

No. 8

REPORT ON THE PROPOSITION
CONCERNING FIRE SYSTEM OF
THE REPUBLIC OF SINGAPORE

AUGUST, 1985

JAPAN INTERNATIONAL COOPERATION AGENCY

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INDEX

	Page
Preface	i
Part 1 Fire prevention administration and elevation of fire prevention consciousness of people in Japan	1
Chapter 1 Fire prevention system in Japan	1
Chapter 2 Elevation of disaster prevention preparedness consciousness and independent disaster prevention organization	2
Part 2 Propositions concerning the fire protection systems in the Republic of Singapore	5
Chapter 1 Propositions concerning the Fire Service Act and Regulations	5
Chapter 2 Propositions concerning the structure and fire protection facilities of building	12
Chapter 3 Propositions concerning installation and maintenance of the fire protection system	16
Chapter 4 Propositions concerning fire inspection and correction of violations in the existing buildings	22
Chapter 5 Propositions concerning improvement of safety in the existing buildings	24
Chapter 6 Propositions concerning fire safety management system	25
Chapter 7 Propositions concerning popular education on disaster prevention	29
Chapter 8 Propositions concerning fire service education system	31
Chapter 9 Propositions on execution of fire prevention works	41

REPORT ON THE PROPOSITIONS CONCERNING FIRE SYSTEM OF THE REPUBLIC OF SINGAPORE

Preface

This report was jointly made by us, 5 persons expert team, commissioned to study fire prevention administration, etc. by JICA, at the request of the Government of Republic of Singapore.

We had stayed in Singapore for 22 days from Nov. 20 to Dec. 11, 1984, visited 17 establishments and discussed with our colleagues of SFS on fire prevention and fire protection training system including construction regulations, fire protection equipment and facilities regulations, etc.

We already presented to SFS the observations of technical visits and the tentative propositions in the form of an interim report during our stay in Singapore. However, this interim report was not enough sufficient because it was made in haste during our stay too short to cover so wide range of problems. So we have prepared herewith, as a final report, our advice how fire prevention administration, fire protection training system, etc. of the Republic of Singapore should be, referring Japanese experiences about these problems with further study on the materials which we could get after returning home.

The chief subjects we were requested to study by the Government of Singapore were;

- a. Fire Service Act and the regulations thereby, also Fire Precautions for Building Codes
- b. The structure, fire prevention facilities and fire protection systems, etc. of public buildings
- c. Educational training of fire personnel and fire safety officers
- d. Measures for promoting safety consciousness of general public

However, in this report, studies relating to these, were also made on:

- e. Elevation of fire safety levels of the existing buildings
- f. The fire inspection of buildings and treatment of violation of laws
- g. Fire protection management
- h. Execution system of fire prevention works

and we made reference to the fire prevention administration, elevation of fire protection consciousness of people, etc. in Japan at present too. By the way, as we omitted from this report, the observations of individual establishment which we visited, it is convenient to refer to the interim report, if necessary.

Since the items requested for our study cover a very wide scope, time of our study was limited, collection of materials was not always satisfactory, and there might be in this report, insufficient part or some points which are not appropriate to the actual state in Singapore, but we presume it covers almost all of problems in question as a whole.

We believe that the weak points in this report can be supplied through interchange of personnel between Japan and Singapore that are expected to be continued for several years from this time on, and we sincerely hope the basis of fire prevention and fire defense education system in Singapore be established as soon as possible.

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Part 1 Fire prevention administration and elevation of
fire prevention consciousness of people in Japan

Chapter 1 Fire prevention system in Japan

1. Japan is, to our regret, a remarkable disaster prone country in the world. Due to her geographical conditions - located on earthquake zone, typhoon infested area, and dry seasonal wind blowing in winter - and in addition, due to the wooden structure of most houses which exist hitherto, she has experienced many disasters in her history.

As far as fires are concerned, for instance, it was recorded that an area of 26 km² was ravaged by a fire with the fire fatalities of about 107,000 in Edo (Tokyo present) in 1657, and also by the great Kanto Earthquake of 1923 more than 380,000 households were reported totally and partly destroyed by fire (cf. about 176,000 households totally and partly destroyed by earthquake), and the killed and missing reached about 105,000.

Those historical bitter experiences have been talked about through generations to form national consciousness, and the root of fire prevention may likely be found in the consciousness of general public. In fact, fire prevention was regarded as the field of voluntary community activities by the town society before 1948, and fire prevention works done by the fire service were nothing but virtual acts without legal basis.

2. The legal basis of the fire service administration in Japan had not been given until enforcement of the Fire Defense Organisation Law and the Fire Service Law in 1948. By these laws, fire prevention was not only legally acknowledged in the fire service administration for the first time, but also it would play a very important part for the modernization of the fire service system.

The fire prevention system under the Fire Service Law has gradually been arranged up to the present in order to cope with the possibility of fires getting complicated and diversified according to the change in urban structures, emergence of high-rise buildings, etc. since enforcement of the Law and its contents are very rich now.

The main systems concerning fire prevention under the current Fire Service Law are as follows:

- o Orders to prohibit smoking outdoors, and remove hazardous materials left about, etc.
- o Power to make fire inspection (including powers to order to submit information and question, etc.)
- o Order to correct contravention in buildings
- o Power to consent building permit
- o Fire protection management system
- o Flame proof regulation of curtains, etc.
- o Regulation on the facilities where fire is liable to occur
- o Regulation on hazardous materials (including power to permit installation of manufacturing plants, regulation on storage of hazardous materials, order to stop use of manufacturing plants hazardous materials engineer system, industrial fire brigades, etc.)
- o Fire protection equipment and facilities, etc. (including responsibility to install fire protection systems, report and inspection of installation of systems, independent test and report of systems, order to correct contraventions, fire protection engineer system, etc.)
- o System of testing fire equipment and tools
- o Power to make investigation of fire (including investigation of fire cause, damage, etc.)

Besides Fire Service Law, the related laws such as the Disasters Prevention Law for Petrochemical Complexes, Etc., the City Planning Law, the Building Standard Law, etc. have been arranged, and form a series of system with the supplement of fire prevention requirements in the Fire Service Law.

Moreover, the system for indicating conformity with fire prevention standard, etc. by administrative guidance also play a part to spread fire prevention system among people, though they have no legal basis.

Chapter 2 Elevation of disaster prevention preparedness consciousness and independent disaster prevention organization

1. In order to prevent fire occurrence and minimize fire damages, it is decidedly important that each individual be always interested in disaster preparedness whether he is at home or work place, and acquires action ability as well as the basic knowledge of initial fire extinguishing, escape, first aid, etc. to be able to cope with fires calmly in case

of fire occurrence.

From the above viewpoint the fire service endeavors to popularise disasters preparedness knowledge using mass media such as bulletins, TV throughout the year, installing disasters preparedness PR center, performing fire prevention diagnosis for each household, etc., and, at the same time, to increase action ability of people, conducting fire drills through various organisations mentioned later on.

Particularly the fire prevention campaigns and drills are intensively carried out in all parts of Japan in specified times of the years, such as "National Fire Prevention Movement" held twice in spring and autumn, "Disaster Preparedness Week", "Cultural Assets Fire Prevention Day", etc. Also the "New Year's Fire Service Parade" which is held in each area of Japan is a traditional demonstration including the standing fire service, volunteer fire corps, independent disaster preparedness organizations, etc., having a good results in appealing fire prevention to local people.

Also, as it is necessary for children to receive disaster preparedness education from childhood, it is incorporated in school education, needless to say.

2. The volunteer fire corps is a fire organisation having such a long tradition that its prototype may be traced back to 1658. At present it is a legal organisation based on Fire Defense Organization Law and its members are legally regarded as the personnel of special duty of municipalities, but essentially they are completely volunteers, making living by their own occupations respectively in the region, so their part played in the promotion of disaster preparedness consciousness of the inhabitants is considerable.

As of April 1984 the number of volunteer fire corps is 3,656 and that of volunteer firefighters 1,042,463.

3. The central government and each local public bodies endeavor not only to arrange their own disaster preparedness system but also to establish independent disaster preparedness organisations based on the feeling of local inhabitants solidarity. As of April 1984 (the same as to the following organisations), 44,022 of independent disaster preparedness organisations are formed throughout the country, and they conduct disaster preparedness trainings spread of disaster preparedness knowledge, the joint purchase of materials and equipment, fire protection patrol, etc. in peacetime, and execute initial firefighting, escape guiding of inhabitants,

etc. in case of disaster time.

Further, the Women Fire Club (11,867 groups and 1,860,225 members), and Junior Fire Club 8,040 groups and 669,438 members) etc. are formed as civilian fire protection organisation and are participating in spread of fire protection consciousness in the respective area.

4. The fire service laws require to form independent fire brigade for specified establishments, and further the scope of such establishments is enlarged by ordinances in several local public bodies. The fire service organs give elaborate guidance so that independent fire brigades may operate effectively and conduct enough trainings. By Petroleum Complex Disaster Prevention Law also, formation of self-defense disaster prevention organisation is required in hazardous materials facilities and petroleum complex, etc.

(T. Ishita in charge)

Part 2 Propositions concerning fire protection systems
in the Republic of Singapore

Chapter 1 Propositions concerning the Fire Service Act and Regulations

1. Standards on exemptions in application of the provisions concerning submission and approval of building plans (Section 2, "Exempted Buildings").

When making exceptions in application of the provisions of Section 15, it is desired that safety of the building be judged as a whole from the viewpoint of its use, construction, size, etc. and that objective standards for judgement be established and enforced uniformly so that people's understanding may be gained.

2. Standards on the storage and handling of combustible materials such as plastics, textiles, etc. (Section 2, "Fire Hazard" (g)).

In handling combustible materials such as plastics, textiles, plants, etc., it is considered necessary to enact provisions including standards not only on separation distances from building but also on their storage, handling, etc. in order to prevent the occurrence and spread of fire.

3. Preventive measures as duties of Fire Service (Section 6 (C))

It is considered necessary that provisions on duties of the Fire Service stipulate not only prevention of fires and safeguarding of human life from them but also protection of property.

4. Provisions concerning powers of entry (Section 8)

- (1) When fire personnel make a fire inspection, it is necessary to enact provisions prohibiting them from disturbing the work of occupants and releasing secret information obtained during fire inspections so that people's confidence and cooperation may be obtained.

- (2) It is desired to enact provisions stipulating that powers of entry be aimed at fire personnel inspecting and confirming the maintenance of fire protection and firefighting facilities that should be exercised by the building owner, etc., and not of fire personnel

themselves inspecting and testing such facilities.

5. Commissions for response to the false alarm due to malfunctioning of a fire alarm system (Section 9 (2) (C))

Regarding the collection of fee for the response of fire units to false alarms due to malfunctioning of a fire alarm system caused by its improper maintenance, it is very difficult to ascertain that the particular false alarm was caused by improper maintenance. Also it is expected that electric power supply to fire alarm systems may be cut off in order to prevent false alarms from reaching the fire service, causing a delay in the discovery and report of fire thereto. Therefore, fee should not be collected for fire brigade responses to false alarms but priority should be given to conducting educations to prevent false alarms rather than collecting fee. It is desired to cope with this problem from a viewpoint of long standing.

6. Installation of fire exits in theaters and movie houses accommodating a large number of people (Section 10)

It is considered necessary to enact provisions for installing fire exits in theaters, movie houses, places of public assembly places, halls etc. that are effective in the evacuation of occupants in accordance with the number of people to be admitted as well as for indicating such number.

7. Securing of water sources (Section 12)

In regard to water sources for the fire service, we cannot rely upon fire hydrants only because of possible stoppage of water supply, broken water lines, etc. Also, it is difficult for fire hydrants only to supply enough water when a large amount of water is required in case of a fire in larger buildings. Therefore, it is desired to make provisions for securing water sources by installing fire cisterns besides fire hydrants or making effective use of swimming pools, etc. in hotels.

8. Provisions for persons who prepare Fire Emergency Plan (Section 14)

- (1) It is considered necessary that the tenant who occupies a part larger than a certain size of a building is responsible for preparing a Fire Emergency Plan from the viewpoint of proper overall management of the building.

(2) The Fire Emergency Plan shall be a general plan including disaster preparedness, disaster operations and education of workers. Therefore, it is considered necessary to enact provisions for basic items in the Fire Emergency Plan so as to obtain people's understanding.

(See Table 1 - Items to be stipulated in the Fire Emergency Plan.)

9. Active participation in evacuation drills and number of drills to be conducted (Section 13 (1))

(1) The owner, superintendent and workers are not supposed to conduct a fire extinguishing, reporting and evacuation drill by notice from the Director, but it is considered necessary to make provisions requiring that they themselves conduct or participate in such a drill in order to bring up workers' operational capabilities.

(2) It is considered necessary that the above-mentioned drill be conducted twice or more every year in public buildings.

10. Clarification of the scopes of approval of building plans (Section 15 (1))

It is inevitable that the scopes of examination of building plans by the Building Authority and the Director overlap to a certain extent. But it is considered necessary to clarify the scope of examination for escape facilities and construction from the viewpoint of fire prevention, fire protection equipment, etc. as far as possible, so that the scopes of approval may not overlap, and that standards of judgement for giving approvals may not differ, paying attention to effective works.

11. Scope of approval of materials and equipment (Section 15 (8))

Although it is stipulated that all materials and equipment in Section 15 (1) and (2) shall be subject to the approval of the Director, it is considered necessary to effectively proceed with approval works by approving important security equipment only because such an approval is enough in maintaining good performance of all materials and equipment.

12. Necessity to submit a public building certificate to public buildings (Section 16)

(1) It is not always considered necessary for the owner or occupier of a public building having an occupant load of more than 200 persons

to obtain a public building certificate every 6 months, since Section 15 provides that he has to obtain an approval from a Director when he constructs a new building, makes an addition, rebuilds or changes the use of a building, that he cannot use such a building without obtaining a Certificate of Completion and that the owner of a building must always perform its maintenance in order to meet the legal requirements, furthermore, Section 8 provides that the Director is vested with the power to order improvement of any contravention of the Act and regulations in premises based upon the power to make a fire inspection of them.

- (2) If a public building certificate is to be issued twice a year, there are at present 709 buildings having an occupant load of more than 200 people, and it is required to assign as many as 9 or more full-time personnel. Rather than issuing a public building certificate, it is considered more effective and efficient for the Director to give priority to inspecting those buildings that have potentials of life hazard and fire extension hazard and carry out complete guidances for the improvement of contraventions in premises.

13. Designation of hazardous materials and licensing qualifications
(Section 18)

It is considered necessary to designate in the Fire Service Act those and similar hazardous materials including chlorates, yellow phosphorus, metal potassium, ether, petrol, ester nitrates, fuming nitric acid, etc. that have fire and ignition hazards and whose fires are difficult to extinguish, and basic items regarding their storage, handling, etc. Also it is necessary to enact provisions of such items as qualifications for obtaining a license, returning of the license by a licensed person who committed law violations, etc. so as to bring up the safety standards in the handling of hazardous materials.

14. Investigation of fire causes (Section 8 (e))

The purpose of fire cause investigations as conducted by the fire service is to investigate and analyze such factors as how a fire started, how it spread, etc. and reflect the result of investigation in future fire prevention and not from the viewpoint of crime investigations as conducted by the police. It is not too much to say that fire prevention

will not work properly without fire cause investigations and that they are the basic points of fire prevention. Therefore, it is considered necessary for the Director to have powers to inquire concerned persons, order to submit information and investigate the damage besides the power of entry for making a fire cause investigation. Also it is considered appropriate to enact provisions for mutual cooperation between the fire service and police so that investigation works may be efficiently conducted.

15. Control by the fire service of persons who install or maintain fire protection equipment such as fire alarm system, sprinkler system, etc.

Since fire protection equipment are those equipment that operate in case of emergency such as fire and not those that are used in peace time, special accuracy is required of their performance, installation work or maintenance check. Therefore, their regular maintenance checks should be conducted. Also it is considered necessary that the qualification system for the fire protection equipment only be established to qualify the persons who install or make maintenance checks of fire protection equipment and not included in the qualification system of persons who install or maintain electrical and mechanical equipment, and that its provisions be enacted so that inspection of fire protection equipment by the fire service may be conducted efficiently as well as to improve their performance together with the performance approval system of fire protection equipment.

16. Classification of registered contractors

As it is expected that there may be difference in abilities among Class 1 and Class 2 registered contractors of fire protection equipment, it is considered that they be decided by examinations or other means which can confirm that they have abilities higher than a certain standard on fire protection equipment. Also it is desired that provisions may be made to conduct regular education courses about once in 5 years for registered contractors in order to improve their knowledge and techniques.

17. Duty of person who finds a fire to report it to the fire service and duty of the concerned to conduct incipient firefighting

It is considered possible to effect early control of fires, improvement of people's disaster preparedness and their cooperation by making it a duty for the person who discovers a fire to report it immediately

to the fire service and for the concerned occupants (owner, superintendent, occupiers and workers) inside the fire building to engage in first-aid firefighting until the arrival of fire units at the scene.

18. Control of smoking

Since a large number of fires are caused by smoking, it is desired to realize complete fire prevention by requiring especially department stores and shopping centers to install a smoking area in a safe place and prevent smoking in sales departments, etc. other than designated locations so as to prevent fires caused by smoking.

(R. Takeuchi in charge)

Items stipulated in fire emergency plan

	C o n t e n t s
1. General items	(1) Matters related to the purpose and operation of fire emergency plan (2) Matters related to the works and authorities of fire safety manager. (3) Matters related to the establishment and operation of fire protection management committee, etc.
2. Disaster prevention management	(1) Matters related to the formation and work allotment of prevention management organisation. (2) Matters related to the method and performance time of voluntary testing and inspections (3) Matters related to improvement and arrangement according to the results of voluntary testing and inspections (4) Matters related to the items to be followed for fire prevention (5) Matters related to safety measures concerning works (6) Matters related to the prevention measures of gas leakage accidents (7) Matters related to disaster prevention measures (8) Other necessary items for prevention management
3. Independent fire brigade	(1) Matters related to the formation and equipment of independent fire brigade (2) Matters related to the method and gist of independent fire activity (3) Matters related to the security system on holidays, night time, etc. (4) Matters related to the activity of independent fire brigade at the time of gas leakage and of earthquake (5) Other necessary items for independent fire activity
4. Education and training	(1) Matters related to performance method and time of disaster prevention education for employees (2) Matters related to the performance method and time of independent fire training (3) Other necessary items related to disaster prevention education and training.

Chapter 2 Propositions concerning the structure and fire protection facilities of building

In accordance with the trend of urban buildings getting larger, higher and more complex it can easily be supposed that the damages of lives, buildings and interior facilities will happen due to the difficulty of escape and fire activity at the time of fire and other disasters. Under these circumstances, synthetic disaster prevention measures of checking occurrence and fire spread by making building uncombustible, of establishing escape method and feasibility of fire fighting activity. We, therefore, propose SFS to study the following points for fire protection, safety, escape and fire fighting activities, concerning building planning for the future on the basis of the results of our observations.

1. Subdivision of compartmentation

Escape activities may be carried out easier by partitioning the space composition of buildings to the minimum extent effective for preventing fire and by confirming fire occurred in some part of building up to putting out within the expected basic space (the compartmentation).

(1) Vertical shaft compartmentation

It is necessary to prevent the upper floors contamination through vertical shaft, enclosing escalator, elevator, vertical duct and pit within the central core of a building partitioned safely with the fire-proof and smoke-stop arrangements.

(2) Area compartmentation

People lose sometimes their sense of direction, in case of disasters, on a basement, non-window floor (the floor, of which the space of effective opening for escape and fire activity is less than 1/30 of the floor area. Same as follows) and in a very large room, so it is necessary to design building so that they can be partitioned safely into part of a fixed area, to make escape route simple and clear, to install effective smoke-stop measures each partition and to make the escape direction visible clearly.

2. Fire compartmentation of building of different uses

In the case of a public building having coexistent parts of which use or time zone of use differs one another, such as meeting hall and department store, accommodating facilities and shops, department store

and hotel, car park and living rooms or boiler room and living rooms, it is necessary to partition in the way of avoiding mutual obstruction for escape and to set up escape route for each partition, if necessary. Fire doors installed in those partitions are to have automatic closing system with heat or smoke detectors.

3. Placement and compartmentation of fire using shops and installation of an automatic fire extinguishing systems

It is necessary that fire-using shops in department stores and hotels be centralised and also the kitchen and dining room in those shops be partitioned with fire stopping. Also, inside the kitchen duct, it is necessary to study to install automatic fire extinguishing system (dry chemical extinguisher) together with a fire damper for prevention of fire spread.

4. Setting up of smoke partition and installation of ventilation system

It is necessary to make interior finish materials incombustible, limit placement of flammables as not to generate much smoke, control smoke streams by setting up of smoke partitions at each fixed area (about 500 m² each), and to suppress disturbance or increase of smoke caused by stopping of ventilation in order to secure evacuation in case of a fire.

For such purposes, it is necessary to set up smoke vents at adequate places such as at the entrance of the safety compartmentation, compartmentation separated with fire resistive structure, fire door, or similar and installed with air supply and exhaust, and emergency lighting system inside or the end of corridor, or to establish smoke exhaust tower, smoke exhaust fan, etc. together as well.

5. Employing nonflammables for interior finish

It is necessary to consider of employing nonflammables for interior finish including ceiling, wall and partition, etc. in high floor, basement, non-opening floor or widely partitioned room, as it is an effective way for preventing fire occurrence, decreasing smoke emission and delaying the time reaching flushover phenomenon. Also, it is necessary to consider employment of nonflammables for bed materials in addition to the surface, in the rooms where much fire being used being in much possibility of fire occurrence, or populated densely.

6. Securing of two-way escape routes in living room

In the facilities such as hospitals, hotels and flats where people always live, as it often takes more time in escape, it is necessary to study the measures for escape to the ground via different two routes from each of living rooms with setting-up of open corridor, exterior escape stair and balcony, etc. facing to open air, and in case that establishing balconies, etc. is difficult, installation of escape equipment should be considered.

7. Setting up of separated safety floor (Intermediate isolated floor) in high-rise building

It is necessary to study, in case of buildings higher than a certain height, installation of the floor for equipment and machines at the middle of the building, separable from both upper and lower floors, separate from usual uses, for the use as primary refuge place in case of all floors evacuation. Since the pipings and shafts from other floors may be cut off completely on that floor, such design is desirable for the cases of putting collective houses or hotels on shops floor, etc.

8. Arrangement of the structure of fire lift lobby.

The fire lift lobby is a part to be a base for fire operation at the time of fire, it is necessary to consider installation of the vestibule with air supply and exhaust, etc., separated fire-preventively from general lift lobby and passage.

9. Fire preventive measures on connection of buildings in one site

In case of connecting buildings mutually on or under the ground in one site, it is necessary to partition the connected part effectively for fire protection, to clarify escape route in the respective building. And in this case, it is necessary to establish mutual liaison system at the time of disaster.

10. Study of measures against ground subsidence

It is necessary to study the measures including geological survey concerning the ground subsidence in industrial area.

11. Study of maintenance system of buildings

It is necessary to establish the system for proper maintenance and

management of the structure and function, concerning the buildings and building equipment of more than a certain size.

12. Study of flame retardance regulations

It is necessary to establish flame retardance regulation on curtain, carpet, cloth blind, black out curtain, drop curtain, etc. used in high-rise building and facilities where unspecified numerous peoples enter.

13. Study of examination items of building plans

It is important for the fire service to understand the contents of building plans from its planning stage, concerning the location, structure, usage, scale, state of equipment and facilities of the building, to check such requirements for fire activities at the structure, fire compartmentation, escape facilities, etc. from professional standpoint of fire protection, and to reflect them on the building to be completed. Since the examination items are enumerated, study of the contents is desired.

- (1) The applied site confirmation of it.
- (2) Confirmation of the site and surrounding buildings, etc.
- (3) Confirmation of the connection of buildings
- (4) Confirmation of the usage, scale and utilization form of the building from the viewpoint of fire protection and escape
- (5) Confirmation of the location, structure, etc. of machine room, electric room and other facilities where much fire being used
- (6) Confirmation of the arrangement (elevation and section) of buildings from the viewpoint of fire protection and escape
- (7) Confirmation of the location, structure, and area of openings
- (8) Confirmation of the installation position and function of fire and smoke partition
- (9) Confirmation of the structure of passages, stairways and exits and of the escape movement line
- (10) Confirmation of interior finish materials, etc.
- (11) Confirmation of installation plan of fire systems
- (12) Confirmation of location and function of the fire command center
- (13) Confirmation of the position, structure and function of fire lift
- (14) Confirmation of the position, illuminance of emergency lighting and of the emergency power source.

(M. Ogawa in charge)

Chapter 3 Propositions concerning installation and maintenance of fire protection systems

1. The idea of regulation of facilities

Fire protection and fire fighting facilities are set up for fire prevention of premises and for protection of lives and properties at the time of fire occurrence. Regarding installation of those facilities, speciality of the weather and climate, and nationality of the country should be taken into consideration well, and yet the effect of such expensive investment should be displayed to the maximum extent.

And it is necessary to note that fire prevention by installation of fire facilities does not ensure "Absolute safety" but pursue "admissible safety" suited to time.

2. Installation regulation of fire protection systems

Due to the premises or part thereof having the structure and utilization form shown as below basically being in higher danger of fire occurrence and of lives at the time of fire occurrence, it is necessary to intensify installation regulation of fire systems, compared with other premises for balancing of safety. Also, it is necessary to arrange and grasp clearly the reason and the purpose of installation, in order to avoid contradiction in the contents of regulation of respective premises, in case of concrete execution of regulations.

- (1) The premises or part thereof used by unspecified numerous peoples such as department store, restaurant, etc.
- (2) The premises or part thereof where the invalids or the handicapped are accommodated or living, like hospital or protective institution
- (3) The premises or part thereof having position and structure very difficult for escape of the persons within and for the activities of fire units

Example 1. The floor of a building having less than a fixed area of openings available for escape and fire activity

2. The part of higher floors of a building having a certain height
3. Basement

- (4) The place (room) in very high danger of fire occurrence

Example 1. Kitchen and boiler room where fire in quantity used

2. Transformer room where oil apparatus used

It is necessary to intensify regulation of facilities as Grade 1 of the building or part thereof, where (1) and (3) or (2) and (3) are completed, particularly. The attached sheet shows an example of panel of installation regulation of fire facilities.

3. Design examination of fire facilities

The design document of fire facilities designed by fire protection engineer are to be examined by fire staff having knowledges and experiences equivalent to the designer, so as to prevent in advance inferior designs having defects found on completion or made for cost-down purpose. Therefore, it is necessary to secure the necessary number of personnel and to give them sufficient opportunity of education as engineering specialists and always improve their abilities.

4. Test by the persons concerned of the premises at the time of installation of fire facilities

When fire facilities are installed by the persons concerned of the premises, it is necessary to let them hold a test as to whether they are conformed with the relevant fire laws, prior to taking the inspection of the Director, and to let them submit the test records on the assumption of inspection by the Director, only in case of their conformity with relevant fire laws. The above is effective to promote interest of the persons concerned of the premises in fire facilities and willingness for conformity with standards. An example is shown in the Reference Materials No.1 of test manual to be held by the persons concerned of the premises.

5. Inspection by the Director at the time of installation of fire facilities

When fire facilities are installed by the persons concerned of the premises, it is necessary for the Director to hold inspection, with their submission of the test records mentioned in 4. Since this inspection is executed from the standpoint of administrative supervision on the obligations of the owners who have to install and maintain fire facilities according to the standard of fire relevant laws, and of those who design and control works, it should be carried out fairly and strictly. An example of inspection manual executed by the Director is shown in the Reference Materials No.1.

6. Check-up of fire facilities

Since the checking up on fire facilities is very important for maintenance of facilities function after their installation, and is one of the important fire protection management works. Therefore, it is necessary to have the person concerned keep the records of the results (date of execution, name of executor, items executed, the quality of the results, things improved, etc.), as well as fixing the contents and term of execution. This record has a wide utility range as one of important survey documents at the time of surprise inspection done by the Director. Also, the concrete inspection contents are divided into those of external appearance and of function, and practical effect is expectable, with regulation of no functional inspection being carried out excepting by fire protection engineer.

7. Views of installation and management condition of fire facilities (from observation of external appearance)

(1) Portable extinguisher

Placement density of portable extinguishers seemed low in each building from the external appearance. Also CO₂ extinguishers and dry chemical extinguishers which are not suitable for ordinary fire (Class A) were sometimes seen in shops and office parts.

As portable extinguishers are the most effective implements at the time of initial fire activity, it is necessary to study of proper placement of portable extinguishers suitable for objects.

(2) Hydraulic hose reel

The function and placement condition of the hose reels, as the equipment used for initial firefighting, were considered adequate. However, some of them were found unusable in the case of extension, and it is necessary to secure their structure and performance, with stipulation of a certain standard of their structure and performance.

(3) Hydrant

The function and arrangement condition were considered adequate as the regular firefighting equipment used by fire company. However, in order to accomplish quick fire fighting activity at high floors of high buildings, it is desirable that the containers of hoses and nozzles necessary for fire fighting activity be properly

arranged in advance. Further, it is very significant that spare pumps are prepared for emergency use, but more efficient backing up system may be formed, if a spare pump be workable even in case of a trouble of main pump, with further study of mutual operation functions of pumps. Those things are common to fire fighting equipment using pump.

(4) Sprinkler system

Since closed type sprinkler heads installed on the ceiling part extremely high (the ceiling part of atrium of hotels lobby) and on the lower floors part facing direct to the open air, are unexpected in their heat sensing effects, it is allowable that such parts are exempted from installation of them.

Also, there were comparatively many places where obstruction to heat sensing and to spray distribution might occur due to the articles placed close to the closed type sprinkler head installed. By the way, to store goods in the openings made on ceiling should be prohibited from the standpoint of prevention of fire spread.

(5) Automatic fire alarm system

It was observed that the installation condition of detectors is about right, but smoke detectors installed in car park appeared liable to cause their functional disorder due to exhaust gas and dusts. Besides, there might be functional disorder (misoperation) due to induced lightning, so from the viewpoint of maintenance and misoperation prevention, it is necessary to select and install the most suitable type of detector other than smoke detector.

(6) Voice communication system

It is very effective in the public premises such as department store, hotel, etc., to put warning sound special to emergency in before public addressing, so that the insiders may listen to with care. And it is necessary to prepare plural skilled persons as the operator.

(7) Emergency exit signs

The arrangement condition of emergency exit signs installed at fire exits was considered about right, but it seems necessary to install signs indicating passages to fire exits from the shopping

part of shopping center, etc. where unspecified numerous peoples enter.

(8) Fire command center

It seemed that there are less means of obtaining and communicating various information on fire occurrence in the fire command center. It is necessary to fire command center to have the structure and functions that instructions and conveyance of information to the insiders of the premises and control of all fire equipment be done at the time of fire. Therefore, necessary is sufficient study of the improvement of the whole systems so as to be a place where control of fire fighting operation can easily be conducted.

(M. Aramizu in charge)

An Example of a Panel Concerning the Installation Regulations of Fire Facilities

Kind of equipment Danger degree	Extinguisher	Hose reel	Hydraunt	Auto-matic fire alarm system	Sprinkler system	Smoke exhaust system	Public address system	Fire lift	Fire command center	Other equipment
Grade 1	o	o	o	o	o	o	o	o	o	-
Grade 2	o	o	o	o	-	-	o	-	-	-
Grade 3	o	o	-	o	-	-	-	-	-	-
Grade n	o	-	-	-	-	-	-	-	-	-

*1 The number of danger degree shows the estimated rank studied carefully from the structure, scale and use of building or part thereof.

*2 The o marked shows the kind of fire facilities necessary for installation.

Chapter 4 Propositions concerning fire inspection and correction of violations in the existing buildings

1. Fire inspection and correction of violations

The purpose of fire inspection is to examine the execution condition of obligations imposed on the persons concerned of buildings according to the relevant fire laws, and to promote violation correction. Inspection is carried out as to "Thing" such as the location and structure of buildings, and installation of fire protection and fire fighting facilities, besides, it is done as to the relation of "Things and man" such as the maintenance and management condition of those facilities, and as to the matters regarding "Man", such as preparation of fire plan and conducting fire drill and concerning reporting training or fire extinguishing training thereof, if they conform to laws.

Also, in case of any violation being found as a result of fire inspection, it is necessary to conduct enough post-investigation and guidance with such a strict posture as no violation condition being continued. For fair and strict execution of fire inspection, it is necessary to establish the internal administrative system for violation treatment, whenever necessary, according to the contents of violation, in addition, to prepare the concrete execution manuals of each inspection subject.

The Reference Manuals No.2 shows an example of execution manual of fire inspection and No.3 flow chart of fire inspection and violation treatment work, respectively.

2. Main inspection items of fire inspection

(1) Inspection on fire protection management

Inspection on management is in many cases that of consciousness latent in mind and of human activity, and it is feared that visual judgement may cause improper result. Therefore, it is to be executed through the confirmation and question of records based on the execution manual of fire protection management. Examples of main inspection items are as follows.

- a. The presence and authority of fire safety officer
- b. Fire emergency plan
- c. Execution condition of fire management based on fire emergency plan

- (a) Frequency of various trainings and condition of acquaintance of part-allotment on fire occurrence
 - (b) Maintenance management condition of various disasters prevention facilities
 - (c) Maintenance condition of various fire protection and fire fighting facilities
 - (d) Maintenance condition of fire using equipment and machinery
 - (e) Condition of capacity control and smoking control at specified places
 - (f) Handling condition of hazardous materials and maintenance of facilities
 - (g) Other necessary items
- (2) Inspection concerning installation violation of fire facilities
 - (3) Inspection concerning the position and structure (limited to items related to fire protection) of buildings
 - (4) Inspection concerning installation violation of hazardous materials facilities
 - (5) Other necessary items

(In charge: M. Aramizu
M. Ogawa)

Chapter 5 Propositions concerning improvement of safety in the existing building

1. Management of existing buildings in case of the revision of legal standards on fire protection and fire fighting facilities

When the more rigid regulations on installation of fire facilities are enforced and escape facilities after the arrangement of legal standards, and when the new standards be applied only for the new buildings after the revision and not for the existing buildings, there are little effects of the revision of legal standards. Therefore, in such cases, it is desirable to apply the new standards also for the specific existing premises such as cinema houses, restaurants, shops, hotels, hospitals and the similars which are regarded particularly necessary for fire prevention and life safety, taking into consideration of economical burden of the building owners. Also, in case of extension or rebuilding of the existing building more than a certain scale, and in case of the change of the use of building to the above uses as well, it is considered necessary to arrange the system that the new standards be applied.

(In charge: R. Takeuchi)

2. The scope in case of the application of new standards for existing buildings

The application of new standards for existing buildings may remarkably improve fire prevention performance, but, in view of the fact that the building is in actual use, there are much difficulties technically and economically in many cases. Particularly, in case of new and additional installation of sprinkler system or fire compartmentation, close examination on individual building is necessary about the structural safety of the increment of its own weight and of columns, beams, floor boards and foundations due to penetration of pipings. Under these circumstances, in case of enforcement of the new standards, it is necessary to balance well the effect and economy, examining in detail of the scope of buildings new standards are applied for and the contents of new standards.

(in charge: M. Aramizu
M. Ogawa)

Chapter 6 Propositions concerning fire safety management system

1. Fire protection management responsibility

The person of final responsibility for fire protection management of premises should be made those who own or occupy the building, but due to the difficulty in execution of practical works for fire protection management in many cases, an agent is sometimes appointed for execution of a part of works which should originally be done by the owner or occupier. It is appropriate to post the agent as fire safety officer who has primary fire protection management responsibility. And clarification of fire protection management responsibility of building owners seems necessary in the laws.

2. Post of fire safety officer

The owner of building of more than a certain scale is to employ a certain qualified fire safety officer for management, but education and training of employees working in the building for improvement of knowledges on fire prevention and for acquisition of emergency ability of activity are included in the business of fire protection management, besides the business of maintenance of fire protection facilities of buildings. Therefore, for fire safety officer, powers are necessitated concerning the budget for repair and remodelling of the building and further concerning personnel affairs of employees on the duties allotment of education or fire protection, the person who can take part in these affairs is desired for such a post (in general the post of chief of department or section).

3. Duties of fire safety officer

Regarding the duties and responsibility of fire safety officer, the stipulations of the "Fire Service (Establishment and Control of Fire Safety Officer) Regulations" seem satisfactory on the whole, but in case of the compound use of flats and shopping center or hotel and shopping center in a single building, fire safety officers are to be appointed each usage and respective fire safety officers are to exert themselves in avoiding contradiction of between both fire emergency plans with mutual close liaisons, so as management of the whole building to be properly performed.

4. Training course for qualification of fire safety officer

Concerning the contents and period of training course for fire safety officer, the curricula mentioned for in the attached sheet are considered necessary as a whole, also, regular re-training course (once per 3 to 5 years) of those who acquired the qualification is desirable.

5. Presentation term of report by fire safety officer

Fire safety officer is to submit a report to the Director every 6 months, but due to numerous number of reports to be submitted and to shortness of preparation term, it is worried that the business volume of the Director may increase and transaction of them be perfunctory, so even the effect of reporting be unexpectable. Therefore some considerations are necessary to extend the reporting term, once a year, for instance, of those which are judged to be fairly managed from the results of fire inspection.

(In charge: R. Takeuchi)

(Training course curricula)

Subject	Description	Time
Duties of fire safety officer and fire service laws concerned	<ul style="list-style-type: none"> o Outline of voluntary fire protection management system o Role of fire safety officer in fire protection management system o System of laws related to fire protection o Duties of the fire service stipulated for in the Fire Service Act, etc. o System of voluntary fire protection management in the Fire Service Act, etc. o Peoples duties provided in Fire Service Act, etc. 	1.5 hour
Phenomenon of fire	<ul style="list-style-type: none"> o Fire occurrence mechanism o Process of fire spread o The nature and harmfulness of smoke o Weather and fire o Fire extinguishment theory o Main fire cases and the instructions 	1 hour
Handling of fire prevention and fire fighting equipment (Practical technique guidance inclusive)	<ul style="list-style-type: none"> o Wall hydrant and fire extinguisher o Fixed fire extinguishing facilities and automatic fire alarm system 	1.5 hours
Fire facilities and inspection system	<ul style="list-style-type: none"> o Installation purpose of fire facilities o Type o Installation objective o Notices on installation o Importance of inspection o Kinds of inspection o Inspection gists o Maintenance 	1.5 hours
Voluntary inspection of fire using equipment	<ul style="list-style-type: none"> o Aim and importance of voluntary inspection o The objective of voluntary inspection o Various inspection gists o Treatment of voluntary inspection results 	1 hour
Safety management of hazardous materials	<ul style="list-style-type: none"> o Hazardous materials provided in laws o Nature and hazardousness of hazardous materials o Hazardous materials facilities and hazardous materials engineer o Cases of fire 	1 hour

Subject	Description	Time
Film	<ul style="list-style-type: none"> o To be useful to fire protection management 	1 hour
Self-defence fire protection activity	<ul style="list-style-type: none"> o Fire Service Act and self-defence fire protection o Self-defence fire protection activity o Formation and equipment of self-defence fire organisation o Training method 	1.5 hours
How to carry forward fire protection management and fire emergency plan	<ul style="list-style-type: none"> o Fire protection management works o How to carry forward fire protection management works o Fire protection management works and fire plan o Making gist of fire plan o Example of fire plan making o Operation of plan 	2 hours
Total		11 hours

* The above is the case of 2 days course.

Chapter 7 Propositions concerning popular education on disaster prevention

1. Needless to say, reinforcement of fire service strength is necessary to guard the people from danger of fire and to secure safety of people living, but it is more important for each of people always to have interest in disaster prevention irrespective of at home or in workshop, for prevention of fire occurrence, and to acquire the basic knowledges and action ability of initial fire extinguishing report, escape and first aid, in order to cope with fire calmly. However, the terror of fire is likely to be forgotten in daily life, even though everyone knows it, and it is not easy to let peoples learn voluntarily those basic knowledges and acquire the action ability at the time of fire.

As mentioned in Chapter 1, various public relations are carried out by fire organs of central government and local public bodies and by civil fire-related organisations in Japan and although some have come to stay in national living, it is the actual state that there are considerable parts of which the effect is not always apparently produced.

After all, no immediate and definite measures for promotion of national disaster prevention consciousness may be found, and the best method in Singapore as well, is that the SFS leading the authorities concerned steadily continue to popularize disaster prevention knowledges and has people participate in fire drill repeatedly.

2. (1) The means for spread of disaster prevention knowledges are first the utilization of direct public relation medias such as the publication and distribution of public information bulletins, the advertisement on newspapers and TV, and holding of public relations by meeting, etc. Among those, it is very effective, for instance, to have readers express their own experiences and opinions on public information bulletins, thinking over the nature of PR which is consisted of both aspects of information and intelligence,

Also, the utilization of so-called indirect media of having news reporters write articles offering informations is useful for appealing to peoples as the accounts being written through objective reporters eye.

Furthermore, the entrance to Fire Academy for experiences, the establishment of fire prevention PR center and demonstrations of

fire trainings are effective for raising interest of people in fire service with teaching them the fear of fire and letting them acquire action ability, as they can see and touch with fun.

(2) The items necessary for PR are preventing of fire occurrence, initial fire extinguishing, report to the fire service, escape and first aid, thinking of passage of fire, in case of PR for house wives, the knack of initial fire extinguishing, knowledge of escape (nature of smoke, escape method of the old and children) and first aid, mainly, should be selected, and in case of office education for employees of hotels or department stores, it is necessary to execute PR, emphasizing how to handle fire extinguishers, to guide customers for escape, etc. Anyway, it is desirable to make choice of the most suitable media, as well as to take up most suitable items or the objective persons. It goes without saying that practical trainings should be carried out repeatedly, whoever are the objects of PR.

(3) The spread and enlightenment activity of fire prevention should be carried out, taking into consideration the most acceptable time to the objective persons. It will be much effective for consciousness enlightenment of people, if "Fire Prevention Week", for instance, is set at specified term in the year through which SFS, with co-operation of schools, offices, community organizations, etc., carry out fire prevention campaign, and if such annual events become established among the whole people.

And moreover, fire prevention education should be carried out from childhood. It is worthwhile studying to take it up with more emphasis at school education and also to form such organisations as junior fire club, for instance.

(In charge: Y. Mizobuchi)

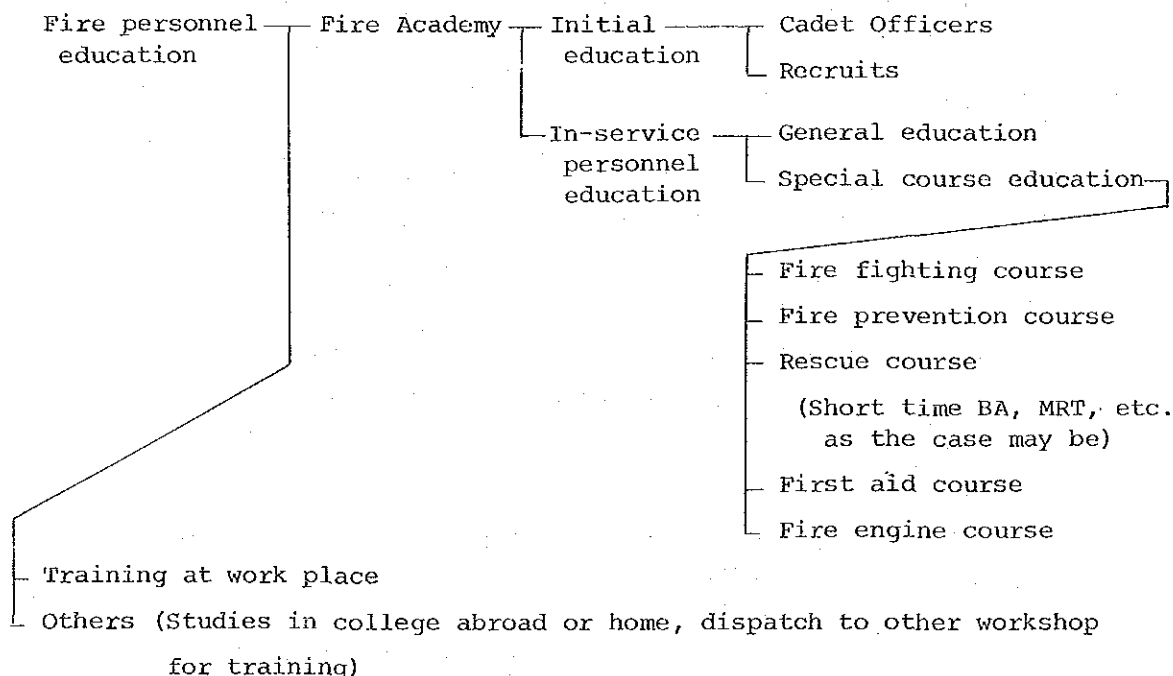
Chapter 8 Propositions concerning fire service education system

For effective execution of the duty of fire service to meet peoples expectations, competent men must be employed, as well as the betterment of fire equipment and facilities. Particularly, in order to carry forward fire prevention administration such as examination of building plan, regulation of fire equipment and facilities or fire inspection which were newly put under the SFS's jurisdiction, both technical staff and fire officers of higher ability are required, considering that these buildings, etc. which became the objects of the SFS's examination or regulation are getting complex and diversified, and the SFS has to meet these changes.

Therefore, it is important in principle to secure higher educational opportunity in accordance with the respective rank and duty of even the in-service staff, as well as the educational training of the newly employed, so from the standpoint above, the followings are proposed:

1. System of fire service education

The education system of fire personnel is desirable in principle, as per the following, though it would be reasonable to be improved according to the change of things:



2. Initial education

(1) The initial education for cadet officers is needless to say the most basic one, for not only their acquisition of necessary fundamental

knowledges and techniques and the exercise of physical strength, but also their correct recognition of responsibility of fire service and their efficient execution of duties, moreover, taking the change of the environment surrounding fire service such as the increase of higher buildings or the construction of MRT, etc., particularly fire prevention administration into consideration, the education term for them of current 14 weeks is not sufficient, so it is necessary to extend it to about half a year in near future. In this case, it will be adequate to include the teaching subjects on the attached sheet No.1 in the curriculum. However, where the class formation might be difficult because of the number of newly employed cadets of a year, it would be necessary to study to prepare the training schedule organizing partially joint classes between cadet and recruit or in-service personnel, on arrangement of the actual curriculum.

- (2) Regarding initial education for recruits, it is necessary to extend the educational term gradually, in order to cope with new types of disaster phenomenons which may happen according to the change of urban structures, etc. In this case, it is desirable to execute the training about handling of BA and the training of MRT accidents which are carried out as special course at present in initial education because they are supposedly basic.

3. In-service personnel education

- (1) The latest knowledges and techniques in response to the development of societies are required for fire personnel. Therefore, every fire personnel should be given the chance of education in accordance with his respective duty, and particularly, concerning the fire prevention administration which was put under the jurisdiction of the SFS, it is necessary to give them the chance of re-education even in short time, putting emphasis on fire prevention presently, in view of the fact that almost of all staff had no opportunities of training.
- (2) Special courses are to be carried out about the specific field according to the necessities at each time, so it is not possible to decide generally as to what courses are to be provided, but the courses of fire fighting, fire prevention, rescue and first-aid at least would continuously be set up from experience of Japan.

Execution of each course may not be possible every year owing to the number of trainees, but in such case it would be necessary to consider the set up of a specified course for instance, every two years.

Besides, such comparatively short courses as BA and MRT should naturally be set up for the present, as occasion calls until they will be incorporated into the initial course. Being considered the firefighting and fire prevention courses the most basic among above special courses, it is appropriate to include the curriculum mentioned in the attached sheets No.2 and 3 in the schedule, though they are changeable according to the educational term.

4. Facilities and equipment of Fire Academy

- (1) It is necessary to secure enough area as to the site of Fire Academy to admit the facilities as mentioned below.
- (2) As it is desirable, not only education for fire personnel reservists and national servicemen but also seminars, safety education for fire safety officers, school children, would be held in the well furnished Fire Academy, ordinary class rooms (enough number of rooms considering how many training courses for fire personnel, seminars for fire safety officers, etc.), physico-chemical laboratory, first aid room, audio-visual room, library and hall are necessary in addition to the parts for management such as schoolmaster's room, teachers room, lecturers room, conference room, etc.
- (3) Regarding training facilities, first, outdoor training yard which is available for discipline training and various practical trainings (enough space at least 3 hoses may be extended in straight line), gymnasium with physical strength equipment, training facilities for water shooting and hazardous materials fire extinguishing, a training tower (more effective with subsidiary tower), smoke and heat training facilities, combustion laboratory, and pool are necessary, and further it is desirable to establish facilities of manhole rescue training and underground passage training.
- (4) Concerning lodging facilities for trainees, the establishment of bed rooms, dining rooms, etc. in accordance with the number of trainees, is a matter of course, and it is necessary to provide with study

rooms and others for trainees to study in the lodging facilities.

- (5) Regarding the building equipment, fire service facilities, etc. of Fire Academy, not only those required by Codes of Fire Precautions for Buildings, but also, for instance, those actually in use for high-rise buildings are desired to be set up.

5. Educational materials and tools

Regarding the materials and tools for training, the types in current use by SFS are in principle to be arranged, moreover, it is necessary to prepare the materials and tools related to the above mentioned equipment and facilities and also those for fire prevention which became new duty of the SFS particularly. (cf. teaching materials and tools being used in Japanese fire defence school in the attached sheet No.4)

6. Teachers of Fire Academy

In the Fire Academy, in addition to stationing of full-time teachers, it is necessary to invite lecturers, who can be in charge of a part of trainings and lectures of special fields from outside as well as inside the SFS, and to promote educational level.

(In charge: T. Ishita
Y. Mizobuchi)

Curriculum desired to be included in the program of Cadet Officers education

Basic theory	Fire service laws and fire service system Physico-chemistry (Physics, chemistry, electricity, combustion and fire extinguishing) Hazardous materials
Practical work theory	Fire fighting Inspection Fire machines and apparatus Fire prevention system Fire cause investigation Fire pump Building regulations Safety management Fire facilities First aid
Practical technique training	Salutation training Rescue training Pump practice Applied fire fighting training Machines and apparatus handling
Others	

Curriculums desired to be included in the program of firefighting course

Basic theory	Fire service laws Combustion theory and fire phenomenon Hazardous materials chemistry Fire extinguishing agents
Practical work theory	Fire fighting (fire property of objects, firefighting tactics, command at the fire scene) Handling of machine and apparatus Safety management
Practical technique training Others	Various machines and apparatus operation training Practical technique training Others

Curriculum desired to be included in the program of firefighting course

Basic theory	Fire service laws Combustion theory and fire phenomenon Electricity Hazardous materials chemistry
Practical work theory	Building plan examination Fire facilities regulations Fire safety management system Spot inspection and violation treatment Fire cause investigation
Others	

Educational materials provided for in Japanese fire school

Classi- fication	Name	Number	Remarks
Teaching material and tool for physiochemical education	Flash point tester	1 set	Tablia tester, etc.
	Petroleum combustion experiment apparatus	"	Apparatus for petroleum combustion limit, etc.
	Chemical experiment instrument	"	Viscometer, calorimeter, etc.
	Molecular structure model	"	
	Extinguishment experi- ment apparatus	"	Oil pan, etc.
	Temperature tester	"	Surface temperature tester, etc.
	Electrical testing apparatus	"	Insulating resistor, etc.
	Analyser	"	Gas chromatograph, etc.
	Chemical experiment apparatus	"	Ph meter, etc.
	Physical experiment apparatus	"	Pulley, etc.
Teaching material and tool for prevention and inspection education	Fire fighting equipment and facilities	"	Extinguishing equipment, alarm, evacuation facilities, etc.
	Testing apparatus for fire fighting equipment and facilities	"	Pressure gauge, etc.
	Extinguisher and section model	"	
	Section model of hazardous material facilities	"	Model of underground storage area, etc.
	Testing apparatus for hazardous material facilities	"	Static electrometer, etc.
	Measuring instrument for inspection	"	Illuminometer, etc.

Classification	Name	Number	Remarks
Teaching material and tool for prevention and inspection and education	Section model of building structure	1 set	Section model of wooden structure building, etc.
	Fire resistive construction materials	"	Slow-burning material, etc.
	Fire door	"	Fire door of degree A and B, etc.
	Electric circuit model	"	Circuit model, etc.
	Interior wiring model	"	Exhibition table, etc.
Teaching material & tool for guard and protection education	Electric installations and equipments	"	Transformer, etc.
	R I tester	"	Geiger counter, etc.
	Apparatus for investigation	"	Measure, carbonization depth tester, etc.
	Foam generator	"	High expansion foam generator, low expansion foam generator, etc.
	Smoke generator	"	Smoke generating furnace, etc.
	Breathing apparatus	more than 10 sets	Including cylinders
	Appliances for rescue	1 set	Gasoline-driven saw, etc.
	Car radio communication equipment	more than 2 sets	
	Portable radio communication equipment	more than 4 sets	
Safety control appliances	1 set	Safety net, etc.	
Teaching materials & tools for disaster prevention education	Meteorological instrument	"	Wind direction meter, anemometer, etc.
	Model of flood protection works	"	Model of triple layer flood protection works
	Equipment for flood protection works	"	Shovel and sickle, etc.
	Equipments for salvation for boats	"	Life boat, etc.

Classi- fication	Name	Number	Remarks
Teaching material & tool for ambulance education	Anatomical model of the human body	1 set	Skeletal structure model, etc.
	Instruments for artificial respiration	"	Artificial resuscitator, etc.
	Instruments for first aid treatment	"	Air brace, etc.
	Stretcher	"	Overall brace stretcher, etc.
	Human model for bandage application drill	"	
	First aid medical appliances	"	First-aid medicines, etc.
Teaching material & tool for mechanical education	Teaching materials for structure and function of automobile	"	Internal combustion engine, engine section model & Transmission of power (with electro-motive power), etc.
	Pumps	"	Centrifugal pump, section model of pump
	Car for drive training	More than two	
	Car for maintenance drill	more than one	
	Instruments for car maintenance	1 set	Compressor, etc.
	Hydraulic testing instruments	"	Water-pressure gauge, etc.
Teaching material & tool for practical training	Standard pumper	More than three	Each pumper must be provided with more than ten hoses and standard fire fighting appliances
	Water discharge appliances	1 set	Nozzle, foam nozzle, etc.
	Special appliances	1 each	Aerial ladder truck, chemical pumper, ambulance, etc.
	Rope	1 set	Rope for knot, etc.
	Working helmet	more than 40	

Classification	Name	Number	Remarks
Teaching material & tool for practical training	Lighting apparatus	1 set	Portable floodlight projector, etc.
	Forcible entry tool	"	Ax, large mallet, etc.
	Dummy for rescue training	more than 2 sets	
	Fire resistive wear and other personal equipments	more than 40	Fire resistive wear and boots, etc.
	Fire detector	1 set	Heat scanner and heat direction scanner, etc.
Teaching material & tool for physical training	Heavy gymnastics materials		Iron bar, buck, etc.
	Ball game materials	"	Materials for soccer, baseball, etc.
	Materials for field and track events	"	Barbell and hurdle, etc.
	Materials for circuit training	"	
	Materials for Judo and Kendo	"	Materials for Kendo, etc.
	Measuring tools of physical standard, physical strength and physical condition	"	Measuring tools of height, breathing capacity and weight, etc.
Teaching material & tool for audio-visual education	Overhead projector	"	Including receiving cabinet
	Slide projector	"	Daylight screen, etc.
	Camera	"	Camera, etc.
	Tape recorder	"	
	Amplifier	"	Amplifier, etc.
	Equipments for movie	"	
	Facilities for library	"	

Chapter 9 Propositions on execution system of fire prevention works

In order to properly and efficiently execute fire prevention works and bring up the effects, it is considered necessary to take up the following items.

1. System of re-checking examinations by the fire service for the approval of building plans

In order to prevent mistakes in the examination of building plans, it is necessary to adopt a system of re-checking contents, to be examined by the fire service, of those buildings whose examinations are expected difficult because of their larger size than a certain scale and in view of their use, construction, etc.

2. Reinforcement of fire inspection system

It is necessary to make complete fire inspections on the maintenance situations of fire protection and fire fighting systems and equipment, violations if any of the Act and Regulations, control of the fixed number of people admitted, etc. and to intensify guidance of improvement of them. It is considered most necessary to separate the responsibilities of the fire prevention inspector and person who examines and makes an inspection at the time of completion of the building for issuing a certificate of completion so that both personnel may bring problems for study and to reinforce the inspection units that fire prevention inspections may facilitate correction of violations of the Act and Regulations.

3. Reinforcement of the fire cause investigation system

It is necessary to organize fire investigation units of the fire service's own that investigate and analyze the mechanisms of occurrence and the extension patterns of fires with the aim of reflecting the results in fire prevention and firefighting operations. It is hoped that in the future fire investigation units be organized systematically in all the 15 fire stations so that they may make investigations of the cause, etc., of small fires.

4. Systematical execution of fire prevention works by the fire station

It is necessary to arrange the system that people's education by fire prevention meetings and trainings in the use of fire extinguishers, evacuation drills for small children and junior high school and primary

school children, fire protection guidance for small scale workplaces, etc. be conducted by stages by the fire station, for effective execution of fire prevention works.

5. Securing of fire prevention personnel

Judging from the facts that there are more than 3,000 high-rise buildings and 200 large shops, hotels, etc. besides flats, many high-rise buildings that are under construction or being planned, and from the results of observation of management situations in buildings, it is expected that the number of personnel who will be assigned to the Fire Prevention Bureau may be insufficient, so due consideration should be given to securing enough number of personnel to say nothing of improving their execution capabilities and excellent qualities. At present, an increase of 15% to 20% of the 121 personnel is considered necessary. It is hoped that in the future personnel be increased in accordance with the expanded scope of works by stages to secure about 20% of all the fire service personnel as fire prevention personnel.

6. Employment of fire women

In regard to fire prevention education, fire personnel tend to place emphasis to the education of people in fire fighting systems and equipment.

However, as the first thing to do in fire prevention education is to have as many people as possible understand fire prevention, especially education of house wives, small children, school children, aged people, etc., is important. The best results could be expected if the fire service employs fire women to be assigned to such education works.

(In charge: R. Takeuchi)

Reference Material No.1

Execution manual of inspection or test

- (Note)
1. This manual shows the items and contents of necessary inspection held by the Director about sprinkler system and automatic fire alarm system, and of the test to be carried out by the person concerned of the premises.
 2. In case of making actual manuals, it is necessary to select the subjects among the fire protection equipment and facilities stipulated in the relevant Fire Service Act and Regulations of Singapore, taking the items and the level of contents in this Reference Materials into consideration.

Automatic fire alarm system

(I) External appearance inspection (Test)

1. Regular power source

Switch for the system are for exclusive use and no branch of other wiring is on the way of wiring to power source.

2. Wiring (excepting wiring of power source circuit)

(1) The connection of wires is made with solder, screw fastener, pressed terminal, etc.

(2) Excepting those used for current circuit under 60V, the wires used for the system and others are not set in the same pipe, duct, wiring thereof or pullbox, in principle.

3. Receiver

To be provided in the place like guard room where someone always stays and where no harm is done to the function of receivers due to temperature, moisture, shock, vibration, etc.

Detector

Setting-up of watch area to be proper.

To be provided as not to be non-watch area as to place where detector be set up.

Detector suitable to the place so as to sense fire effectively and yet as not to be fear of misalarm.

Transmitter, signal lamp and local alarm sounding device

(Proper protection measures be taken on those which are set up at the place where there is no fear of emission and stagnation of corrosive gas, non-cumbustion gas or dusts or where is effected by rainwater.

(II) Performance inspection (Test)

Performance test is divided in the inspection of each machine or apparatus and inspection of system as a whole and is carried out respectively as per the following.

Concerning those related with other equipment, test is to be executed together with such other equipment, or separately alone with care for accident prevention).

1. Wiring inspection (Test)

(1) Insulation resistance

a. Method

To measure the insulation resistance value between the earth and the circuits of power source, detector, signal lamp, local alarm sounding device or accessory devices, at the receiver and relay by insulation resistance measurer of DC 250V.

B. Judgement

In case of less than 150V of earth voltage of circuit, it is to be more than 0.1 meg. ohm.

In case of more than 150V of circuits earth voltage, it is to be above 0.2 meg. ohm.

(2) Wiring without interruption

a. Method

Wiring without interruption of detector circuit be confirmed by the values stipulated for in Table No.1. Then, to separate the confirmed detector from the wire of circuit, to set the transmitter and push buttons at the end of the circuit.

The action test to be made returning to the original state after completion of test, for confirmation of the correct action.

Table No.1

No. of wirings	Number of detectors
Under 10	One piece
More than 11 and less than 50	Within 2 pcs. (To be separate circuit respectively)
Above 51	Within 3 pcs. (To be separate circuit respectively).

b. Judgement

(a) Detector circuit to be of wiring without interruption from terminals or lead wires.

(b) The circuit is not to work.

2. Receiver inspection (Test)

(1) Fire indication inspection (Test)

a. Method

With operation of circuit selection switch, to confirm the work of each relay of the receiver, the rumbling of fire sound signal, the action of each displaying device and the holding function of those of receivers. In this case, to push a key for test on the side for fire test and turn in order the rotary switch.

Further, to confirm the test holding function and sounding appliance each circuit, and test the next circuit after restoring to the formal state.

b. Judgement

To be normal the actions of relay, fire lamp and the displaying device, check the sectional displays of each circuit with their numbers, and the rumbling of fire sound signal.

(2) Circuit liveness inspection (Test)

a. To confirm the wire cut of detector circuit, the connection condition of receiver with detector and relays. In this case, to investigate the conditions of terminal resistances, as well as the indication of instruments for test of each circuit, with turning the rotary switch in order.

b. Judgement

The indication of instruments for test of each circuit are to be proper (within the color-classified scope of reasonable values)

(3) Simultaneous work inspection (Test)

a. Method

To inspect by the following whether any abnormal action be caused in the function of receivers even in case of simultaneous action of several circuits or pieces of detectors or relays.

(a) To use regular power source

(b) To actuate 5 circuits for P type receiver (all circuits for receivers with less than 5 circuits) and 5 pcs. of

relays for R type receivers, with successive fire actuation of each circuit without restoring.

- (c) To work main fire sounding device and sectional ones together with (b).
- (d) In accordance with (b), to make working state on those which are equipped with sub-receiver and indicators.

b. Judgement

Whether the functions of receiver, sub-receiver, indicators, main sounding device and local alarm sounding device are in good order, and the fire working state is continued effectively.

(4) Common wire (excepting those of less than 7 circuits) inspection (Test)

a. Method

To confirm whether watch area is proper with the number of circuits of watch area indicated "Off" on the testing instruments by removing one of general wires from the connection terminal inside the receiver and by rotating in order of circuit selection switch according to the examples of circuit liveness test standard.

b. Judgement

The watch areas commonly used by general wire are to be less than 7.

(5) Auxiliary power source inspection (Test)

a. Method

To confirm as to whether the automatic switching to auxiliary power source in case of the break of regular source and reswitching to regular source in case of restoration are available, and whether the terminal voltage of auxiliary power source is proper (beyond the red line scale) with the indication of voltmeter.

b. Judgement

The voltage, capacity, switching and restoration works of auxiliary power source be normal.

(6) Emergency power source (limited to those incorporated) inspection (Test)

a. Method

To confirm as to whether automatic switching to emergency power in case of the break of regular power, re-switching to regular power in case of restoration, and whether fire indications works are normal with emergency source in the state of switching to emergency source. In case of auxiliary power source serving as emergency power source as well, the above inspection may be omitted by the execution of auxiliary power source inspection.

b. Judgement

In the same way to (5) b.

(7) Accessory devices (limited to those connecting accessory devices) inspection (Test)

a. Method

Confirm by fire indication inspection whether fire signals received by receivers are conveyed to other accessory devices.

b. Judgement

Correct conveyance of fire signals from receivers to accessory devices.

(8) Mutual actuation inspection (Test) (limited to those which are equipped with more than 2 pcs. of receivers in one premises)

a. Method

(a) To carry out mutual call, in case of the set-up of telephones and interphones available for simultaneous calls between mutual receivers.

(b) To rumble local alarm sounding devices from any receiver.

b. Judgement

(a) Simultaneous mutual call available.

(b) Correct actuation of local alarm devices.

(III) General inspection (Test)

1. Method

To confirm the following as to whether receivers correctly receive fire signals by the actuation of detectors and the operation of transmitter, whether the rumbling area and volume of local alarm sounding devices are proper, and whether the composition and function of system are normal.

In this case, detectors, transmitters to be actuated and audio devices for volume measurement to be measured their sound volume are sufficed with the number shown in Table No.2.

Table 2

Kinds of machines and apparatus	Number of samples
Detector	
Line type rate of rise heat detector	More than half number of pieces each kind per 1 watch area
Spot type rate of rise heat detector	
Combined spot type	More than 1 piece each kind per 1 watch area
Fixed temperature type	
Smoke detector	More than 1 piece per 1 watch area for those equipped on plane (To be mainly for common use part)
Transmitter	Discretionary
Local alarm sounding device (for measurement at the position 1 m away)	More than 1 piece each floor

(1) The methods for heating and smoking for detectors activation are by the following each kind of detectors.

a. Those of air pipe type among line type rate of rise heat detector

To send in by test pump the air equivalent to the activation air pressure of detector (the air volume indicated on each examiner). (Refer the illustration mentioned below.)

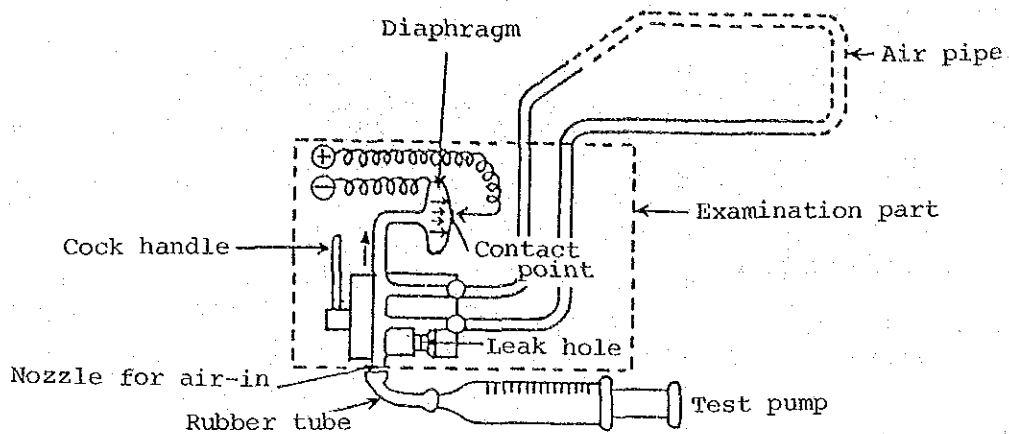


Illustration No. 1

- b. Those of thermocouple type among line type retro heat detector

To charge the voltage equivalent to the activation voltage of detector (heat motive power) on the examination part (Meter relay) with meter relay tester.

In this case the activation voltage started with switching the tester on the side of activation test, with slow operation of the dial and with charging of voltage on the examination part (Meter relay), to be within the value designated on each examination part.

- c. Those of thermosemiconductor type among line type rate of rise heat detector

To be in the same way of the standard of thermocouple type. However, those equipped at the place less than 8 meters in height, may be in accordance with the example of the standard of the spot type rate of rise heat detector.

- d. Those of spot rate of rise heat type, combined spot type and of spot fixed temperature type (excepting those, of which heating tests can not be repeated)

To heat with heat tester according to Table No.3

Table 3

Tester Detector	Heat tester	
	Platinum warmer type	Infrared bulb type
Spot type rate of rise heat detector Spot type combined heat detector	2 fireholes	Power consumption 250W
Spot type fixed temperature detector	3 fireholes	Power consumption 500W

In this case, the activation time is to be the values shown in Table No.4.

Table 4

Activation time of detector Detector	Kind of detector		
	Special class	1st class	2nd class
Spot type rate of rise heat detector Spot type combined heat detector		within 30 sec.	within 30 sec.
Spot type fixed temperature detector	Within 40 sec.	Within 60 sec.	Within 120 sec.

However, in case of exceeding 50°C difference in surrounding temperature and nominal activation temperature on spot type rate of rise heat detector, the activation time may be doubled.

e. Those of fixed temperature line type

To activate circuit tester fixed at the end of lead wire or detector, or to short-circuit of lead wire.

f. Those which repeated heat tests are unable among fixed temperature spot type. To be enough of the test of detector circuit by transmitters.

g. Smoke detector

In principle, to smoke with less than 2 holes by smoking tester. In this case the activation time is to be the values shown in the Table No.5.

Table 5

	Non-accumulation type		Accumulation type	
	Ionization type	Photoelectric type	Ionization type	Photoelectric type
1st class	Within 30 sec.	Within 30 sec.	Within 60 sec.	Within 60 sec.
2nd class	Within 60 sec.	Within 60 sec.	Within 90 sec.	Within 90 sec.
3rd class	Within 90 sec.	Within 90 sec.	Within 120 sec.	Within 120 sec.

- (2) Measure the sound with an ordinary noisemeter at the point 1 meter away from the center local alarm sounding devices

2. Judgement

- (1) Respective displays of receivers to be made correctly corresponding to each watch section, and main and sectional firebell devices rumble in good condition.
- (2) The rumbling area of sectional firebell devices (Interlocking is unnecessary on those detectors installed on stairways) is appropriate, the sound volume is above 90 decibells at the place 1 meter away from the firebell device, and yet effective report to the premises or thereof is capable.

Sprinkler system

[1] External appearance inspection (Test)

1. Water source

- (1) Their kind and structure are proper and the water volume is always reserved in more than that stipulated.
- (2) Effective measures are taken to withstand quakes.

2. Pressurized water supply device

- (1) To be installed at the place where there is little fears of damages due to fire, etc. and is convenient for inspection.
- (2) Necessary accessory machines and apparatus are properly equipped according to the kinds of whatever pressurized water supply devices are used.
- (3) The pressurized tank of water pressure actuating switch is to meet other laws and regulations, if applicable.

- (4) Effective measures are to be taken to withstand quakes.
 - (5) The approved goods are to be corrected in the combination of the machines and apparatus indicated on the name plate.
 - (6) The results of the test results report before installation are to be correct, on pressurized water supply device and its accessories, of which pre-installation test was completed.
3. Starting device
- (1) Starting method is to be correct.
 - (3) Those devices which use closed type sprinkler head, as fire detecting device of automatic starting device, are to be set up so as to detect fire effectively, and those which use detectors are set up according to the standard of automatic fire alarm system, respectively.
 - (4) On the operation part of manual starting device, the sign indicating the spray area in charge of the starting device is to be provided.
4. Control panel of motors
- (1) To be provided at such place as pump room, etc. where there is little fears of damages due to fire.
 - (2) The control panel is in principle for exclusive use of fire extinguishing equipment, made of incombustible materials having heat resistant quality of steel plates, etc.
5. Piping
- (1) Its quality, diameter, etc. are to be proper.
 - (2) The suction pipe of pump is to be exclusive for each pump.
6. Power source and others
- (1) The capacity of regular power source is to be appropriate.

- (2) Emergency power source
 - A. The class and capacity are to be appropriate.
 - B. To be in conformity with the standards of emergency power source.
 - (3) Wiring
 - A. The class and capacity are to be appropriate.
 - B. The wiring from power source to motor has no branch to other equipments on the way.
7. Sprinkler head
- (1) The number and installation condition of spray areas are to be appropriate.
 - (2) Installation method
 - A. The arrangement is appropriate and there is no non-watch part.
 - B. To be combined firmly with piping.
 - C. The fixation direction is to be correct.
 - D. There is nothing provided to hinder heat sensing and spray distribution, around the head.
 - (3) Machines and apparatus
 - To be of the kind and indicated temperature according to the place of installation.
8. Control valve
- (1) To be fixed at the place where there is little fears of damages due to fire, etc., and where is convenient for inspection.
 - (2) To be fixed each floor or spraying area.
 - (3) Measures of unnecessary closing are to be taken.
9. Water flow alarm device, delays valves, etc.
- (1) Water flow alarm device or pressure actuated switch
 - To be provided at the place where there is little fears of damages due to fire and others, and where is convenient for inspection.

- (2) Delay valve
 - A. The start operation part is to be fixed at the place of stage floor and easily accessible at the time of fire of stage floor.
 - B. The device for action test is to be provided.

- 10. Terminal test valve or manual release valve
 - (1) Terminal test valve
 - A. The place for installation is to be appropriate.
 - B. To be of the structure that pressure gauge is fixed on upstream side, and discharge outlet is fixable on delivery side.

 - (2) Manual release valve
 - A. To be provided at the place of stage floor easily accessible at the time of fire of stage part.
 - B. To be of the structure of easy operation.

- 11. Automatic alarm device
 - (1) Fire bell devices are to be provided effectively each floor or spray section.

 - (2) Fire indication device is to be provided at the place where persons always stay of central control room (including Fire Command Center).

- 12. Water inlet
 - (1) To be provided at the place easily accessible by fire engine.

 - (2) The connectors of water inlet are to be complied with the regulation stipulating for technical standard of metal fasteners.

[II] Performance inspection (Test)

- 1. Insulation resistance inspection (Test)
 - (1) Method
 - To measure insulation resistance value of power source circuit (including signal lamp circuit) by insulation resistance measurer suitable to the voltage used.

(2) Judgement standard

The insulation resistance values are to be the values in Table No.6.

Table 6

Classification of voltage of circuit		Insulation resistance value
Earth voltage (Voltage between mutual wires of non-earth circuit)	Under 150V	Above 0.1 M ohm
	Above 150V and under 300V	Above 0.2 M.ohm
	Over 300V	Above 0.4 M.ohm

2. Control panel inspection (Test)

(1) Method

To confirm the working condition of machines and apparatus for operation and monitoring of pressurized water supply devices fixed on control panel, with starting and stopping it.

(2) Judgement

- A. Voltmeter to confirm power source voltage and power source signal lamp are to act without fail.
- B. The current value at the operation time of pressurized water supply device is to be appropriate.
- C. Push button switches for start and stop of pressurized water supply device are to work securely.
- D. The switch is to be able to switch power source input simultaneously.

3. Discharge inspection (Test)

(1) Method

To discharge the release of terminal test valves fixed closest to and the farthest from the pressurized water supply device, irrespective of the types.

(2) Judgement

The discharge pressure and the amount of water discharged at the test outlet fixed on secondary side of terminal test valve are to be approximately above 1kgf/cm^2 and under

10kgf/cm², and above 80ℓ/min., respectively. Discharged water is calculated by the following expression.

$$Q = K \sqrt{P}$$

Q: discharged water (ℓ/min.)

P: Discharge pressure (kgf/cm²)

K: Constant

4. Starting device and automatic alarm system inspection (Test)

(1) Method

- A. To release the terminal test valve of the place where discharge pressure is presumed to become the lowest.
- B. After inspection of A, to execute the operation of action and stop of pressurized water supply device directly.

(2) Judgement

- A. Those using an elevated tank and pressurized tank as a pressurized water supply device
The correct transmission of fixed alarm by the action of water flow alarm device or pressure actuated switch, with the action of pressurized water supply device through the release of terminal test valve, is to be made, and the sprayed floor is to be indicated to the place where persons stay all the time like guard room, etc.
- B. Those using pump onto pressurized water supply device.
Correct transmission of fixed alarm with the start of pressurized water supply device by the action of water pressure actuating switch or water flow alarm device through release of terminal test valve, is to be made, and sprayed floor is to be indicated as well to the place where persons stay all the time like guard room, etc.
- C. In case of stopping operation of pressurized water supply device being executed, the action of the device is to stop.

5. Pressurized water supply device inspection (Test)

(1) Method

A. Those using an elevated tank

Water in elevated tank to be drained with the release of drain pipe valve.

B. Those using pressurized tank

Water in pressurized tank to be drained with the release of drain pipe valve. To decrease the pressure of pressurized tank.

C. Those using pump.

To start pump and execute closing operation and rated load operation.

D. To carry out the following test, besides the above C, for those using pumps.

(a) Piping system for performance test

To execute as per the following, collating with pump performance test result and property curve (C - H) submitted in advance.

Closing the sluice valve closest to the delivery side, and discharge the fixed amount and under rated discharged capacity of water with use of piping for performance test.

(b) Water temperature rise prevention device

To execute shut-off operation of pump with remote or direct control.

(2) Judgement

A. Those using elevated tank

To supply automatically from water supply system.

B. Those using pressurized tank

(a) To supply automatically from water supply system.

(b) To give pressure automatically to the proper pressure by pressurizing device.

C. Those using pumps

(a) The voltage value and current value at the time of closing operation and rated load operation are to be proper.

(b) Piping system for performance test

The indication values of pressure gauge and compound pressure gauge at the time of respective flow discharged are to be proper.

(c) Temperature rise prevention device

Drain from escape piping to be done automatically, and yet the amount of flow to be correct according to the installed pump and no abnormal rise in pump temperature.

(d) Others

- a. Revolution of motor and pumps to be smooth.
- b. No remarkable heat and abnormal sound to be in motors.
- c. Start performance of motors to be secure.
- d. No remarkable leakage from the ground part of the pump.
- e. No leakage nor splits in pipings after stoppage of pumps and normal function of foot valve.

6. Water supply inspection (Test) from fire engine

Opening power source circuit of pressurized water supply device, to execute as per the following.

(1) Method

- A. In case of those using water flow alarm device for alarm and indication, to release the drain valve of the device to reduce the pressure in pipings.
- B. To pump water by fire engine with the pressure within the pressure scope indicated according to inspection place (17.5 kgf/cm² in case of the pumping pressure exceeding 17.5 kgf/cm²).

(2) Judgement

No remarkable leakage from inlet and no hindrance in connecting and releasing of hoses to inlet.

7. Mutual simultaneous call system inspection (Test)

In case of more than 2 receivers installed in one fire premises, inspection be executed as per the following.

(1) Method

To speak over telephone, interphone, etc. between mutual receivers.

(2) Judgement

Communication to be smooth.

Execution manual of spot inspection

- (Note)
1. This manual shows examples of the items and contents of fire inspection conducted by the Director.
 2. In case of making actual manuals, it is necessary to select the subjects among the matters provided in the relevant fire service acts and regulations of Singapore, taking the items and the level of contents of this Reference Materials into consideration.

Contents

Fire protection management

Fire safety managers

Fire safety manager not employed yet not reported of employment
and dismissal

Fire emergency plan

Not prepared yet Not reported yet

Not amended yet Not reported yet

Fire prevention management

Voluntary inspection Not executed yet Records improper
Contents improper

Management of escape means

Exit, passage, corridor, staircase, fire compartmentation

Obstruction for escape Things left about
Fixation of decorations, etc.

Fire doors Closing hardness by obstacle
Access of combustibles

Short of passage width sales place seat

Lodging room

Escape route diagram Not displayed yet
Contents improper

Roof

Escape space secured yet

Deeds prohibited

Unapproved

Smoking Use of naked fire Hazardous goods bringing in

Conditions for approval

Location Structure Facilities Quantity
Fire prevention measures - unfulfilled

Flame retardant materials No flame retardant performance

Hazardous materials Storage Handling - Improper

Control of the number of people to be admitted - Improper

Non-fulfillment of supervision works of fire-use management

Non-fulfillment of fire protection works under construction

Fire protection management

Self-defence fire service

Self-defense fire protection system (daytime, holiday and night-time) Improper number of personnel Non-establishment of self-defence fire company No participation in training course Improper equipment

Self-defence fire activity Consciousness of duty Fire fighting activity Escape guidance Report Communication of fire occurrence to insiders Rescue and first aid Safety protection Fire command center - Operation - Improper

Education . Training

Training of fire fighting and report Not executed yet Short of times Contents improper

Escape/training, Not executed yet, Short of times, Contents improper.

Education improper against employees Inspection and report Not executed yet Improper preservation of records

Inspection and report

Not executed yet Improper preservation of records

Fire extinguisher Wall hydrant system Sprinkler system Spray fire extinguishing system Foam fire extinguishing system CO2 fire extinguishing system Halogen fire extinguishing system Dry chemical fire extinguishing system Outdoor hydrant system Motor pump equipment Automatic fire alarm system Gas leakage fire alarm system Electric leakage fire alarm system Fire bell Automatic silen Public address system Escape apparatus Guide lamp Water source Smoke exhaust system Sprinkler system with F.D. connection Fire department stand pipe Emergency power outlets Wireless communication support system

Fire fighting facilities

Fire extinguisher

Not equipped yet Short of number Invalid

Setting up Place Adaptability Improper

Damaged Corroided No good function

Indoor (out) hydrant system

Not setup yet Not setup yet partially

Power source shutoff

Pressurized water supply device

Direct Remote - No good start Short of pressure
Short of water of priming tank

Fire fighting facilities

Indoor (out) hydrant system

Improper switching condition of valves

Hydrant boxes

Door Locking Difficult opening and closing
Operation hindrance

Implement Removed Damaged

Emergency power source Not installed yet No good automatic
switching

Sprinkler system

Not installed yet Partially installed

Control panels

Power source broken

Damaged Hindrance of operation

No good automatic start of pump

Alarm system Indication device - no good

Pressurised pumping device

No good start Short of pressure

Short of water of priming tank

Improper condition of switching valves

Improper support of pipings

Flow meter

Control valve Detect in operation Closed

Automatic alarm valve Flow action valve
Flow switches - no good function

Not watched yet

Head

Detection spray - detect
Damaged Deformed
Water inlets Damaged Deformed Detect in operation
Emergency power source Not installed yet No good automatic switching

Fire fighting facilities

Water spray extinguishing system (water spray, foam, CO₂, halogenated, dry chemical, fire extinguishing systems)

Not installed yet Not installed partially

Protection sections

Use for other purposes Improper structure
Automatic closing device of openings Not installed yet
Removed Damaged No good function
Indication, signal Not installed yet No good function

Pressurised pumping device

No good start Short of pressure
Short of water in priming tank
Improper valves opening and closing condition

Storage containers

Position Place - Improper
Fire extinguishing agent Short of volume Improper kind
Damaged Corrosion Defect of operation

Control panels

Power source shutoff
Position Place Kind - Improper
Damaged Operation defect Interlocking conveyance
Indication - No good function

Starting device

Position Kind Switching condition - Improper
Damaged Operation defect

Mis-operation prevention measures Not installed yet
Improper measures

Detector and head of fire detect device Not watched yet
Sensing defect Damaged Missed

Heads

Not installed yet Short of installation numbers

Fire fighting facilities

Water spray extinguishing system (water spray, foam, CO₂, halogenated,
dry chemical, fire extinguishing systems)

Heads

Radioactive hindrance

Damaged Missed

Piping and valves

Damaged Operation defect

Improper switching condition

Alarm, Power source

Fire bell device Improper kind No good rumbling

Emergency power source Not installed yet Automatic switching
no good

Exhaust device, Not executed yet, Damaged.

Hose reels Not installed yet Damaged

Cracks Operation defect

Motor pump equipment

Not installed Not installed partially

Short of water of source

Start Vacuum indication - no good Short of fuel

Loaded equipment Removed Damaged

Automatic fire alarm system

Not installed yet Not installed partially Invalid

Receiver Sub-receiver

Power source shutoff

Bell device Main bell Section bell - stop

Fire indication activation test Window display
Main bell rumble - no good

Circuit liveness test - no good

Emergency power source Not installed yet Short of voltage
Automatic switching no good

Fire fighting facilities

Automatic fire alarm system

Detector

Not watched yet

Fixation place Place Position Kind Surroundings
- Improper

Sensing defect Damaged Deformed Corrosion Missed

Sectional fire bell device

Damaged Corrosion No good fixing

No good rumbling

Gas leakage fire alarm system

Not installed yet Not installed partially

Receiver Sub-receiver

Power source shutoff

Bell device Main bell Alarm - stop

Gas leakage indication test Window display Main bell rumbling - No good

Circuit liveness test - No good

Trouble indication test - No good

Emergency power source Uninstalled yet Short of voltage
Automatic switching no good

Detector

No watch

Fixation place Position Kind Surroundings - Improper

Detection defect Damaged Deformed Corrosion Missed

Alarm device

Voice alarm device Position improper Action no good
Gas leakage display lamp Improper position No good lighting
Detection areal alarm device no good rumbling

Fire fighting facilities

Electric leakage fire alarm

Not installed yet Not installed partially Invalid
Power source shut off
Bell device rumbling no good
Detected leaked current fixed value improper

Emergency bell, automatic siren

Not installed yet Not installed partially
Power source shutoff
Emergency power source Not installed yet Short of voltage
Automatic switching no good
Bell device rumbling no good
Damaged Corrosion Missed

Public address system

Not installed yet Not installed partly
Amplifier
Power source shutoff
Address test Interlocking Switching Selection - No good
Emergency power source, Not installed yet,
Short of voltage, Automatic switching no good.

Speaker

Damaged Missed
Voice unclear

Starting device

Damaged Corrosed
Starting no good Calls unclear

Escape apparatus

Not installed yet Short of installation number
Unusable Improper kind
Improper position Operation defect
Outdoor use hindrance Climbing down space Refuge space
Fixed ring

Fire Fighting Facilities

Exit lamp

Not installed yet Fire exit Passage (staircase, indoor, corridor)
Seats
Short of number of installation Fire exit Passage (staircase,
indoor, corridor) Seats
Power source shutoff
Position Kind - Improper Visual hindrance
Unlit Damaged
Emergency power source Not installed yet Short of voltage
No good automatic switching

Water source

Not installed Not installed partly
Drafting hole Water intake Damaged Deformed Operation defect
Short of water in source
Pressurized pumping device
Power source shutoff
Direct Remote - Start no good, Connecting device Damaged
Calls no good

Smoke vent system

Not installed Not installed partly
Power source shutoff
Smoke vent closed, manual releasing device
Removed Operation difficult
Manual Automatic Remote - Releasing device no function

Sprinkler system with FD connections

Not installed Not installed partly

Water inlet Damaged Deformed Operation defect

Valves Improper released condition Operation defect

Spray head Short of number of installation

Spray defect Damaged Deformed

System chart Not displayed yet Unclear

Fire fighting facilities

Fire department stand pipe

Not installed Not installed partly

Water inlet Damaged Deformed Operation defect

Valves Improper switching condition Operation defect

Water outlet Damaged Deformed Operation hindrance

Container Difficult opening closing operation defect

Spraying apparatus Removed Damaged

Pressurized pumping device Power source shutoff

Emergency power outlets

Not installed Not installed partly

Main power source shutoff

Protection box Opening closing difficult Operation defect

Outlets Damaged Deformed

Emergency power source Not installed No good automatic switching

Wireless communication support system

Not installed Not installed partly

Protection box Opening closing difficult Operation defect

Connecting terminal and cable Removed Damaged Deformed

Corrosion

Management

Special case standard Position Structure System Management

- Improper

Fire command center Concentrated control
Structure Function - Improper No arrangement of qualified person

Buildings

Structure

Improper structure of main construction

Fire door on the external wall openings in danger of fire spread
Not installed Removed

Buildings

Structure

Fire door on the external wall openings in danger of fire spread
Improper structure damaged Access to combustibles

Breaches

Emergency breach Not installed Closed Difficult use
due to obstacles

Alternate opening Improper structure Closed
Difficult use due to obstacles

Above 3rd floor of wooden building used for living room

Living room Corridor Passage - Improper interior furnishing

Partition

Areal partition Not installed Removed

Partition for different use Not installed Removed

Vertical opening partition Not installed Removed

Partition of section of underground arcade Not installed
Removed

Party wall, Floor Improper structure Damaged

Fire Doors

Fire door Not installed Removed No good function

Automatic closing device Not installed Removed
No good function

Heat (smoke) Detector interlocking system Not installed
Removed No good function

Operation part Lock Damaged Difficult access

Improper structure Damaged Deformed - Difficult closing

Duct, Piping

Fire damper

Not installed Removed Improper structure

Automatic closing device Not installed Removed
No function

Closed Defect Difficulty

Buildings

Partition

Duct, Piping

Penetration Improper quality of materials Uncomplete back-
filling

Entrance, corridor, passage

Difficult door opening Damaged Deformed Door unlocking device
not proper

Stair

Direct stair Not installed Short of installation number

Escape stair Not installed Short of installation number

Smoke proof tower Not installed Short of number of installation

Stair Staircase Vestibule Structure Interior finish -
Improper Use for other purposes

Fire doors

Fire door, Not installed Removed Function no good

Automatic closing device Not installed Removed
No good function

Heat (smoke) detector interlocking mechanism,
Not installed Removed Function no good

Structure Open direction - improper Damaged Deformed
Difficult closing

Operation part Locking Difficult access Damaged

Duct, Piping

Fire damper

Not installed Removed Improper structure

Automatic closing device Not installed Removed
No good function

Close Obstacle Difficulty

Penetration part Quality improper Incomplete back filling

Electric facilities

Transformer, Generator, Battery

Installed place (room)

Wall, Floor, Ceiling Improper structure Damaged

Fire door Not installed Removed Improper structure
Damaged

Leakage of water, Flooding

Duct, piping penetration part Improper quality of materials
Incomplete back filling Fire damper - Not installed

Short of pressure of air tank for start

Short of fuel

Shut-off of power source for charging

Switchboard

Switch Breaker Damaged Overheat

Fuse Capacity Kind - Improper

Wiring

Wire cables Execution Kind - Improper

Neon tube lamp equipment

Tube lamp equipment Position Structure - Improper

Tube lamp damaged, wire Deteriorated Damaged

Control

Inspection, measurement test No execution Improper records
keeping No good insulation resistance value

Arrangement Cleaning - No good

Fire using equipment and apparatus

Position Surrounding Wall

Position Improper Stair Exit - Access, Combustible Gas, Steam
Generation Stagnation

Air intake Exhaust - Short of space

Combustibles - Short of keeping distance

Upper Side Lower - Improper fire protection measures

Fire using equipment and apparatus

Position Surrounding Wall

Installed place (room) Structure Interior finish - Improper

Surrounding building material Overheat Carbonized

Machine, apparatus

Position structure - Improper

Damaged Crack Fuel leakage

Safety control device Not installed Removed Damaged
No good activation

Ground vibrations Overturn Damage Crack - Improper preven-
tion measures

Piping

Damaged Crack Corrosion Leakage

Quality of materials Joint - Improper Hose timeworn

Ground vibration Damaged Missed - Improper prevention measures

Fuel tank, container

Position Structure - Improper

Short of retention distance Improper heat interception method

LPG container (above 20ℓ) indoor use

Damaged Crack Deformed Corrosion Leakage

Ground vibration Overturn Damaged Crack - Improper prevention
measures

Chimney exhaust

Not installed Damaged Crack Improper support

Combustible material Fuel piping Wiring - Short of retention
distance

Surroundings Penetration - Improper fire protection measures

Canopy, exhaust duct Structure Common use - Improper

Oil, fats removal device Not installed Removed
Improper structure

Flame spread prevention device Not installed Removed
Improper structure

Fire using equipment and apparatus

Control

Static electricity removal Ventilation Explosive proof
Measures improper

Adjustment Cleaning - No good

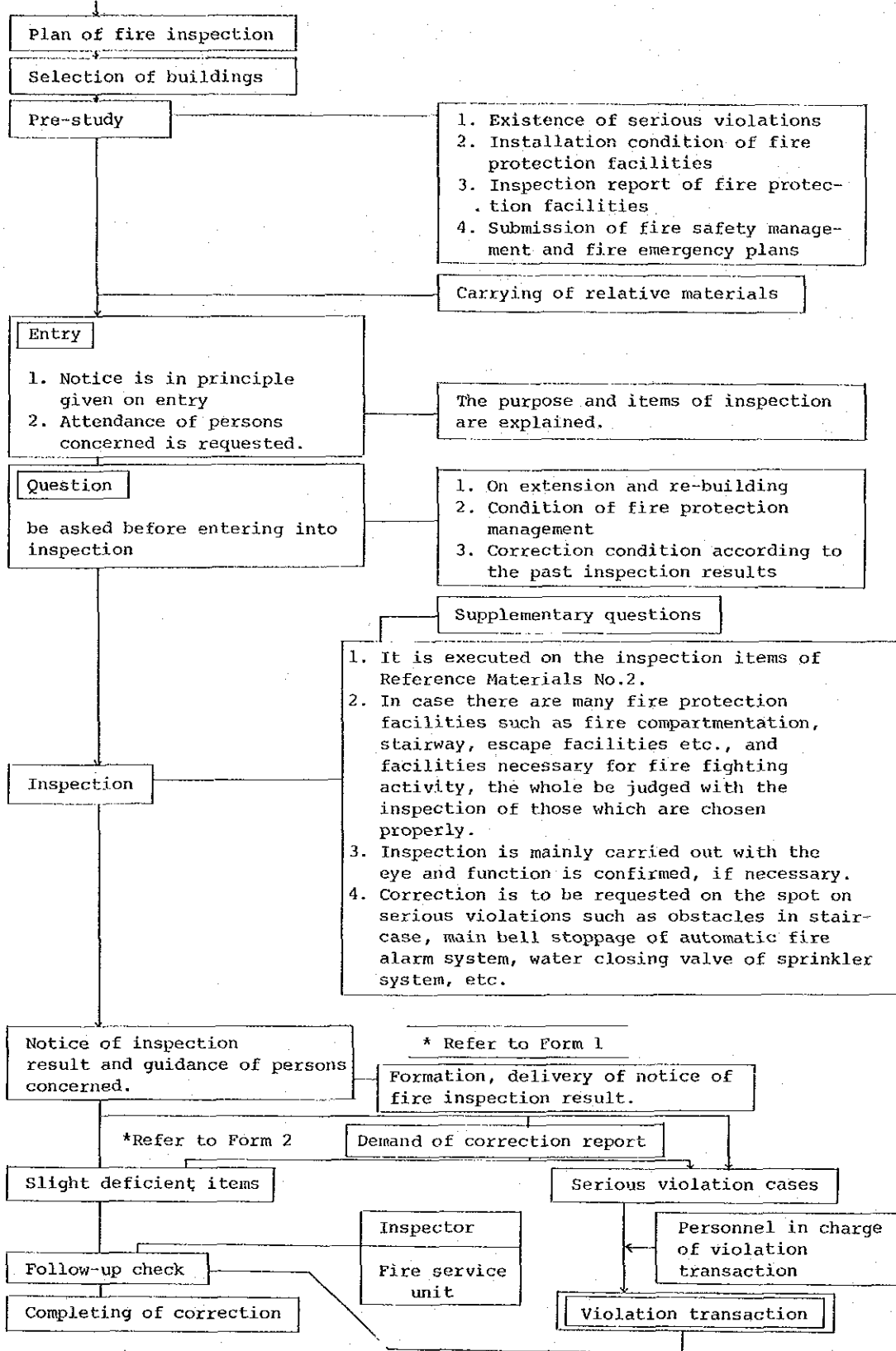
Inspection not executed Improper records keeping

Flow chart and violation transaction of fire inspection

- (Note)
- 1 This materials show an example of transaction concerning flowchart and violation treatment of surprise inspection

 2. In the case of making actual manuals, basically sufficient are the contents that are proper for smooth correction of violations in accordance with the administrative policy of Singapore.

Flow chart on fire inspection



Violation Indication

		Name of building, facility, etc.	
Number	Contents (Article and law based)	Confirmation of correction	Code number
1	No good function of automatic alarm valve set up in the machine room on north side of 1st floor	Mar. 10, 1985	
2	No installation and no warning of detectors due to change of compartment on food shop south side of 1st floor.		

Note The mark with x in correction confirmation column shows the completion of correction immediately.

Date:

TO: Chief Fire Station

Name

Address

Telephone

The concerned

Title name

Person in charge

Title name

Correction (Plan) Report

The correction (Plan) of violation indication items based on fire inspection result notice delivered on March 1, 1985, is as per the following.

Name of building, facility, etc.	Indication number	Contents	Date Correction Plan	Remarks
Machine room north side 1st floor	1	No good function of automatic alarm valve set up in machine room north side of 1st floor.	Apr.1 1985	
Food shop south side of 1st floor	2	No installation nor warning of sensors due to change of partition of food shop south side of 1st floor.	March 8, 1985	

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