores. The levels are classified by taking out the attribute of fire safety management in the proposed FRS1 [10]. Therefore, there are three attributes [23] on key risk parameters, building requirement, and FSI, with 5 points assigned to each, giving a total of 15 point.

- Level 1 for those karaokes satisfying all the requirements, scoring full marks of 15 points:

These should be the safest types of karaoke establishments since all the statutory requirements are fulfilled. The FLD would be low, say less than 283 MJm⁻². Building constructions are well-designed following the current regulations such that no dead-ends are found. All the FSI are installed and properly maintained. However, this does not imply fire safety management is not necessary. Strategies in fire safety management still have to be considered.

- Level 2 for those karaokes fail to satisfy some requirements, scoring 6 to 14 points inclusively:

Most of the karaokes fall into this category of medium safety level. And it is found that in the second survey, many karaoke establishments have already started some kind of fire safety management training to their staff. This will surely be a great improvement in the FRS1 if the establishments are further managed by trained staff knowing the appropriate actions to be taken in both normal and emergency modes of operation.

Table 1: Proposed fire safety ranking without considering fire safety management

Karaoke number	Risk factors (5 points)	Passive building construction (5 points)	FSI (5 points)	Total mark
1	5	1	2	8
2	5	1	2	8
3	5	2	1	8
4	5	1	2	8
5	4	1	1	6
6	4	2	1	7
7	4	1	1	6
8	2	2	1	5
9	4	2	1	7
10	4	2	1	7
11	4	2	1	7
12	4	1	1	6
13	5	1	2	8
14	4	2	2	8
15	4	2	2	8
16	4	2	2	8
17	4	2	2	8
18	4	2	2	8
19	5	2	1	8
20	5	2	2	9
21	4	2	0	6
22	4	1	2	7
23	5	1	3	9
24	5	1	2	8 (Closed)
25	4	0	2	6
26	5	1	1	7
27	4	2	2	8
28	4	2	2	8 (Closed)
29	5	2	2	9
30	5	-1	1	5
31	5	1	1	7
32	5	1	1	7
33	5	1	1	7
34	5	0	1	6
35	5	1	1	7
36	5	2	2	9
37	5	2	2	9
38	5	1	2	8
39	4	1	2	7
40	4	0	3	7
41	4	2	1	7
42	4	1	3	8
43	5	1	1	7
44	5	1	1	7
45	5	2	3	10

- Level 3 for those karaokes that satisfy only a small number of the requirements, scoring 5 points or less:

These karaokes are considered to be less safe. The situations may not be so favourable for the continuation of business unless fire safety management is carried out promptly to focus on the problems and then improve the safety standards of

the establishments. There may be high FLD with excessive storage of combustible materials or alcoholic beverages. The establishments may be extremely crowded with occupants, having high OLF. They may be located in basements or at high levels of high rise buildings. Moreover, there may be dead-ends in the establishments. Further, the installations of FSI may not be adequate or maintained properly. All of the above reasons may

reduce the safety of the establishments, which in turn will result in a low ranking in the system. Therefore, the FSMS for the karaoke establishments in this level should pinpoint their weaknesses and try to advance the safety levels for the general public.

6. PERSONNEL MANAGEMENT

In a well-planned FSMS, all staff are expected to take part in the management scheme. They should form a strong management structure consisting of three parties of fire safety management personnel, to perform tasks on dealing with the risk analysis factors, building structure protection and also the FSI. However, as the situations with regard to the different safety levels in the FSMS are different, the management staff should perform tasks according to the action levels of the establishments.

A fire safety manager with good fire fighting experience and good fire knowledge, preferably from the fire brigade, should be appointed [16-20,24-27]. In addition, it is helpful to have several fire safety officers responsible for various zones in the establishment to assist the fire safety manager. Other staff should be trained with some basic knowledge related to fire safety. All staff should know their responsibilities and carry out the necessary actions in the FSMS step by step. An effective scheme includes not only procedures to be executed in normal business and actions to be taken against an accidental fire, but includes also training the staff to ensure proper execution of the assigned duties [16-20,24-27].

- **Fire safety manager**

Recent regulations have made clear reference to the importance of good management, with the introduction of the concept of 'fire safety manager' for carrying out 'fire safety management' [16-20,24-27]. A fire safety manager should therefore be appointed in a karaoke establishment with full responsibility to take charge of the overall development, construction and effective implementation of the FSMS. The manager should be responsible for the fire safety plan of the karaoke establishment, be involved in every process of the implementation and get the tasks done by controlling the allocated budget. In the chained karaoke establishments, one fire safety manager can be employed to make specific plan for each shop. However, in each shop, there should be a key person in charge. A strong fire safety management structure should be established.

The need for fire safety should be regularly emphasised to all the staff. The conditions of the

establishment should be recorded and updated when alteration works have been done so that the information kept in the report reflects the latest situations. The manager should:

- ensure the fire services installations are in compliance with the statutory regulations and also other contractual agreements [e.g. 28].
- prepare an emergency plan with procedures of actions to be taken in case of fires [16-20,24-27].
- try to minimise injuries of the occupants, damage to the building and its contents.

- **Fire safety officer**

Designated persons like fire safety officers should be appointed to assist the Fire Safety Manager and be responsible for the fire safety in the karaoke establishment. It is worthwhile to consider issuing a license to those qualified for taking up this role. Those full-time staff with good fire services training can be very suitable candidates. With good knowledge on fire safety and assigned responsibilities, they should be capable of taking appropriate actions in case of fires [16-20,24]. The scheme should include all the procedures of the actions of the fire safety officers, other staff and customers in response to fires. The expected responses from the occupants and their abilities to respond to fire danger should be evaluated. Actions planned in advance can avoid any delay in rescue. Each officer who is responsible for a particular area of the establishment should keep an eye on the potential hazards in the establishment. Accidental fires caused by careless disposal of cigarette ends lighting up combustible materials should be avoided. Whenever the officer is absent, somebody else should stand by to maintain the proper fire safety arrangement.

- **General grade staff**

Induction training should be provided to all new staff, including those temporary and part-time staff [16-20,24]. This is essential because untrained employees may endanger themselves and also the customers. They should at least know the general layout plan of the karaoke establishment; the general safety rules for working in the karaokes; some basic legislation covering the establishments; the locations of fire alarms (FA), fire extinguishers (FE) and means of escape (MoE). An updated staff list, a record of the names and number of customers, and their approximate locations in the establishments should be kept as such information would be useful in case of emergency or even in fire drills.

7. GENERAL RESPONSIBILITIES OF STAFF

Staff of each grade should play a role in fire safety management. All staff should follow the rules set and the fire safety manager should possess some specific qualifications.

All staff are expected to follow the rules below in all three levels in the FSMS:

- Be alert to fires.
- Be punctual at work and mark attendance in the register [25].
- In the case of shift works, the hand-over work should be explained clearly such as reporting any potential hazards.
- No sleeping, consumption of alcoholic beverages or gambling is allowed when on duty [25].
- Be able to analyse the situations for proper actions and should not put themselves in any danger in case of fires.

Fire safety managers are expected to have the following qualities for all three levels in the FSMS:

- Take the “leader” role in all aspects of fire safety management.
- Have the capability to prevent fires, be prepared for emergencies, maintain safe environment by carrying out assessments or audits, and training [18] and respond promptly to fires.
- Have good knowledge on FSI and also loss prevention in security, safety and claims management [26].
- Have the ability to handle emergencies.
- Ensure effective communication with government departments such as BD, FSD, etc., karaoke staff and occupants.
- Those with fire fighting experience such as working as fire officers before are strongly recommended.
- Establish an appropriate fire safety team for that specific karaoke by managing the human resources. Though the fire safety manager is the one responsible for constructing and governing the scheme [26], co-operation is required from other staff. The fire safety manager should play key roles in carrying out the procedures and all employees should understand and follow the emergency procedures in fires.

Fire safety managers are also expected to perform the following duties for all the levels in the FSMS:

- Protect the occupants and retain the building and its contents from fire disasters.
- Understand the causes of fires and minimise the extent of possible damage.
- Understand the operation of the specific karaoke establishment that he/she is responsible for on a 24-hour basis [26].
- Know the responsibility being allocated and identify the causes, control the causes and minimise the loss [20].
- Have the authority to allocate the human and financial resources to meet the potential needs of the situations.
- Familiarise with the major characteristics and the overall layout of the establishment such as the locations of exits, FE and dead-ends if any, etc. of the specific karaoke that they are working in [24].
- Work out a proper evacuation plan according to the special features of the establishment.
- Identify and carry out measures to monitor, reduce and eliminate the potential fire hazards.
- Ensure all the FSI meet the latest statutory regulations, requirements and codes [24] issued by the BD, FSD or other government departments.
- Seek advice from government departments or authorities [24] on the specific requirements of running a karaoke establishment when drafting the FSMS.
- Review the FSMS with all the staff in the establishment after receiving approval from the local authorities [26], such as changing of the plan, annual updating and also altering in the responsibilities of the staff, etc.
- Monitor the safety systems being installed in the karaoke establishment, especially those required maintenance and testing [18].
- Update the FSMS regularly, such as annually.
- Make appropriate changes to the plan if there are any physical changes taken place in the establishment [26].
- Determine the size of the officer team by considering the size of the karaoke establishment.
- Establish a thorough staff training program for the particular karaoke [18].

- Arrange fire safety training programs to ensure new employees be trained before they work in the establishment [18].
- Conduct fire safety seminars for all the staff to emphasise the importance of fire safety and to ensure a safety environment can be maintained in the karaoke establishment.
- Train and inform staff of their responsibilities in fires [24].
- Identify all the resources available for implementing the FSMS to its full extent.
- Analyse documents including the evacuation plan, fire protection plan, health and safety program, security procedures, finance and purchasing procedures, employer handbooks, insurance program, etc.
- Instruct the fire safety officers to perform various tasks in different fire safety aspects and teach them to follow the steps in FSMS with explanations on carrying out the tasks.
- Periodically review all the current aspects of fire safety arrangements of the establishment [24].
- Identify and understand the relevant standards so that any fire protection and suppression systems or building services installations are currently updated.
- Identify the locations of shutoffs of utilities such as the town gas supply in kitchen.
- Notify the closest Fire Services Station of the establishment [24].
- Design a well-planned pre-written evacuation plan [26] in the FSMS with emergency procedures described in detail for fire safety personnel in the particular karaoke establishment to follow.
- Divide the establishment into fire zones that correspond to the zoning of other fire protection systems such as fire detection (FD) systems to facilitate the evacuation of occupants.

Fire safety officers are expected to take up the following duties in the normal operation of business of the karaoke establishments in all levels of the FSMS.

- Attend regular fire safety seminars.
- Familiarise with messages shown to the customers through videos before they sing.
- Explain the highlighted points of concern on life safety to the customers if necessary.
- Know how to prevent, contain and report fires.

- Learn to calm customers down in case of fires, not to make them nervous.

Besides, many different tasks should be performed to suit the three levels in the FSMS of karaoke establishments. Two modes of operation should be identified [9,18]:

- Normal mode
This mode is performed under normal operation without accidents.
- Emergency mode
A sequence of actions to be taken in case of fires.

In normal mode, all the staff should perform various tasks to ensure fire safety in the establishment, but not to disturb the operation of business. In emergency mode of operation, all staff should know how to deal with the situations in the case of a fire [18]. Relating to the fire safety concerns in karaoke establishments as stated in section 3, all the fire safety strategies in the FSMS are designed as associated issues related to the safety aspects of the karaoke establishments. Tasks for the key parameters in local codes, building requirements and also FSI are described specifically in Appendix A in an order following the actions to be taken at each level as suggested on the following section. Note that those are typical actions to be taken and should be included clearly in the fire safety plan. Normally, such a fire safety plan has three components on maintenance plan, staff training plan and fire action plan. However, specific items should be worked out for individual karaokes, depending on its geometrical characteristics, number of customers, number of karaoke boxes, and its FSRS1 scores, i.e. how far it deviated from the expectation in the new fire safety codes [2,3,11-14].

8. ACTION LEVEL 1 FIRE SAFETY MANAGEMENT

The fire safety manager should perform the tasks with respect to:

- The key parameters in the normal mode of operation: KNM1a-f,2a,f,g,h,l,m,n,s,3a,b,c,e-h,4a-d,5a,b,d,6a,b,7a,b,c,8a-l
- The key parameters in the emergency mode of operation: KEM1a,3a-u
- The building requirements in the normal mode of operation: BNM2a-e,3a-g,4a-d,5a,d,e
- No need to take any actions on the building requirements in the emergency mode of operation.

- The FSI requirements in the normal mode of operation: FNM1a-h,2a,b,4b,h,k,5a-k,6a-d,7a,b,d-h,8b-e,9a-d,10b-e,11b,c,e
- The FSI requirements in the emergency mode of operation: FEM2a,4a-i,5a

The fire safety officers should perform the tasks with respect to:

- The key parameters in the normal mode of operation: KNM1a-h,2b,d-m,o,p,q,s,3a,b,c,e-h,4a-d,5a-d,6a,b,7a,b,c,8a-l
- The key parameters in the emergency mode of operation: KEM1a,b,2a-d,4a-v
- The building requirements in the normal mode of operation: BNM2e,3a,b,e,4a,b,e,5e
- No need to take any actions on the building requirements in the emergency mode of operation
- The FSI requirements in the normal mode of operation: FNM2b,3a,b,4a-l,5c,d,i,6e,f,7c,d,e,i,8a,c,f,g,h,10a,11a,c,d
- The FSI requirements in the emergency mode of operation: FEM1a,2a,3a,b,4a-i

The general grade staff should perform the tasks with respect to:

- The key parameters in the normal mode of operation: KNM1e,f,2r,s,4e,f,g,5d,f,6c,d,7e,8e,h,i,j,p,q
- The building requirements in the normal mode of operation: BNM2e,3e,4a
- The FSI requirements in the normal mode of operation: FNM2b,4d

9. ACTION LEVEL 2 FIRE SAFETY MANAGEMENT

The fire safety manager should perform the tasks with respect to:

- The key parameters in the normal mode of operation: KNM1a-h,2b,d-s,3a,b,c,e-h,4a-d,5a-d,6a,b,7a-c,8a-l
- The key parameters in the emergency mode of operation: KEM1a,3a-u
- The building requirements in the normal mode of operation: BNM2a-e,3a-g,4a-d,5b-f
- No need to take any actions on the building requirements in the emergency mode of operation

- The FSI requirements in the normal mode of operation: FNM1a-h,2a,b,4b,h,k,5a-k,6a-d,7a,b,d-h,8b-e,9a-d,10b-e,11b,c,e
- The FSI requirements in the emergency mode of operation: FEM2a,4a-i,5a

The fire safety officers should perform the tasks with respect to:

- The key parameters in the normal mode of operation: KNM1e,f,2m-s,3d-h,4a,e,f,g,5d,e,6b,c,d,7c,d,8e,h-o
- The key parameters in the emergency mode of operation: KEM1a,b,2a-e,4a-v
- The building requirements in the normal mode of operation: BNM2e,3a,b,e,4a,b,e,5e
- No need to take any actions on the building requirements in the emergency mode of operation
- The FSI requirements in the normal mode of operation: FNM2b,3a,b,4a-l,5c,d,i,6e,f,7c,d,e,i,8a,c,f,g,h,10a,11a,c,d
- The FSI requirements in the emergency mode of operation: FEM1a,2a,3a,b,4a-i

The general grade staff should perform the tasks with respect to:

- The key parameters in the normal mode of operation: KNM1e,f,2r,s,4e,f,g,5d,f,6c,d,7e,8e,h,i,j,p,q
- The building requirements in the normal mode of operation: BNM2e,3e,4a
- The FSI requirements in the normal mode of operation: FNM2b,4d

10. ACTION LEVEL 3 FIRE SAFETY MANAGEMENT

The fire safety manager should perform the tasks with respect to:

- The key parameters in the normal mode of operation: KNM1a-h,2c-s,3a,b,c,e-h,4a-d,5a-d,6a,b,7a,b,c,8a-l,r
- The key parameters in the emergency mode of operation: KEM1a,3a-u
- The building requirements in the normal mode of operation: BNM1a,b,2a-e,3a-g,4a-d,5c-h,6a-j
- The building requirements in the emergency mode of operation: BEM1a

- The FSI requirements in the normal mode of operation: FNM1a-h,2a,b,4b,h,k,5a-k,6a-d,g,7a,b,d-h,8b-e,i,9a-f,10b-e,11b,c,e
- The FSI requirements in the emergency mode of operation: FEM2a,4a-i,5a,b

The fire safety officers should perform the tasks with respect to:

- The key parameters in the normal mode of operation: KNM1e,f,2h,m-q,s,3d-h,4a,e,f,g,5d,e,6b,c,d,7c,d,g,8e,h-k,m,n,o
- The key parameters in the emergency mode of operation: KEM1a,b,2a-e,4a-v
- The building requirements in the normal mode of operation: BNM1a,b,2e,3e,4a,6k,l,m
- The building requirements in the emergency mode of operation: BEM1a-f
- The FSI requirements in the normal mode of operation: FNM2b,3a,b,4a-l,5c,d,i,6e,f,7c,d,e,i,8a,c,f-i,9e,f,10a,11a,c,d,f
- The FSI requirements in the emergency mode of operation: FEM1a,2a,3a,b,4a-i

The general grade staff should perform the tasks with respect to:

- The key parameters in the normal mode of operation: KNM1e,f,2r,s,4e,f,g,5d,f,6c,d,7e,f,g,8e,h,i,j,p,q
- The building requirements in the normal mode of operation: BNM2e,3e,4a,6k,l,m
- The FSI requirements in the normal mode of operation: FNM2b,4d

11. CONCLUSION

Karaoke establishments can be safe in accidental fires if there is proper fire safety management [15-21]. Even though there are various styles and characteristics in different karaokes, similar approach can be used to work out the FSMS. Different FSMS with three action levels have been proposed for existing karaoke establishments with different FSRS1 scores [10]:

- Action level 1 is for karaoke establishments with high scores. The actions to be taken under the normal mode of operation should be executed carefully.
- Most of the karaoke establishments surveyed should have fire safety management at action level 2. Therefore, the FSMS must be implemented properly with the list described previously.

- Action level 3 is for those karaokes without good provision of fire safety. Fortunately, only one karaoke was classified under this level. The FSMS should be worked out carefully in consultation with experienced professionals.

Concerning the fire safety management team, it is important that the fire safety manager should have practical experience in fire fighting. Extensive training should also be designed for both the fire safety managers and the fire safety officers, and if feasible, to the general grade staff as well, if they are involved in controlling a fire. Otherwise, it might happen that the staff themselves might take wrong actions such as go blindly to a room with a flashover fire. Backdrafts due to opening the door would hurt lots of people.

By following the actions listed in this paper, a karaoke establishment of lower score in FSRS1 can be safe as the most important thing is to implement a FSMS. These FSMS should be updated regularly to cater for the new demand from the customers. However, the suggested items at the three action levels should not be taken as 'universal'. A 'tailor-made' FSMS should be worked out for individual karaokes, depending on their particular needs. That is to say, a global approach can be adopted, but different FSMS to be worked out by experts.

The new regulations should consider putting on fire safety management, irrespective to whether the fire safety provisions are up to the new required specifications [2,3,11-14]. This should be implemented as soon as possible for public safety.

REFERENCES

1. South China Morning Post, Hong Kong, 26 January (1997).
2. Consultation paper on licensing control of karaoke establishments, Urban Services Department and Regional Services Department, Hong Kong Special Administrative Region, February (1998).
3. Press Release, Legislative Council: Karaoke Establishments Bill, the Hong Kong Special Administration Region Government, 15 March (2000).
4. British Standard BS 476 Part 22, Fire tests on building materials and structures - Methods for determination of the fire resistance of non-loadbearing elements of construction, British Standards Institution, London, UK (1987).
5. British Standard BS 476 Part 7, Fire tests on building materials and structures - Method of test to determine the classification of the surface spread of flame of products, British Standards Institution, London, UK (1997).

6. ISO 9705, Fire tests - Full-scale room test for surface products, International Standards Organisation (ISO), Geneva, Switzerland (1993).
7. G.C.H. Lui and W.K. Chow, "Review on safety codes relating to karaoke establishments and fire safety management", *International Journal on Engineering Performance-Based Fire Codes*, Vol. 1, No. 2, pp. 59-70 (1999).
8. W.K. Chow and G.C.H. Lui, "Survey on the fire safety requirements in karaoke establishments", *International Journal on Engineering Performance-Based Fire Codes*, Vol. 2, No. 1, pp. 1-13 (2000).
9. G.C.H. Lui and W.K. Chow, "A preliminary proposal on fire safety management for karaoke establishments", *Conference Proceedings of the 18th International System Safety Conference*, Fort Worth, Texas, USA, 11-16 September 2000, System Safety Society, Union Town, Virginia, USA, pp. 76-84 (2000).
10. W.K. Chow and G.C.H. Lui, "A fire safety ranking system for karaoke establishments in the Hong Kong", *Journal of Fire Sciences* – Accepted to publish (2000).
11. Code of Practice for the Provision of Means of Access for Firefighting and Rescue, Buildings Department, Hong Kong (1995).
12. Code of Practice for the Provision of Means of Escape In Case of Fire, Buildings Department, Hong Kong (1996).
13. Code of Practice for Fire Resisting Construction, Buildings Department, Hong Kong (1996).
14. Code of Practice for Minimum Fire Service Installations and Equipment and Inspection and Testing and Maintenance of Installations and Equipment, Fire Services Department, Hong Kong Special Administrative Region (1998).
15. H.L. Malhotra, Fire safety in buildings, Building Research Establishment Report, Department of the Environment, Building Research Establishment, Fire Research Station, Borehamwood, Herts, WD6 2BL, UK (1987).
16. BSI-DD240: Part 1: 1997 (Draft), Fire safety engineering in buildings – Part 1: Guide to the application of fire safety engineering principles, British Standards Institution, London, UK (1997).
17. Bickerdike Allen Partners, Design principles of fire safety, Her Majesty's Stationery Office, London, UK (1996).
18. M. Shipp, "Fire safety management in fire safety engineering", Eurofire '98, 11 to 13 March 1998, Brussels, Belgium (1998).
19. K.K. Papaioannou, "Fire safety engineering, design and management in historic buildings", Eurofire '98, 11 to 13 March 1998, Brussels, Belgium (1998).
20. Establishing a loss control programme, Fire Safety Management Course, Loss Prevention Council, pp. 1-5, WTI Burn Hall, Borehamwood, UK, September (1999).
21. Guidance notes for the management of indoor air quality in offices and public places, Indoor Air Quality Management Group, Government of the Hong Kong Special Administrative Region, November (1999).
22. J.P. Redfern, "Property evaluation of FR polymeric materials using a range of instrumental techniques", *Polymer Degradation and Stability*, Vol. 64, No. 5, pp. 561-572 (1999).
23. J.M. Watts, "Fire risk assessment using multiattribute evaluation", In: Y. Hasemi (editor), *Fire Safety Science: Proceedings of the Fifth International Symposium*, Tsukuba, Japan, pp. 679-690 (1997).
24. British Standard BS 5588, Fire precautions in the design, construction and use of buildings, Part 11, Code of practice for shops, offices, industrial, storage and other similar buildings, Section 8 Management, British Standards Institution, London, UK (1997).
25. Manual for security personnel providing guarding services in buildings, Security & Guarding Services Industry Authority, Security Bureau, Hong Kong Special Administrative Region, 23 January (1999).
26. M.W. Janko, Property fire protection: a practical approach, Van Nostrand Reinhold, New York, USA (1992).
27. An introduction to risk management and the control of risk, Fire Safety Management Course, Loss Prevention Council, pp. 1-10, WTI Burn Hall, Borehamwood, UK, September (1999).
28. Care and maintenance of automatic sprinkler systems, Technical Bulletin TB 6:1990:1, Loss Prevention Council, Borehamwood, UK (1990).

APPENDIX A

Actions to be taken in the proposed Fire Safety Management Scheme (FSMS)

A1. Key Parameters in Local Codes (K)

A1a Normal mode

- *KNM1. Fire load density*
 - KNM1a. Identify the fire hazard scenarios of a particular karaoke establishment related to storing combustibles.
 - KNM1b. Identify the possible losses of accidents and hazards due to ignition of the combustibles stored.
 - KNM1c. Control the losses resulted from human behaviour or environmental causes.
 - KNM1d. Carry out routine inspections on controlling the causes of fires [24].
 - KNM1e. Identify the ignition sources [19] and possible causes of fires such as electrical problems, smoking, cooking, and arson or misconduct; and keep them away from the combustible items.
 - KNM1f. Minimise occurrence of the possible ignition that may lead to fires.
 - KNM1g. Try to control by eliminating, reducing, retaining and transferring the fire risks [25].
 - KNM1h. Identify areas with high fire loads such as storage areas for table clothes, papers, candles, compact discs, tapes, furniture and liquors.
- *KNM2. Storage of combustible materials and flammable liquors*
 - KNM2a. Keep the FLD less than 283.75 MJm^{-2} .
 - KNM2b. Store minimum amount of goods so as to reduce the smoke being generated in fires [27].
 - KNM2c. Ensure the FLD is less than the maximum allowed value.
 - KNM2d. Reduce the amount of materials being stored in the establishments with high FLD [27]. This case is rather unlikely since the land price and rent in the HKSAR are too high for using the karaoke as a store.
 - KNM2e. Avoid storing excessive amount of alcoholic beverages.
 - KNM2f. Designate storage rooms to places as near as possible to the fire hydrant/hose reel (FH/HR) or areas with availability of water such as toilets.
 - KNM2g. If possible, allocate the storage rooms to places with FD systems or with automatic sprinkler systems.
 - KNM2h. Place adequate number of FE suitable for fire fighting.
 - KNM2i. Keep storage of combustible materials away from places with high OLF, such as the karaoke boxes and the waiting hall.
 - KNM2j. Fence or suitably protect the areas for storing combustible materials.
 - KNM2k. Do not store large amount of combustible materials or alcoholic beverages in the vicinity of any naked flames so as to avoid goods accidentally being lighted up [27].
 - KNM2l. Avoid obstructions to the evacuation routes by the storage of goods and a free escape route should be maintained [24].
 - KNM2m. Stick clear and visible "No Smoking" signs at some prominent places near the storage areas of combustible and flammable materials.
 - KNM2n. Do not leave the storage areas unattended so that even a small fire is started, somebody can take actions to prevent flashover from occurring.
 - KNM2o. Piles of goods should not block the installed sprinkler heads [25,28].
 - KNM2p. Separate storage areas by fire doors.
 - KNM2q. Establish procedures to safely handle and store flammable goods and liquids.
 - KNM2r. Handle the flammable liquids including liquid fuel carefully and avoid spillage.
 - KNM2s. Prevent ignition of combustible materials that will produce lots of heat and smoke.
- *KNM3. Electrical problems*
 - KNM3a. Ensure electrical installations and wiring meet the latest statutory regulations.
 - KNM3b. Avoid malfunctioning of electrical equipment through regular maintenance by registered electrical workers so as to ensure the installations are in good conditions [25].
 - KNM3c. Keep the maintenance records in a register for future references [24].
 - KNM3d. Check the electrical equipment daily using procedures set up [24] and report any unsafe conditions, such as circuits overloading, misuse of adapters and damaged sockets, plugs or electrical wires etc. to the fire safety manager for taking appropriate actions.
 - KNM3e. Ensure electrical wiring is properly connected and maintained [19].

- KNM3f. Avoid using damaged or frayed cables and faulty equipment.
- KNM3g. Avoid overloading of the electrical systems by the significant demands on the electricity supply from lots of televisions and amplifiers in the establishments [25].
- KNM3h. Avoid overheating of prolonged operations of electrical appliances, equipment and electric wiring such as televisions and ensure that they are properly maintained.
- *KNM4. Smoking*

KNM4a. Ensure the smoking areas are free of storage of combustible materials.

KNM4b. Suggest the designated area for smoking inside the establishment [24] and enhance fire protection by installing necessary FSI at that particular area.

KNM4c. Display “No Smoking” notice in refuse areas and storage areas of combustible materials or flammable liquids.

KNM4d. Avoid smoking or careless disposal of lighted cigarette ends that may accidentally ignite the carpets, sofas or curtains in the rooms of the establishment.

KNM4e. Coat the furniture items in the karaoke establishments with fire retardant so as to delay the ignition time if they catch fires.

KNM4f. Dispose the cigarette ends in a safe place. Ashtrays with proper design and being made of non-combustible materials should be provided in every room.

KNM4g. Further dispose the cigarette ends in some metal containers and do not throw any ignitable material into rubbish bins if they are not properly extinguished.
 - *KNM5. Cooking*

KNM5a. Properly install the cooking appliances and provide adequate ventilation.

KNM5b. Keep the kitchens with the highest fire risks safe.

KNM5c. Avoid the storage of large amount of combustible materials or flammable liquid around the cooking areas.

KNM5d. Ensure the cooking facilities such as the gas stoves are handled carefully.

KNM5e. Allow cooking inside the kitchen area only.

KNM5f. Remove any grease from the stoves or extraction fans that may cause fires.
 - *KNM6. Misconduct and arson*

KNM6a. Install Closed Circuit Television (CCTV) for security purposes.

KNM6b. Pay great attentions to avoid firebombs or Molotov cocktails thrown into the karaokes.

KNM6c. Avoid occupants drinking too much and become unconscious. Let their friends accompany them.

KNM6d. Avoid misconduct of occupants such as arguing and even fighting.
 - *KNM7. Occupant load factor*

KNM7a. Divide establishments into different zones according to the zoning of other FSI such as FD system.

KNM7b. Assign a fire safety officer to each zone.

KNM7c. Ensure enough fire safety officers are on duty during weekends or public holidays when the karaoke establishments are usually fully packed with people.

KNM7d. No waiting or sitting of customers at the corridors when all the rooms are occupied.

KNM7e. Allocate customers to the rooms that are close to the exits first to facilitate evacuation in fires.

KNM7f. Allocate rooms at the dead-end corridors to customers last only when other rooms are occupied.

KNM7g. Ensure the number of occupants in rooms at dead-end corridors do not exceed the maximum allowance as stated in the building codes.
 - *KNM8. Evacuation plan*

KNM8a. Establish a systematic, safe and well-organised evacuation plan with some well-planned procedures to ensure safe egress of occupants from the tragic scene [24].

KNM8b. Let all the fire safety management personnel know their responsibilities and duties as listed in the FSMS.

KNM8c. Set codes or secret wordings for emergency messages for internal communication between staff so as to avoid the arousal of chaotic conditions of customers on overhearing the conversation on the accidents happened.

KNM8d. Pre-tape some videos particularly suitable for an individual karaoke to show what should be done in case of emergencies.

- KNM8e. Make sure all the staff understand the emergency message codes to be used in the karaoke establishments.
- KNM8f. Hold fire drills regularly [18].
- KNM8g. Minimise the disturbance to the ordinary business of karaoke establishment in drills.
- KNM8h. Train to keep calm by practising and getting used to the procedures.
- KNM8i. Practice seriously and familiarise with the procedures in evacuating the occupants in regular fire drills.
- KNM8j. Familiarise with the escape routes and alternative means of escape in fires [24].
- KNM8k. Assign some fire safety officers to different zones, monitor evacuation procedures and assist occupants to evacuate from each zone in the karaoke establishment [24].
- KNM8l. Modify the number of the occupants allowed in each zone of the karaoke establishment if renovations are taking place.
- KNM8m. Ensure the evacuation plan has clearly indicated the evacuation procedures [24].
- KNM8n. Post maps of the evacuation routes from individual rooms at prominent places such as the back of the door of each box.
- KNM8o. Ensure the map in each room can clearly indicate the location of the occupants in that particular room and also highlight the possible evacuation routes.
- KNM8p. Remind the customers to read the map of the evacuation routes in their rooms.
- KNM8q. Give a briefing to the customers before they sing.
- KNM8r. Design an appropriate evacuation plan according to the specific features such as dead-end corridors etc. of the establishment.

A1b Emergency mode

- *KEM1. Fire load density*
 - KEM1a. Use appropriate types of FE placed nearest to the fire origin by well-trained fire safety personnel.
 - KEM1b. Pre-wet partitions or combustible materials adjacent and close to the fire origin.
- *KEM2. Occupant load factor*
 - KEM2a. Carry out the well-organised zone evacuation according to the pre-planned evacuation plan by trained fire safety officers in fires [24].
 - KEM2b. Evacuate the occupants involved in the fire zone first.
 - KEM2c. Tell the occupants in other zones to keep calm and evacuate them in sequence according to the evacuation plan.
 - KEM2d. Evacuate only a certain number of people at one time at different zones so that the capacity of the means of escape will not be overloaded.
 - KEM2e. Disperse customers in the rooms of the dead-end corridors in the establishment also with higher priority.
- *KEM3. Evacuation plan for fire safety managers*
 - KEM3a. Identify the location of the fire from either the FA signal panel or indications and reports from other personnel on notifying the alarm.
 - KEM3b. Report to the FSD about the location and nature of fire by dialling 999 at once on notification of fire if the FA system is not directly connected to the fire station.
 - KEM3c. Ensure the firemen know the location and nature of the fire if the systems consist of a direct link of fire alarm system to the nearest fire station.
 - KEM3d. Tell other safety officers the location of fire origin.
 - KEM3e. Arrive quickly at the scene of fire origin.
 - KEM3f. Judge the most appropriate actions to take and give instructions to the fire safety officers immediately.
 - KEM3g. Assist in smothering the fire if the condition is appropriate.
 - KEM3h. If flame is found at the ceiling with heavy smoke in the affected area, close the door of the fire room to confine the fire; then evacuate from the scene immediately.
 - KEM3i. Use the public announcement system to broadcast the situation and tell the customers to keep calm; inform them that well-trained fire safety officers will be responsible for leading them to the safe directions of egress.
 - KEM3j. Instruct the officers to evacuate the transient customers immediately in sequence according to the zones if the fire is found to be uncontrollable and has the tendency to spread.
 - KEM3k. Close the door of the room of fire origin to confine the effects of fire to that room and isolate the fire area [24]. This also limits and slows down the spread of fire and smoke to the

- corridors and other places, which in turn will minimise the suffocation of occupants from inhaling smoke.
- KEM3l. Make sure no one except the policemen and the firemen are allowed to enter the karaoke.
- KEM3m. Broadcast signals through Audio/Visual advisory systems.
- KEM3n. Ensure all the fire dampers in the MVAC systems are in operation and all the air-conditioning systems except the smoke control systems should be closed.
- KEM3o. Turn off all the electrical appliances [25] except those of lighting.
- KEM3p. Turn off all the powered equipment [24] unless they are provided for emergency services.
- KEM3q. Take a roll call to ensure all the occupants are safe at the assembly point [25].
- KEM3r. No one besides those for investigating or fire fighting such as the police and firemen are allowed to re-enter the establishment [24].
- KEM3s. Stand by to provide assistance and information to the firemen about the major plant locations and electrical switch rooms etc.
- KEM3t. Report the accidents to the management company and insurance company of the establishment.
- KEM3u. Ensure all the occupants has left the establishment, and reach a safe place as designated [25].
- *KEM4. Evacuation plan for fire safety officers*

KEM4a. Immediately sound the FA using the nearest manual FA point or hitting the break glass unit or shouting for help when discover a fire [24].

KEM4b. If any occupants are endangered by the fire, the officer who discovers the fire should provide immediate assistance to the people being involved and then inform the other staff to raise the alarm at the nearest manual FA point [24].

KEM4c. If a fire is detected, they should report to the fire safety manager immediately on the exact location of the fire and the nature of the fire if known.

KEM4d. Communicate through two-way hand-held walkie-talkies by the karaoke staff will also be useful and this can allow prompt notification of fires if radio communication system is used in the establishment [26].

KEM4e. Use coded emergency messages when communicating and reporting any emergencies in the telephone or walkie-talkies conversation because this can save time, avoid alarming the customers on overhearing the accidents which may arouse phobia and avoid misunderstanding or unclear messages being delivered.

KEM4f. If the situations allow, fire safety officers with proper training can attempt to use the nearest FE provided to smother the fire.

KEM4g. If the fire is out of control, close the door to confine the fire to stop it from spreading to other areas; then evacuate customers from the scene immediately [24].

KEM4h. In case of any malfunctioning of the FA systems, the officer who discovers the fire should report to the fire safety manager immediately on the situation and location of the fire by telephone or hand-held radios [26].

KEM4i. Follow the instructions of the fire safety manager.

KEM4j. When they notice the FA, they should react promptly and execute their assigned duties as pre-planned in the FSMS.

KEM4k. Evacuate the customers in phase, with good discipline and in an orderly manner [24].

KEM4l. Reassure the occupants from any panic.

KEM4m. Evacuate the occupants directly involved in the fires and in the zone that is in the vicinity of the fire source first.

KEM4n. Calm down the occupants in the other zones.

KEM4o. Avoid chaotic situations and give proper evacuation directions to the customers.

KEM4p. Instruct the occupants not to spend time in collecting personal belongings when they escape in fires [24].

KEM4q. Direct the occupants to use appropriate exits for evacuation to a safe place for assembly.

KEM4r. Instruct customers to use staircases which are free of smoke and not lifts in fires [25].

KEM4s. Instruct customers to crawl on the floor, use wet towels to cover their mouth and nose and take short breaths when escape in smoke-filled areas [26].

KEM4t. Ensure smoke doors are not wedged open and let them remain closed but unlocked [24].

KEM4u. If possible, when the fire has not yet grown beyond flashover, check each area of the zone including karaoke rooms, lavatories, storeroom and kitchen (if any), to ensure no one is trapped; close the doors after checking [24].

KEM4v. Close the door of each room to avoid the spread of fire or smoke into those areas [24].

A2. Buildings Requirements (B)

A2a Normal mode

- *BNM1. Location in building*
 - BNM1a. Remind the occupants of those karaokes at basements to escape in upward direction in case of emergencies.
 - BNM1b. Avoid evacuation problems from those karaokes in high rise buildings where the normal access is through lifts.

- *BNM2. Evacuation routes*
 - BNM2a. Get approval and meet the fire safety standards of the authorities for any alteration, renovation, relocations of partitions or reconstruction works of the establishment.
 - BNM2b. Size the means of egress to handle the number of persons intended to occupy the space or that calculated using the OLF, whichever is larger.
 - BNM2c. Ensure escape routes are well-illuminated with sufficient emergency lighting [24].
 - BNM2d. Ensure the evacuation routes are clearly directed by exit signs.
 - BNM2e. Ensure all the escape routes, including fire exits, smoke lobbies, staircases and doorways are clear of obstructions by any furniture items, goods, rubbish bins or any illegal constructions of storage cabinets etc. at all times [24].

- *BNM3. Smoke doors*
 - BNM3a. Ensure the access to ground level or roof is not closed with doors or gates [25] unless they are unlocked and readily open towards the direction of exit without using keys.
 - BNM3b. Repair and fix the smoke doors if any damage is found.
 - BNM3c. Maintain the smoke doors regularly in proper operations and physical conditions.
 - BNM3d. Ensure the hinges of the smoke doors are not damaged and ensure they can be opened and closed smoothly and readily [24].
 - BNM3e. Ensure the smoke doors are kept properly closed at all times so as not to allow fire or smoke spread to other parts of the evacuation routes [24].
 - BNM3f. Ensure the smoke and exit doors are open in the direction of evacuation and unlocked [24].
 - BNM3g. Inspect frequently the automatic closures and fusible links of the fire doors, if any.

- *BNM4. Corridor width*
 - BNM4a. Ensure the required effective widths of evacuation routes are maintained by keeping the routes clear of obstructions [24].
 - BNM4b. Determine the number of occupants allowed to evacuate from different zones and avoid overloading the capacity of each evacuation route.
 - BNM4c. Allow zone evacuation from the karaoke establishment with occupants being directed by the fire safety officers to evacuate in phases in case of fires [24].
 - BNM4d. Relocate the partitions if the corridor widths are less than the statutory requirement.
 - BNM4e. Allow more occupants to escape in zone evacuation from rooms in karaokes with corridor wider than 1.2 m.

- *BNM5. Fire rated construction*
 - BNM5a. Maintain a well-constructed building for occupants to have enough time to escape in case of fires by ensuring the separating walls and partitions have the necessary fire resistance period of the walls.
 - BNM5b. Maintain the structures of the karaokes with certain fire rated hours for the firemen to have long enough time to fight the fires and escape from the scene.
 - BNM5c. Improve the fire resistance by spraying appropriate paints or coatings to the partition materials so as to delay the ignition time of the materials.
 - BNM5d. Minimise the openings made by the services such as ducts, pipes and cables passing through the fire-resisting walls and floors and pay attention to their designs in detail.
 - BNM5e. Ensure an effective evacuation of occupants from the establishment within the fire resistance period of the construction that may not be able to withstand the fire and may collapse after a certain period of time.
 - BNM5f. Ensure sprinkler systems meeting the statutory requirements are installed in the establishment with shorter periods of fire rated construction.
 - BNM5g. Prefer to have a longer period of fire resistance of construction in tall buildings since premature collapse of building structures will lead to serious consequences.

- BNM5h. Ensure a stronger structure with longer fire rated period for the rescue of people by firemen at the basements since no collapse of structures should endanger their lives.
- *BNM6. Dead-end situations*
 - BNM6a. Eliminate or minimise corridors with dead-ends by designers in the design and construction stage of the layout plans of karaoke establishments since dead-ends with rooms from which there is only one way or direction of escape are very dangerous and should be avoided. People escaping have no options but to use that corridor to escape, even though they are enclosed by fire resisting construction.
 - BNM6b. Ensure the BS 476 on fire resistance periods [4] of the corridor walls and the partitions are 2 hours; or rated as Class II or below under BS 476 - surface spread of flame [5]; or equivalent.
 - BNM6c. Protect the dead-end corridors by extra FD and protection systems such as smoke detectors or sprinklers.
 - BNM6d. Ensure smoke control systems are installed for rooms at dead-end corridors.
 - BNM6e. Ensure the evacuation routes and exits are clearly indicated by more exit signs for the evacuation of occupants at dead-ends.
 - BNM6f. Plan carefully for the limited distance i.e. the sum of the direct distance in the room and the travel distance in the corridor should not exceed 18 m.
 - BNM6g. Deal with the situations with proper strategy to ensure the occupants at dead-end corridors can escape in a quick and well-planned manner even if the corridors have only very short travel distances or there is only one or two rooms opening into them.
 - BNM6h. Identify the number and exact locations of dead-end corridors from the layout or during site inspections in the establishment.
 - BNM6i. Place FE at the end of dead-end corridors.
 - BNM6j. Place some special fire protection kits, such as masks for prevention of smoke inhalation, wet towels, fire blankets, and dry powder FE or sand buckets for the customers in the rooms at the dead-end corridors.
 - BNM6k. Serve the rooms at the dead-end corridors at the last priority to customers.
 - BNM6l. Ensure the number of occupants in the rooms at dead-end corridors are within specified limit.
 - BNM6m. Minimise and avoid the possibility of the worst case to happen, i.e. small fires happen at the entrances of the dead-end corridors which block the only exit from the rooms to safety.

A2b Emergency mode

- *BEM1. Dead-end situations*
 - BEM1a. Inform the trapped customers through the Audio/Visual devices if fires cannot be put out by FE at the dead-end corridors.
 - BEM1b. Keep them calm by telling them they will be rescued soon.
 - BEM1c. Give correct directions for occupants in rooms at the dead-end situations to evacuate.
 - BEM1d. Ask the occupants to wear the masks provided in the fire protection kits or use wet towels to cover their nose and mouth.
 - BEM1e. Open the additional exits.
 - BEM1f. Ask the occupants in the rooms at the dead-end corridors to evacuate first in the phased evacuation even if fires are occurring in other places of the establishment.

A3. Fire Services Installations Requirements (F)

A3a Normal mode

- *FNMI. Fire services installations*
 - FNMIa. Ensure all the FSI meet the latest statutory regulations, requirements and codes issued by FSD on their operations and maintenance [18].
 - FNMIb. Ask insurance companies to recommend fire prevention and protection measures.
 - FNMIc. Ensure preventive maintenance is carried out in schedule for all the fire services equipment to be functioning normally, properly and safely for immediate response [19].
 - FNMId. Ensure the systems are operative by regular scheduled testing and inspections carried out at least once every 12 months by registered FSI contractors since most of the systems are infrequently used [25].
 - FNMIe. Have in-depth knowledge of all the operations and mechanisms of the fire services or mechanical ventilation systems installed.
 - FNMIf. Update the knowledge of fire control and protection systems from time to time.

- FNM1g. Remind the management company to make early arrangement on the inspection of FSI in the establishment.
- FNM1h. Ensure emergency supply is available for all the emergency services and the maintenance and testing of the emergency equipment is carried out periodically [18].
- *FNM2. Fire hydrant/ hose reel*

FNM2a. Follow the inspections and testing checklists and procedures listed in the Code.

FNM2b. Note the number and locations of FH and HR in the establishment.
 - *FNM3. Fire hydrant*

FNM3a. Ensure adequate clearances are provided around the hydrant outlet and valve for the free use of the hydrant.

FNM3b. Ensure an effective width of exit route is maintained without being reduced by the FH.
 - *FNM4. Hose reel*

FNM4a. Ensure the characters “FIRE HOSE REEL” of at least 50 mm high are clearly marked on the doors of the HR [14].

FNM4b. Know the procedures of operating HR: 1. Break glass of the FA call point or actuate FA call point; 2. Open control valve before running out hose; 3. Turn on water at nozzle and direct jet at base of fire [14]. (Not suitable for electrical fires)

FNM4c. Ensure the operation instruction notices of the HR, which are provided in prominent positions adjacent to the HR or affixed immediately below the words "FIRE HOSE REEL" on the outer surface of the door, are not subject to undue weathering [14].

FNM4d. Keep the fire HR unobstructed.

FNM4e. Ensure the cradle type HR can be swung freely into the corridor or passage without any blockage [14].

FNM4f. Ensure the HR cabinets are not used as a storage place for anything.

FNM4g. Ensure the doors of the HR cabinets or recesses are not provided with locks [14].

FNM4h. Ensure that when the doors of the HR are in open positions, they should not cause undue obstructions and interference with any exit point or any means of escape.

FNM4i. Ensure that there is no damage to the tubing of every HR and the jet nozzle is unbroken.

FNM4j. Ensure the tubing of the HR is permanently connected and properly wound around the drum without kinking [14].

FNM4k. Ensure the 30-meter tubing can reach every part of the karaoke without any blockage by obstructions.

FNM4l. Ensure the manual FA call points are clearly seen and accessible.
 - *FNM5. Fire alarm*

FNM5a. Check the FA systems in fire drills and follow the testing procedures in the Code.

FNM5b. Consider an alternative backup for the alarm system since it may become inoperative in case of fires.

FNM5c. Know and clearly mark the exact locations of the manual break glass units in the establishment.

FNM5d. Ensure precise signals to be conveyed to the occupants being notified.

FNM5e. Ensure the activation of the FA system can cut the music sent through the audio equipment in rooms.

FNM5f. Provide public address systems to announce the fires and instruct the customers the appropriate actions in case of fires [24].

FNM5g. Conduct simple and direct messages to the customers and also keep them calm.

FNM5h. Motivate the occupants to evacuate promptly in the correct and safest way by conveying the message with a sense of urgency [24].

FNM5i. Ensure the FA system is well-communicated with the central control room if any.

FNM5j. Link the FA system to the nearest fire service station for automatic notification.

FNM5k. Test the manual FA points when the whole FA system is required to be tested in accordance with the appropriate standard.
 - *FNM6. Fire detection*

FNM6a. Ensure an independent indication of the locations of the manual FA call points according to the zoning.

FNM6b. Test the systems and components in accordance to appropriate FSD standards.

FNM6c. Check the smoke detectors once a month and change the batteries at least once a year.

- FNM6d. Adjust the sensitivities of the smoke detectors to match with the general smoke densities in the karaoke rooms since smoking is usually allowed in karaokes.
- FNM6e. Ensure the smoke detectors are clean and not covered with dust that may affect the sensitivities of detection.
- FNM6f. Keep the smoke detectors in good conditions.
- FNM6g. Ensure the dead-ends are well-protected by properly designed and operated FD systems.
- *FNM7. Sprinkler*
 - FNM7a. Give the overall responsibility to the fire safety manager.
 - FNM7b. Follow the testing procedures in accordance to appropriate FSD standards.
 - FNM7c. Keep the sprinkler heads in good conditions.
 - FNM7d. Keep adequate clearance from the sprinkler heads.
 - FNM7e. Ensure they are not blocked by high stack of goods in the storage areas [24].
 - FNM7f. Give instructions to other staff and perform regular inspections on the sprinkler system by the fire safety manager with proper training from the sprinkler installing company and also adequate knowledge and a thorough understanding of the system.
 - FNM7g. Follow some comprehensive and typical schedules or checklists for testing and maintenance for the sprinkler system, such as the Care and Maintenance of Automatic Sprinkler Systems of the Technical Bulletin TB6: 1990: 1 [28].
 - FNM7h. Carry out visual inspection regularly to check the proper positioning of control valves, condition and clearance.
 - FNM7i. Ensure the sprinkler heads are not covered with dust that may affect the sensitivities of detecting and responding to fires.
- *FNM8. Fire extinguishers*
 - FNM8a. Ensure the number of suitable types of FE are adequate and they are available throughout the establishment.
 - FNM8b. Test the extinguishers according to appropriate FSD standards and manufacturer's instructions.
 - FNM8c. Inspect the extinguishers monthly [26].
 - FNM8d. Ensure the number and locations of the FE are the same whenever counted and replace any missed ones.
 - FNM8e. Provide adequate training and sufficient instructions on the uses of suitable FE to the staff [26].
 - FNM8f. Train the staff to use suitable FE properly [26].
 - FNM8g. Know the number and locations of all the FE available in the establishment.
 - FNM8h. Know the functions of various extinguishers and how to choose appropriate types such as gas, powder, water and foam FE to fight small fires [25].
 - FNM8i. Put extra extinguishers near dead-end corridors.
- *FNM9. Smoke control*
 - FNM9a. Understand the indoor air movement pattern in the karaoke establishment.
 - FNM9b. Identify the 'downstream' area of the MVAC systems where smoke will be accumulated.
 - FNM9c. Follow the testing procedures in accordance to appropriate standards.
 - FNM9d. Ensure the fire dampers inside the ductwork are in good operation in case of fires.
 - FNM9e. Apply the zone smoke control concept in rooms at dead-end corridors.
 - FNM9f. Install mechanical smoke control systems in rooms at dead-end corridors to maintain positive pressures at those rooms by continuous supply of fresh air and also for an additional protection against the smoke ingress.
- *FNM10. Emergency lighting*
 - FNM10a. Ensure all the emergency lighting is in good condition [24].
 - FNM10b. Ensure the entire escape routes are well-lit with emergency lighting [24].
 - FNM10c. Follow the testing and maintenance procedures in the Code.
 - FNM10d. Ensure all batteries of the emergency lighting circuits are kept fully charged at all times and are capable of maintaining the stipulated lighting levels for a period of not less than two hours.
 - FNM10e. Emergency lighting installed in specified premises used for entertainment shall be tested annually by the appropriate power supply company who shall issue to the Director of Fire Services a certificate of satisfactory test result.
- *FNM11. Exit signs*
 - FNM11a. Ensure all the exit signs are in good condition.
 - FNM11b. Test all signs according to the procedures in the Code.

- FNM11c. Ensure all exit signs especially those low level directional exit signs are clearly visible and not blocked by any obstructions [24].
- FNM11d. Ensure all the exit signs are clean.
- FNM11e. Test the exit signs whenever an emergency lighting system is tested [14].
- FNM11f. Ensure extra number of exit signs are provided with clear indication of the evacuation routes and exits for the evacuation of occupants at dead-end situations.

A3b Emergency mode

- *FEM1. Fire hydrant/ hose reel*
 - FEM1a. Staff are trained to use the HR properly if the situations are found to be appropriate to fight the fires.
- *FEM2. Fire alarm*
 - FEM2a. Ensure audible alarms and warnings are clearly heard by customers in every part of the karaoke establishment even in isolated areas.
- *FEM3. Sprinkler*
 - FEM3a. In case of sprinklers being activated in fires, ensure the floors except the fire zone are not wet and keep the evacuation routes dry to prevent slippery.
 - FEM3b. Ensure hot steam is being enclosed in the fire compartment when sprinklers are operated.
- *FEM4. Fire extinguishers*
 - FEM4a. Choose the correct types of extinguishers.
 - FEM4b. Use carbon dioxide (CO₂) extinguishers for electrical small fires or fires in confined places or flammable liquids [25].
 - FEM4c. Use water/ CO₂ extinguishers for fires involving woods and textiles [25] such as partitions, sofas, carpets or curtains.
 - FEM4d. Use dry powder extinguishers for most fires involving flammable liquids, metals and electricity [25].
 - FEM4e. Use proper procedures to fight small fires by well-trained officers in fires.
 - FEM4f. Know the steps of using the extinguishers, for example, firstly hold the extinguisher firmly in an upright position; pull the safety pins; stand at a proper distance (6 to 10 feet) away from the fire source; then press down the lever and try to put out the small fires by aiming the nozzle at the bottom part of the fire and spray; stay low to avoid inhaling smoke [25].
 - FEM4g. Turn the foam or chemical type of extinguishers upside down and shake them well, then spray the foam horizontally on the surface of the small fires involving flammable liquids [25].
 - FEM4h. Do not spray directly into the liquid pool.
 - FEM4i. Use fire blankets to cover the flames to trap air and then turn off the heat source and leave them cool for small fires found in kitchen and involving flammable liquids [25].
- *FEM5. Smoke control*
 - FEM5a. Ensure the zone smoke control systems are operating properly in fires.
 - FEM5b. Ensure the mechanical smoke control systems in rooms at dead-end corridors are operating.