

TCVN 3890 : 2009

Second edition

**FIRE PROTECTION EQUIPMENTS FOR BUILDING AND
CONSTRUCTION – PROVIDING, INSTALLATION,
INSPECTION, MAINTENANCE**

(This English version is for reference only)

HANOI - 2009

Forewords

TCVN 3890:2009 replaces TCVN 3890:1984.

TCVN 3890:2009 was compiled by Ministry of Public Security and National Standard Technical Committee TCVN/TC 21 *Fire Protection Equipments*, proposed by Directorate for Standards, Metrology and Quality (STAMEQ), and published by Ministry of Science and Technology.

Fire protection equipments for building and construction – Providing, installation, inspection, maintenance

1. Scope of application

This standard stipulates on providing and basic requirements of installation, inspection, maintenance of fire protection equipments for buildings and constructions.

Buildings and constructions for specific purpose with special requirements of fire protection and extinction, such as manufacture places, toxic chemicals and explosive materials storages, nuclear establishments; large production bases, large fuel storages; underground trenches, mine ores, mine constructions; offshore structures, besides conforming to regulations of this standard, also need to comply with regulations of other current relevant standards.

Buildings, constructions and fire protection equipments for building and construction that are not stipulated in this standard shall be decided by the competent authorities.

2 Normative References

The following normative references are of great importance when applying this standard. For document with year of publication, apply the stated edition. For document without year of publication, the latest edition (include its amendment) shall be applied.

TCVN 2622, *Fire protection of buildings. Design requirements.*

TCVN 4513, *Interior water supply system. Design standard.*

TCVN 4530, *Filling station. Specifications for design.*

TCVN 4878, (ISO 3941) *Fire protection. Classification of fires.*

TCVN 5307, *Petroleum and petroleum products terminal. Design requirements.*

TCVN 5684, *Fire safety for petroleum and petroleum products facilities. General requirements.*

TCVN 5738, *Automatic fire alarm system. Technical requirements.*

TCVN 5760, *Fire-extinguishing system. General requirements of design, installation and utilize.*

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TCVN 7336, *Automatic sprinkler systems. Design and installation requirements.*

TCVN 6100 (ISO 5923), *Fire protection. Fire extinguishing media. Carbon dioxide.*

TCVN 6101 (ISO 6183), *Fire protection equipment. Carbon dioxide extinguishing systems for use on premises. Design and installation.*

TCVN 6305 (ISO 6182), *Fire protection. Automatic sprinkler systems.*

TCVN 7026 (ISO 7165), *Fire fighting. Portable fire extinguishers. Performance and construction.*

TCVN 7027 (ISO 11601), *Fire fighting. Wheeled fire extinguishers. Performance and construction.*

TCVN 7161 (ISO 14520), *Gaseous fire-extinguishing systems. Physical properties and system design.*

TCVN 7435-1 (ISO 11602-1), *Fire protection. Portable and wheeled fire extinguishers. Part 1: Selection and installation.*

TCVN 7435-2 (ISO 11602-2), *Fire protection. Portable and wheeled fire extinguishers. Part 2: Inspection and maintenance.*

3 Terms and definitions

The following terms and definitions are used in this standard.

3.1

Means of fire protection and extinction

Include of mechanical means, machines, equipments, tools, chemicals, supporting tools, primitive means specialized for fire protection and extinction, human and property rescue.

3.2

Fire fighting nozzle system for building and construction

Water supplying system for firefighting nozzles, which is installed in advance for building and construction, ensures the flow and pressure column used for fire extinction.

3.3

Fire fighting nozzle

A synthesis of specialized equipments includes of lock valve, faucet, nozzles which are installed in advance to guide water to the fire.

3.4

Outdoor water supplying system for fire fighting

A system of specialized equipments that is installed outdoor to supply water for fire extinction.

3.5**Automatic fire extinguishers**

Fire extinguishers operate according to automatic principles, are hung or put in areas that need to be protected.

3.6**Fire extinguishers with wheels**

Fire extinguisher of more than 25kg but not over 450kg weight designed to be on wheels so that it could be moved and operated for fire extinction by one person.

NOTES: Fire extinguisher with wheels is also known as fire extinction trolley according to TCVN 7027.

3.7**Moving distance of fire extinguishers**

The maximum actual moving distance from the place where the fire extinguisher is put to the place that needs to be protected.

3.8**Primitive fire fighting tools**

Common tools, materials that are specialized for fire extinction.

4. General regulations

4.1 Buildings, constructions, parts of constructions, rooms, compartments and equipments (hereinafter referred to as building and construction) which depend on neither the owner nor the managing unit must be equipped with means of fire protection and extinction according to regulations of this standard.

4.2 Means of fire protection and extinction equipped for building and construction as stipulated in this standard shall include:

- Fire extinguishers: portable fire extinguishers; fire extinguishers with wheels; automatic fire extinguishers;
- Automatic fire alarm system;
- Fire extinction system: automatic or semi-automatic fire extinction systems which use water, steam, powder, foam, air as the extinguishing agent; indoor fire fighting nozzle system and outdoor water supplying system for fire extinction;
- Mechanical means for fire extinction: fire extinction cars; fire extinction ship; mobile fire pump;

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- Means used for rescuing humans from fire: human rescuing wires; rope ladders; human rescuing pipes;
- Smoke protecting means: filtering face masks; gas-masks;
- Means used for breakdown lighting and exit instructing: exit sign; emergency lamp; emergency exit lamp;
- Common demolishing tools: powered pincers; handsaws; hammers; crowbars;
- Primitive tools for fire extinction: barrels, water tanks, sand tanks; buckets; casks; splashing buckets; shovels; long-handled sickles; tinder; fiber blankets; ladder (bamboo, wood or metal); hand pump, etc.;
- Fire extinction substances: water; foam; powder; gas.

4.3 Type of fire protection and extinction means; fire fighting methods, fire fighting substances, fire fighting systems chosen must be suitable with the nature, the dangerous level of fire/explosion of building and construction in each type of fire; suitable with the ability and effect of each type of fire extinction substance and means. Fire-fighting effectiveness of each type of fire extinction substance is stipulated in Table 1 and in relevant current technical standards.

4.4 Fire classification shall be in accordance with TCVN 4878.

4.5 Means of fire protection and extinction must be inspected periodically as regulated. The inspecting results shall be recorded in fire protection equipment log book. Sample of fire protection equipment log book is given in Annex A.

4.6 Means of fire protection and extinction must be maintained periodically according to the manufacturer's instructions, this standard and regulations of the competent authorities. During the maintaining and repairing period of on-duty-fire-fighting-means, must arrange correlative replaced means to ensure the fire safety in building and construction.

4.7 Inspection, maintenance of means of fire protection and extinction must be carried out by professional organizations or fire safety technicians of that unit. Persons in charge of these works must be trained and have suitable qualifications.

Table 1 – Fire fighting effectiveness of fire extinction substances

Fire extinction substance		Fire fighting effectiveness according to fire type							
		A		B		C	D		
		A1	A2	B1	B2		D1	D2	D3
Water		++		-		-	-		
Foam	High-expansion Foam	++		+	-	-	-		
	Low-expansion and medium expansion foam	+	-	++	+	-	-		
Gas	CO ₂	-		+		+	-		
	Nitrogen, FM200, Inergen, Argon, etc.	+		+		+	-		
Powder	BC powder	-					-		
	ABC powder			++		++	-		
	ABCD powder	+					++	-	
<p>NOTES:</p> <p>“++” <i>Very effective.</i></p> <p>“+” <i>Suitable for fire extinction.</i></p> <p>“-” <i>Not suitable for fire extinction.</i></p> <p><i>BC powder</i> <i>Used for fires marked B, C.</i></p> <p><i>ABC powder</i> <i>Used for fires marked A, B, C.</i></p> <p><i>ABCD powder</i> <i>Used for fires marked A, B, C, D.</i></p>									

5 Providing, installation, inspection, maintenance of fire extinguishers

5.1 Providing, installation of fire extinguishers

5.1.1 All areas, categories in buildings and constructions with fire and explosion hazards, include ones which already have fire extinction systems, must be equipped with fire extinguishers.

NOTES: Levels of fire and explosion hazard of building and construction are defined in TCVN 7435-1 (ISO 11602-1) and Annex D of TCVN 7435-2 (ISO 11602-2).

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5.1.2 Automatic fire extinguishers shall be equipped for areas of fire hazards where humans cannot enter or are hardly there. Automatic fire extinguishers must be installed in a way that is suitable with the protecting area and the hanging or putting height of each type of extinguisher.

5.1.3 Calculation of providing and installation of fire extinguishers made on the basement of installation norm for fire extinguishers and the maximum moving distance from the position of fire extinguishers to the furthest protecting point is defined in Table 2.

Table 2 – Norm of installing fire extinguishers and maximum moving distance from the position of fire extinguishers to the furthest protecting point

Fire hazard level	Installation norm	Maximum moving distance to portable fire extinguishers, fire extinguishers with wheels	
		For solid substance fire	For liquid fire
Low	1 pcs/150 m ²	20 m	15 m
Medium	1 pcs/75 m ²	20 m	15 m
High	1 pcs/50 m ²	15 m	15 m

5.1.4 Fire extinguishers equipped in accordance with 5.1.1 shall use fire extinction substances that conform to requirements at Table 1 and shall have minimum weight or volume (G) of not smaller than the values regulated at Table 3 (for solid substance fire) and Table 4 (for liquid, gas fire).

Table 3 – Weight or volume of fire extinction substance for solid substance fire

Fire hazard level	Weight or volume of fire extinction substance, G		
	Powder, <i>kg</i>	Solution of foam making substance or water with additives, <i>liter</i>	Clean fire extinction gas, <i>kg</i>
Low	$G \geq 2$	$G \geq 6$	$G \geq 6$
Medium	$G \geq 4$	$G \geq 10$	$G \geq 8$
High	$G \geq 6$	-	-

Table 4 – Weight or volume of fire extinction substance for liquid, gas fire

Fire hazard level	Weight or volume of fire extinction substance, G			
	Powder, <i>kg</i>	Solution of foam making substance or water with additives, <i>liter</i>	Clean fire extinction gas, <i>kg</i>	Carbon dioxide, <i>kg</i>
Low	$G \geq 4$	$G \geq 5$	$G \geq 4$	$G \geq 5$
Medium	$G \geq 6$	$G \geq 9$	$G \geq 9$	-
High	$G \geq 15$	$G \geq 25$	-	-

5.1.5 For narrow and long areas or areas with many different, adjacent floor levels, installation of fire extinguishers must ensure that the moving distance from the position of fire extinguisher to the furthest protecting point would not exceed the values specified in 5.1.3.

5.1.6 On the same floor or storey, if the plane is separated into different areas by walls, partitions or other barring objects and there is no traveling path, the installation of fire extinguishers for these areas shall be separated and in accordance with 5.1.3 and 5.1.4.

5.1.7 For replacement where necessary, the number of reserve fire extinguisher must not be less than 10% total number of fire extinguishers.

5.1.8 Fire extinguishers shall be installed at designed positions. Should not place all fire extinguishers at one place.

5.1.9 Functions and construction of fire extinguisher shall be in accordance with TCVN 7026 (ISO 7165); TCVN 7027 (ISO 11601).

5.1.10 Besides the requirements specified in this standard, choosing and installation of fire extinguisher must also be carried out in accordance with TCVN 7435-1 (ISO 11602-1).

5.2 Inspection, maintenance of fire extinguishers

5.2.1 Inspection, maintenance of fire extinguishers is regulated in TCVN 7435-2 (ISO 11602-2).

5.2.2 Results of inspection, maintenance of fire extinguishers shall be recorded in log book (Annex A) and observing card attached to each set of fire extinguisher (Annex B).

6 Providing, installation, inspection, maintenance of automatic fire alarm system

6.1 Providing, installation of automatic fire alarm system

6.1.1 Automatic fire alarm system is composed from basic parts such as: fire alarm center, fire alarm head, fire alarm press buttons, sound and light fire alarms, linking equipments and power source. Each

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part of the system must have enough basic functions and must integrate and link together to form a complete fire alarm system.

6.1.2 Technical requirements for automatic fire alarm system are defined in TCVN 5738.

6.1.3 Types of building and construction that must be equipped with automatic fire alarm system:

- a) Administrative building, head office of governmental institutes, political-social organization of district level and higher; other administrative buildings, head offices, working offices that have at least 5 floors or have space volume of at least 5000m³;
- b) Hotels; guest houses, hostels, motels that have at least 5 floors or have space volume of at least 5000m³ ; other accommodation houses that have at least 7 floors;
- c) Buildings, constructions belong to science and technology studying facilities that have at least 5 floors or have the total space volume of at least 5000m³;
- d) Schools, education facilities, hospitals, sanatoriums that have at least 5 floors or have the total space volume of at least 5000m³ ; kindergartens with at least 100 children or total space volume of at least 1000 m³; other health care facilities that have at least 50 beds;
- e) Theatres, cinemas, meeting halls, houses of culture, gymnasium house, other crowded places that have at least 200 seats; dance hall; discotheques, clubs, places that provide entertainment services and other public constructions with area of at least 200m² or space volume of at least 1000m³;
- f) Permanent and semi-permanent markets and trading centers;
- g) Archives houses, libraries, museums, exhibitions;
- h) Broadcasting stations, television stations, telecommunication post office of district level and higher;
- i) Airports; first grade railway stations (stations for goods and passengers); houses for parking cars and motorcycles with space volume of at least 5000m³;
- k) Production houses, production constructions contain flammable substances and goods and have space volume of at least 5000m³;
- l) Power plants, indoor transformer stations;
- m) Storages, ports for exportation and importation of petroleum and liquefied gas
- n) Other good and material storages with fire hazard that have space volumes of at least 1000 m³;
- o) Regional or national centers of command, moderation, operation, control;
- p) Security constructions and national defense constructions with fire hazards, explosion hazards or required special protections;
- q) Underground constructions with fire and explosion hazards, basements.

6.2 Inspection, maintenance of automatic alarm system

6.2.1 After installing automatic fire alarm system, test the operation of the whole system. Automatic fire alarm system shall be put into operation if the test results show that the system satisfies the requirements of the design and relevant standards.

6.2.2 Automatic fire alarm system, after being putting into operation, must be inspected at least twice a year. When inspecting, must test the whole functions of the system and test the operating ability of all equipments of the system.

6.2.3 Periodic maintenance of automatic fire alarm system shall be carried out in accordance with the environmental conditions of installation place and the manufacturer's regulations; however, maintenance of the whole system should be carried out at least once every two year. The maintenance must include of general inspection for operation of all equipments of the system.

7 Providing, installation, inspection, maintenance of automatic fire extinction system

7.1 Providing, installation of automatic fire extinction system

7.1.1 Buildings and constructions defined in Annex C must be equipped with automatic fire extinction system. Installation of automatic fire extinction system for other types of building and construction shall be decided on the basement of the analysis of fire hazard level and other factors relevant to humans and properties protection.

In buildings and constructions defined in Annex C, automatic fire extinction system shall be equipped for all rooms, regardless of their areas, except for the following areas:

- Wet area (bathrooms, toilets, cold rooms, washing area, etc.);
- Staircases;
- Areas that are free from fire hazard.

7.1.2 Fire extinction substance of automatic fire extinction system chosen for buildings and constructions in accordance with 7.1.1 must meet the requirements specified in Table 1 and protection requirements.

7.1.3 When designing, installing gas fire extinction system must consider the requirements of guarantying safety for humans; must design suitable protecting methods to ensure that everybody could quickly move out of the dangerous areas, restrain humans from entering the area after discharging gas, unless for rescuing victims quickly; must satisfy requirements of TCVN 6100, TCVN 6101 and TCVN 7161-1.

7.1.4 When installing automatic fire extinction system which is dangerous for human, must calculate escape time to ensure that the final person could get out of the protected room or area before the system automatically discharges fire extinction substance.

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Escape paths in buildings and constructions that are equipped with automatic fire extinction systems must be in accordance with the requirements defined in 7.1.3 and in other relevant standards.

7.1.5 Automatic fire extinction system must have automatic and manual control parts. For water-based fire extinction system with drencher nozzles and steam-based or gas-based fire extinction systems, the use of remote and manual control part is acceptable.

7.1.6 Water-based automatic fire extinction system must go with a nozzle which is installed outdoor for taking water from pump truck or mobile firefighting pump.

7.1.7 Other regulations on choosing, installing automatic fire extinction system are stipulated in TCVN 5760, TCVN 6101, TCVN 6305, TCVN 7161-1, TCVN 7336 and other relevant standards.

7.2 Inspection, maintenance of automatic fire extinction system

7.2.1 After installing automatic fire extinction system, must test the operation of the whole system. Automatic fire extinction system shall be put into operation if the test results show that the system sufficiently satisfies the requirements of the design and relevant standards.

7.2.2 Unless the manufacturer instructs otherwise, automatic fire extinction system shall be periodically inspected and maintained at least once a year.

7.2.3 In each time of periodic inspection and maintenance, except for equipments that operate only one time such as sprinklers, disposable heat detector, etc., all equipments and functions of the system must be inspected and operational tested, this includes quantity and quality inspection of fire extinction substances.

7.2.4 Inspection, maintenance of automatic fire extinction system shall be carried out in accordance with TCVN 6101, TCVN 6305, TCVN 7161-1, other relevant standards and instructions of manufacturers.

8 Providing, installation, inspection, maintenance of indoor fire nozzle systems and outdoor water supplying systems for fire extinction.

8.1 Providing and installation of indoor fire nozzle systems

8.1.1 The following buildings and constructions should be equipped with indoor fire nozzle system:

- a) Production houses with area of at least 500m² or space volume of at least 2500m³;
- b) Storehouses with area of at least 500m² or space volume of at least 2500m³;
- c) In family houses that have at least 7 floors; tenement houses, hotels, apartment buildings, restaurants that have at least 5 floors;
- d) Administrative buildings that have at least 6 floors; schools, hospitals that have at least 3 floors;

- e) Stations, other kinds of public constructions, auxiliary houses of industrial constructions with space volumes of at least 5000m³;
- f) Theatres, cinemas, meeting halls, clubs that have at least 300 seats;
- g) Solid and semi-permanent trading centers.

8.1.2 Installation of indoor fire nozzle system is not mandatory in the following cases:

- a) Production house of refractory grade I, II and with inner equipments made of non-flammable materials which are used as a place for processing, transporting and preserving non-flammable products and semi-products;
- b) Production houses level D, E with refractory grade III, IV, V and space volume of less than 1000m³;
- c) Public bathrooms, washing rooms;
- d) Warehouses that are made of non-flammable material and contains non-flammable goods;
- e) Pumping stations, water filtration stations of drainage systems.
- f) Production houses and auxiliary houses of industrial constructions that do not have water supplying pipelines, and external fire-fighting water is from rivers, lakes, ponds, or water tanks for fire-fighting.

8.1.3 Indoor fire nozzle system should not be installed in buildings or constructions using or preserving substances that may cause fire, explosion or fire spread upon contact with water.

8.1.4 Water pressure in indoor fire nozzle system in production bases, warehouses with high fire danger, buildings and constructions of at least 25 meter height, markets, trading centers, hotels, dance halls, railway station, seaports, theatres, cinemas must be maintained at the level which ensures the fire fighting capacity.

8.1.5 Indoor fire nozzle systems could be designed independently or in combination with water-based automatic fire extinction system.

Indoor fire nozzle systems must go with outdoor nozzles which would be used for taking water from pump cars or mobile fire extinction pumps.

8.1.6 Number of fire nozzle, flow, pressure column of fire extinction water in buildings and constructions are stipulated in TCVN 2622.

8.1.7 Technical requirements for indoor fire nozzle systems shall be in accordance with TCVN 2622, TCVN 4513, TCVN 5760 and relevant current standards and regulations.

8.2 Providing, installation of outdoor water supplying system for fire extinction

8.2.1 Outdoor water supplying system for fire extinction shall be provided to the following buildings and constructions:

- a) Administrative buildings, tenement houses, apartment buildings;

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- b) Hotels, hospitals, schools, cultures and sports constructions;
- c) Markets, trading centers, supermarkets;
- d) Stations, stores, auxiliary houses for industrial constructions, other kinds of public construction;
- e) Production houses, industrial constructions.

8.2.2 Installation of outdoor water supplying system for fire extinction is not mandatory in the following cases:

- a) Places with population of less than 50 persons and buildings that have maximum 2 floors;
- b) Buildings that lay outside the population points, restaurants with space volume of up to 1000m^3 , shops with area of up to 150m^2 (except for shops for selling industrial goods), public houses with refractory grade I, II and space volume of up to 250m^3 , locate in population points;
- c) Production houses whit producing category E, refractory grade I, II and space volume of up to 1000m^3 (except for buildings with unprotected metallic pillars or wooden, plastic pillars with space volume of more than 250m^3);
- d) Storages for seasonal agricultural products with space volume of less than 1000m^3 ;
- e) Storage for flammable materials or non-flammable materials kept in flammable packing whose area is up to 50m^2 .

8.2.3 Technical requirements for outdoor water supplying system for fire extinction shall be in accordance with TCVN 2622, TCVN 5760 and relevant current standards and regulations.

8.3 Inspection, maintenance of indoor fire water nozzle system and outdoor water supplying system for fire extinction

8.3.1 Indoor fire water nozzle system and outdoor water supplying system for fire extinction, after being installed, shall be operational tested. The test shall be carried out with the whole system. Indoor fire water nozzle system and outdoor water supplying system for fire extinction shall be put into operation if the test results show that the systems fully satisfy the requirements of the design and relevant standards.

8.3.2 Once a week, check the quantity of water reserved for fire fighting in the tank, operate the main fire fighting pump and reserved fire fighting pump.

8.3.3 At least every six month, inspect the fire water nozzles, check the tightness of the joints, the closing and opening ability of valves and test the spraying ability of 1/3 total number of fire water nozzle..

8.3.4 Once a year, carry out spraying testes to check for the quality status of all nozzles, joints and storzs that are equipped; clean all water opening/closing valves and storzs, replace any equipment that has impaired quality.

8.3.5 Periodic technical maintenance of indoor fire water nozzle system and outdoor water supplying system for fire extinction according to the manufacturer's instructions shall be carried out maximum once a year.

9. Providing, installation, inspection, maintenance of mechanical fire-fighting equipments

9.1 Providing, installation of mechanical fire-fighting equipments

9.1.1 Big storages, airports, seaports, key foundation of economic, politics, socio-culture, industrial zones shall be equipped with not only fire extinction systems but also fire extinction trucks, fire extinction ships that use both water and foam for fire extinction. Object and minimum norm of providing are given in Table 6.

Table 6 – Object and minimum providing norm of mechanic fire extinction means

No.	Object	Size	Fire extinction truck, pcs	Mobile fire extinction pump, pcs
1	Storage			
1.1	Reserved store	National level	1	
1.2	Reserved store	Ministerial level, branch level		1
1.3	Petroleum and petroleum products storages	Total capacity of more than 100,000 m ³	2	
1.4	Petroleum and petroleum products storages	Total capacity of from 15,000 m ³ to 100,000 m ³	1	
1.5	Petroleum and petroleum products storages	Total capacity of less than 15,000 m ³		1
2	Airport, seaport			
2.1	Airport	International	3	
2.2	Airport	Inland	2	
2.3	Seaport	Type I	2	
2.4	Seaport	Type II	1	
2.5	Other inland ports			1
3	Production facilities			
3.1	Thermoelectric plant	Capacity of at least 200MW	1	
3.2	Hydroelectric plant	Capacity of at least 300MW	1	
3.3	Thermoelectric, hydroelectric plant	Capacity smaller than the above		1
3.4	Nuclear power plant	Not depend on capacity	2	
3.5	Paper-mill	Capacity of over 35,000tons/year	1	
3.6	Textile mill	Capacity of over 20 millions m ² /year	1	
3.7	Cement plant	Capacity over 1 million tons/year	1	

Table 6 (continue and finish)

No.	Object	Size	Fire extinction truck, pcs	Mobile fire extinction pump, pcs
3.8	Nitrogenous fertilizer factory	Capacity of at least 180,000 tons/year	1	
3.9	Steel factory	Capacity of at least 300,000 tons of rough steel per year	1	
3.10	Paper mill, textile factory, cement plant, nitrogenous fertilizer factory	Capacity smaller than the above		1
3.11	Oil refinery and petro-chemistry refinery	Not depend on capacity	2	
3.12	Fuel gas processing facilities	Capacity of at least 15,000,000m ³ gas / day and night	1	
3.13	Mineral exploiting facilities	Capacity of at least 300,000 tons/year	1	
3.14	Fuel gas processing and mineral exploiting facilities	Capacity smaller than the above		1
4	Industrial zone			
4.1	Industrial zone	Total area of over 300 hectares	3	
4.2	Industrial zone	Total area of from 150 to 300 hectares	2	
4.3	Industrial zone	Total area of from 50 to 150 hectares	1	
4.4	Industrial zone	Total area of less than 50 hectares		1

9.1.2 Type I and type II seaports shall be further equipped with at least 01 fire-fighting ship.

9.1.3 Providing of fire trucks, fire-fighting ships, mobile fire pump for buildings and constructions that are not mentioned in the above list shall be regulated by competent fire protection agency.

9.1.4 Fire-fighting trucks, fire-fighting ships, mobile fire pumps provided for buildings and constructions must ensure the following requirements:

- a) has suitable technical properties and fire-fighting features for buildings and constructions that are in need of protection;

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b) has fire-fighting substances, attached tools and equipments in accordance with regulations .

9.1.5 Fire-fighting trucks, mobile fire pumps and their attached fire-fighting equipments must be stored in houses with roofs (garage).

9.1.6 Arranging wharf for fire-fighting ships must ensure that the fire-fighting ships would be able to move quickly and would not be blocked or obstructed by other objects.

9.2 Inspection, maintenance of mechanical fire-fighting equipments

9.2.1 Fire-fighting trucks, fire-fighting ships, mobile fire pumps shall be regularly inspected and maintained to ensure that they could always operate well according to technical properties designed by the manufacturer.

9.2.2 Fire-fighting trucks, fire-fighting ships, mobile fire pumps should always be loaded with enough fuel and fire-fighting substance and have sufficient attached appliances.

9.2.3 Fire-fighting trucks, fire-fighting ships, mobile fire pumps shall be inspected and maintained regularly, periodically and unexpectedly. The content of each inspection and maintenance mode shall be in accordance with the manufacturer's regulations.

10 Providing, installation, inspection, maintenance of human-rescuing-equipments, breakdown-lighting and exit-instructing equipments, common demolishing tools and smoke-protecting equipments.

10.1 Providing and installation of human-rescuing-equipments, breakdown-lighting and exit-instructing equipments, common demolishing tools and smoke-protecting equipments

10.1.1 Apartment buildings, hotels and other types of buildings with the minimum of 25 meter height whose each floor contains over 50 persons must be equipped with human rescuing means. Type of human rescuing means provided for each specific construction shall be decided by competent fire protection agency.

10.1.2 Human rescuing means provided shall meet the technical and safety requirements as specified by the manufacturer and must be suitable with the using conditions.

10.1.3 Installation of hanging and hooking structures for human rescuing wires, rope ladders, human rescuing pipes shall be in accordance with the load, height, refractory limits and the possibility of safe rescue. Installing position of human rescuing equipments shall be in accordance with technical requirements and using properties of the equipments.

10.1.4 Breakdown-lighting and exit-instructing equipments shall be installed on the escape paths of buildings and constructions in the following areas:

a) At places that are dangerous for the movements of humans;

- b) At alleys and staircases used for escaping when number of person that need to escape exceeds 50 persons;
- c) Along the main alleys and exit doors of production compartments, where the number of working person exceeds 50 persons;
- d) At places of instructions for staircases in buildings that have more than 6 floors;
- e) In public rooms and auxiliary houses of industrial factories, where there is the possibility of gathering at the same time more than 100 persons;
- f) Production rooms without natural light.

10.1.5 Emergency lighting lamp and exit lamp must have reserved power source which can ensure for at least 2 hours of operation time.

Emergency lighting lamp shall have average initial illuminating intensity of 10 lux and the minimum illuminating intensity measured at any point along the escape alley of not less than 1 lux.

From the distance of at least 30meters, in normal illuminating condition (300lux) or in emergency condition (10lux) the letters “EXIT” or other suitable letters on the emergency exit lamp must be seen clearly

10.1.6 Emergency lighting lamps and emergency exit lamps shall be installed, located on doors, corridors, escape staircases, turnings on escape paths for illuminating, instructing way and easily observing. The locations of emergency lighting lamps, emergency exit lamps must ensure the visibility of the escape path and the distance must not exceed 30m.

10.1.7 Building and construction shall be equipped with at least one set of common demolishing tools; the tools shall be located in the following areas:

- a) Production houses;
- b) Storages;
- c) Tenement houses, hotels, apartment buildings, restaurants;
- d) Administrative buildings, schools, hospitals;
- e) Stations, other types of public constructions;
- f) Theatres, cinemas, meeting halls, clubs, dance halls;
- g) Permanent and semi-permanent markets and trading centers.

10.1.8 Smoke protection equipments shall be equipped for hotels and shall be located at the convenient locations in the hotel rooms. Each person shall be equipped with at least one set of filtering face masks. It is encouraged to be further equipped with full poison filter masks.

10.1.9 Direction signs for exit and indicating boards for positions of human rescuing equipments must be available at the positions that are easy to be observed.

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10.2 Inspection, maintenance of means used for rescuing humans from fire, breakdown lighting and exit instructing equipments, common demolishing tools and smoke protection equipments.

10.2.1 Means used for rescuing humans from fire, breakdown lighting and exit instructing equipments and smoke protection equipments shall be inspected periodically once a month.

10.2.2 Once a year, means used for rescuing humans from fire, breakdown lighting and exit instructing equipments shall be inspected and maintained in accordance with the process and technical requirements of each type of equipment. Breakdown lighting lamp and emergency exit lamp shall be tested for 2 hours, equipments that could not ensure working time shall be replaced.

10.2.3 Common demolishing tools shall be periodically inspected every six months.

10.2.4 Means used for rescuing humans from fire, breakdown lighting and exit instructing equipments equipped for buildings and constructions must be preserved from rain, direct sunlight, wet.

11. Providing, installation, inspection, maintenance of primitive fire-fighting tools

11.1 Providing, installation of primitive fire-fighting tools

11.1.1 Primitive fire-fighting tools are provided to petroleum and petroleum products storages, petroleum and liquefied gas trading stations, markets, goods storages, production facilities and family houses.

11.1.2 Providing of primitive fire-fighting tools to petroleum and petroleum products storages, petroleum trading stations, petroleum constructions is defined at TCVN 5307, TCVN 4530, TCVN 5684.

11.1.3 Providing of primitive fire-fighting tools to warehouses, stores, production facilities is specified in Table 7.

Table 7 – Providing of primitive fire-fighting tools

No.	Name of construction item	Sand barrel, m^3	Fiber blanket 1m x 2m, pcs	Barrel, water tanks 200l, pcs
1	Warehouses, stores containing goods which are non-flammable solid materials			1/500 m^2 floor
2	Warehouses, stores containing goods which are flammable solid materials, includes liquid with igniting temperature of over 45°C being kept in closed barrels and weights less than 500kgs	1/350 m^2 floor	1/350 m^2 floor	1/350 m^2 floor
3	Warehouses, stores containing equipments, cars, motorcycles			1/200 m^2 floor
4	Producing and processing facilities that use mechanical equipments, drying furnace, welding machines		1/200 m^2 floor	1/200 m^2 floor
5	Facilities for producing, packing, classifying, preserving goods that do not use flame	1/300 m^2 floor	1/300 m^2 floor	1/300 m^2 floor

11.1.4 For other facilities, providing of primitive fire-fighting tools shall depend on the conditions and the requirements of each facility.

11.1.5 Primitive fire-fighting tools shall be installed at each area in accordance with its fire-fighting requirements. Each tool used for containing fire-fighting water shall be attached with at least two buckets (or barrels). These buckets are used for scooping water. Each sand container shall be attached with at least two shovels

Water and sand containers must be covered to avoid contamination.

11.1.6 Primitive fire-fighting tools: long-handle sickle, tinder, bamboo ladder, shovel, bucket or barrel for scooping water, water container, sand container, hand pump must be painted red.

11.2 Inspection, maintenance of primitive fire-fighting tools

11.2.1 Primitive fire-fighting tools shall be periodically inspected and maintained at least once every six month.

11.2.2 Equipments used for containing fire-fighting water and sand must always be full with water and sand or have the volume of contained water and sand of not less than 4/5 the volume of the equipment. Sand must be kept dry and preserved from contaminants. Add water, sand where noticing that the volume of water, sand does not meet the requirement. Fire-fight sand, water shall be replaced if it is determined to be unsatisfying.

ANNEX A

(For referenced)

Sample of log book for fire protection equipments

Cover:

SOCIALIST REPUBLIC OF VIETNAM
Independent – Freedom – Happiness

LOG BOOK
FIRE PROTECTION EQUIPMENTS

Name:

.....

.....

Address:

.....

Tel: Fax:

Date of issue:

Issuing by:

Person in charge of fire protection:

.....

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Collective table of fire protection equipments

No.	Date (of inspection or putting into service)	Type of fire protection equipment, system	Code	Quantity	Unit	Technical status	
						Pass	Fail

Page 5, 6 ... (and continuous pages)

TABLE FOR OBSERVATION
OF TECHNICAL STATUS OF EACH TYPE OF FIRE PROTECTION EQUIPMENT (OR SYSTEM)

Work item:

.....

Type of fire protection equipment (or system):

At position no.: (or equipment code as defined by management units).....

No.	Inspection date	Content and result of inspection	Inspection method	Conclusion	Inspector, inspection organ	Signature	Remarks

ANNEX B

(For referenced)

Sample of card for observation of fire protection equipments’ inspection results

**Card for observation
of fire protection equipments’ inspection results**

Equipment :

Code: Series No.:

Put into service on: date.....month.....year.....

Inspection date	Inspection results	Inspector, inspection organ

Card size: 100x150 (mm)

(Notes: There must be stamp of unit on the card)

ANNEX C
(Normative)

Buildings and Constructions require automatic fire extinction system

No.	Subject	Requirements
1	Building	
1.1	<p>Warehouses contain:</p> <ul style="list-style-type: none"> - Sulfur/metal/alkali based materials and products ; - Wool, felt, leather, metal and gemstone; - Film, pictures, video with volume of at least 200kgs (if being kept in non-flammable packing), and of any volume (if being kept in flammable packing); - Semiconductor devices, chip and other electronic devices; - Engines, machinery, spare units that contain fuel, oil and grease; - Materials, goods belong to fire hazard category C and are preserved on shelf of at least 5.5 meter height 	Not depend on construction area and number of floors
1.2	Storages used for preserving natural rubber, artificial rubber and rubber products	
1.2.1	Single storey building	Total construction area of at least 750 m ²
1.2.2	Buildings that have at least two floors	Not depend on construction area
1.3	Storages that have at least two floors and are used for preserving materials and goods of fire hazard category C (except for cases specified in 1.1 and 1.2)	Not depend on construction area

No.	Subject	Requirements
1.4	Archiving house, library preserves statistical documents, handwritten historical documents and other valuable documents	Not depend on construction area
1.5	Building of at least 25meter height (except for production house category D and E)	Not depend on construction area
1.6	Single storey buildings with steel frame and metal roof:	
1.6.1	Public ^(*) , collective, civil	Area of at least 800m ²
1.6.2	Commercial ^(**) – administrative	Area of at least 1200 m ²
1.7	Commercial specialty buildings ^(**) (automatic fire fighting system should not be installed in areas for preserving and preparing meat, fish, fruits, vegetables which are kept in non-flammable packings; metal dishes, non-flammable materials):	
1.7.1	Underground	Area of at least 200m ²
1.7.2	Single storey building (except for subjects specified in 1.6)	Area of at least 3500m ²
1.7.3	Buildings that have two floors	Area of at least 3500m ²
1.7.4	Buildings that have at least three floors	Not depend on area
1.7.5	Store that sells flammable liquid (except for petrol station for cars and store that sells canned flammable liquid with the volume of each can not exceed 20 liters)	Not depend on area
1.8	Cultural houses and groups (includes cultural groups within groups of production buildings, storages and accommodation houses)	Not depend on area and number of floor
1.9	Buildings for exhibition and advertisement:	
1.9.1	Single storey building	Area of at least 1000m ²
1.9.2	Buildings that have at least two floors	Not depend on area
2	Constructions	
2.1	Cable constructions (trenches, spouts, tunnels, wells, two-layer floors, platforms, compartments, etc. used for running power cables or communication cables) of electric power plant	Not depend on area

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No.	Subject	Requirements
2.2	Other cable constructions with voltage of at least 500KV	Not depend on area
2.3	110 KV cable construction connected with transformer of at least 63 KVA capacity	Not depend on area
2.4	Overhead cable constructions of production houses and civil buildings	Over 100m ³
2.5	Combined cable tunnel of production house and civil building where 220V cables or conducting wires are installed, volume of the cable tunnel exceeds 100m ³ , quantity of cable wire is:	At least 12 threads
2.6	Closed or opened conveyor used for transporting flammable materials	Of at least 25 meter length
2.7	On suspending ceiling (technical space) for running ventilating pipes, water supplying pipes and cable tray with over 12 cable threads, voltage of at least 220V, insulated by flammable materials and hard-to-burn materials (includes being installed on the same bearing frame)	Not depend on area and volume
2.8	Petrol station and tank containing flammable liquid and easy-to-burn liquid	In accordance with TCVN 4530, TCVN 5307, TCVN 5684
3.	Rooms, compartments	
3.1	Rooms, compartments used for storing, producing	
3.1.1	Belong to production category A and B (except for houses of processing and preserving agricultural products of grain form)	Area of at least 300m ²
3.1.2	Contain/preserve/produce: rubber/wood (cellulose)/sulfur/alkali metal materials and products; semiconductor devices, chip and other electronic devices; materials and products made from wool, felt, leather; film, pictures, video made from flammable materials.	Not depend on area
3.1.3	Belong to production category C (except for cases stated in 3.2)	

No.	Object of providing	Requirements, index of norm
3.1.3.1	On entresol or basement	Not depend on area
3.1.3.2	On other floors that are above the ground surface	Area of at least 300m ²
3.1.4	Preserve and produce material and products that made from aluminum ores, liquid rubber; flammable and easy to burn liquid products such as: solvent, glue, mastic, immersing solution; painting booth, compartment for synthetic rubber making, room for storing compressor with gas turbine engine, petrol and diesel oil heating room	Not depend on area
3.1.5	High voltage laboratories, rooms that have flammable partitions	Not depend on area
3.2	Dynamic rooms, compartments	
3.2.1	Rooms for transformers and compensators of at least 500 KV	Not depend on area
3.2.2	Rooms for transformers with voltage of 220 to 230KV and capacity of at least 200 MVA	Not depend on area
3.2.3	Rooms for transformers and shearing machines which are in hermetic boxes:	
3.2.3.1	With capacity \geq 63 MVA	Not depend on area
3.2.3.2	With voltage \geq 110 KV	Not depend on area
3.3	Communication rooms, compartments	
3.3.1	Technical workshop for terminal equipments, intermediate switching room, radio signal transmitting and receiving center.	Not depend on area
3.3.2	Rooms for digital switching center, telephone control center; computer and telegram center of provincial/municipal post office with total space volume of at least 40,000 m ³	Not depend on area
3.3.4	Automatic telephone switchboard with capacity of at least 10,000 subscriber numbers, channels or linking points	Not depend on area

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No.	Object of providing	Requirements, index of norm
3.3.5	Dividing and connecting rooms which use computers to control automatic telephone switchboard with capacity of at least 10,000 inter-provincial/ inter-municipal channels	Area of at least 24m ²
3.3.6	Rooms for processing, classifying, preserving and packing letters, telegram, cablegram, newspapers	Area of at least 500m ²
3.4	Transportation rooms, compartments	
3.4.1	Rooms, compartments for producing, repairing and processing train (electric machines, equipments, repairing and processing train cars, wheels, engines, etc.)	Not depend on the area of room, compartment
3.4.2	Room, compartment as a component of underground system (except for transport station, passenger coach, battery room, pumping station, heating equipment, ventilating room)	Not depend on the area of room, compartment
3.4.3	Traffic control center with automatic systems, high/medium frequency radio communication center	Not depend on the area of room, compartment
3.4.4	Rooms for assembling and disassembling aircraft engine, aircraft, chassis, wheels of airplane/helicopter	Not depend on the area of room, compartment
3.4.5	Rooms for producing, repairing aircraft engine	Not depend on the area of room, compartment
3.4.6	Rooms for vehicle parking in some constructions (except for accommodation buildings):	
3.4.6.1	Basement (includes space under a bridge)	Not depend on the area of room, compartment
3.4.6.2	Entresol, floors that are above the ground	At least 3 cars
3.4.7	Ways for parking the underground with technical maintenance	At least 4500m ²
3.5	Public function rooms	
3.5.1	Rooms for preserving and transacting big amount of publication, documentation, manuscripts and other valuable materials (includes operating-room records)	Not depend on area

No.	Object of providing	Requirements, index of norm
3.5.2	Library storage which contains at least 500 000 units of book and documentation	Not depend on area
3.5.3	Exhibition booth	Area of at least 1000m ²
3.5.4	Museum's preservation rooms and showrooms for valuable works and articles	Not depend on area
3.5.5	Rooms, compartments, house with cultural, artistic function:	
3.5.5.1	Cinemas, clubs, theatres with stage dimension of 21m x 15m regardless of the number of audiences or with smaller stage dimension (that is 21m x 15m) and capacity of over 700 audiences	Not depend on area
3.5.5.2	Concert hall or concert-cinema room with at least 800 seats	Not depend on area
3.5.5.3	Storages for: props, scene, curtains, stage/studio instruments	Not depend on area
3.5.5.4	Studio	Area from 1000m ² and above
3.5.5.5	Rooms for preserving portable luggages, storages for flammable materials that are installed in each floor of the station (includes airport):	
3.5.5.5.1	Basement, underground floor	Not depend on area
3.5.5.5.2	floors that are above the ground	Area of at least 300m ²
3.5.5.6	Rooms, compartments for preserving flammable materials or non-flammable materials in flammable packings that are located in:	
3.5.5.6.1	Below the grandstand of roofed sport constructions	Area of at least 100m ²
3.5.5.6.2	In roofed sport construction with capacity of at least 800 seats	Area of at least 100m ²
3.5.5.6.3	Below the grandstand of outdoor sport construction with capacity of over 3000 seats	Area of at least 100m ²
3.5.5.7	Rooms for host computer; communication rooms; rooms for preserving magnetic boards, archival paper tape, cameras; technical rooms below the stage, studios.	Not depend on area

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No.	Object of providing	Requirements, index of norm
3.5.5.8	Rooms, compartments for goods trading in other function buildings (accommodation buildings, public buildings, etc.) installed at:	
3.5.5.8.1	Entresol, basement	Area of at least 200m ²
3.5.5.8.2	Other floors that are above the ground	Area of at least 500m ²
4.	Equipments	
4.1	Have painting booths that use flammable or easy-to-burn liquid	Not depend on type of equipment
4.2	Have drying chamber	Not depend on type of equipment
4.3	Flammable waste reclaiming tower	Not depend on type of equipment
4.4	Oil-cooled-transformers with voltage of:	
4.4.1	500 KV	Any capacity
4.4.2	From 220KV to 330KV	Capacity of at least 200MVA
4.4.3	Voltage of 110KV, installed in hydroelectric plant	Capacity of each machine shall be at least 63 MVA
4.5	Oil-operated shearing machine in hermetically sealed distribution equipments	Weight of the oil is at least 60kg
4.6	Test electric stations using petrol/diesel generator designed on cars or trailers	Not depend on area
4.7	Shelves of at least 5.5 meter height used for preserving flammable materials or non-flammable materials in flammable packings.	Not depend on area
4.8	Barrels, cisterns containing oil with capacity of	At least 3m ³
<p>NOTES:</p> <p>(*) Public houses, for example: schools, hospital, cultural and sport house, etc.</p> <p>(**) Buildings used for trading, commercial or entertaining purposes, for example: markets, commercial centers, dance halls, etc.</p>		

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