

**ANDHRA PRADESH STATE DISASTER RESPONSE AND
FIRE SERVICES DEPARTMENT**

**II. Notification of Alternatives to Water Sprinklers in Design of
Fire Safety Systems-Reg.**

@@@@

**1) The basis of power conferred on Director General, AP Fire
services to issue No Objection Certificate for Fire Safety:**

(1) As per Section 13 of A.P. Fire Service Act, 1999 Issue of No Objection Certificate: (1) Any person proposing to construct a building of more than 15 meters height for commercial/business purpose, 18 meters and above height for residential purpose, and buildings of public congregation like schools, cinema halls, function halls, religious places, which are more than 500Sq. Meter in plot area or 6 meters and above in height shall apply to the Director General or any member of the service duly authorized by him in this behalf, before submission of such building plans to the authority or officer competent to approve the same under the relevant law, for the time being in force, for a no objection certificate along with such fee as may be prescribed.

(2) The Director General or any member of the service duly authorized by him in this behalf, shall within sixty days of receipt of such application, on being '**satisfied**' about the provision of fire prevention and safety measures as stipulated in the [National Building Code Guidelines, as amended from time to time] or any other law for the time being in force regulating such purpose or activity, shall issue a no objection certificate with such conditions as may be considered necessary and if not so satisfied, reject the same for reasons to be recorded in writing.

2) The purpose of this notification:

The purpose is to define and elaborate the word "**satisfied**" to include the following six alternative technologies to conventional water sprinkler system in all types of structures /Occupancies. However, the choice is left to the managements.

1. Installation of Temperature and Heat Sensors connected to hooters.
2. Aerosol Automatic extinguishing devices.
3. Dry Chemical Powder modular system.
4. CO₂ flooding system.
5. N₂ flooding system.
6. The clean agent flooding system.

3) Nature of the National Building Code of India:

*The National Building Code of India(NBC), promulgated by the Bureau of Indian Standards, is a comprehensive building code containing **guidelines** for regulating building construction activities across the country. Relevant paragraphs of the "Foreword" to the NBC are extracted hereunder:*

"The Code contains regulations which can be immediately adopted or enacted for use by various departments, municipal administrations and public bodies. It lays down a set of minimum provisions designed to protect the safety of the public about structural sufficiency, fire hazards and health aspects of buildings; so long as these basic requirements are met, the choice of materials and methods of design and construction are left to the ingenuity of the building professionals".

"The provisions of this Code are intended to serve as a model for adoption by local bodies, Public Works Departments and other government construction departments, and other construction agencies. Existing PWD codes, municipal byelaws and other regulatory media could either be replaced by the National Building Code of India or suitably modified to cater to local requirements in accordance with the provisions of the Code. Any difficulties encountered in adoption of the Code could be brought to the notice of the National Building Code Sectional Committee for corrective action".

*From the above, it is evident that **NBC does not have the force of law and is not statutory** in nature. It serves as a **Model Code** for adoption by all agencies involved in the building construction works.*

4) The intent and objectives behind Part-4 of National Building Code which deals with "Fire and Life Safety":

An extract from the Foreword to Part 4 of the NBC:

*"Absolute safety from fire is not attainable in practice. The objective of this Part is to specify measures that will provide that degree of safety from fire which can be reasonably achieved. (**The Code endeavors to avoid requirements that might involve unreasonable hardships or unnecessary inconvenience or interference with normal use**) and occupancy of buildings but insists upon compliance with minimum standards of fire safety necessary for building occupants and users".*

5) Power conferred on Director General of Fire Services to remove practical difficulties and to prescribe modern technologies for designing fire safety systems:

Yes, there is.

a) The 'satisfaction' in 13(2) can be defined to include cost effective, Modern Fire Fighting Equipment that is equivalent or better in effectiveness of dousing fires than the existing conventional Fire Equipment.

b) As per clause 5.1 Part II of NBC,2016 : the provisions of the Code are not intended to prevent the use of any material or method of design or construction not specifically prescribed by the Code, provided any such alternative has been approved.

"As per clause 5.2 Part II of NBC,2016 : The Authority(Director General of Fire Services) may approve any such alternative provided it is found that the proposed alternative is satisfactory and conforms to the provisions of relevant parts regarding material, design and construction and that material, method, or work offered is, for the purpose intended, at least equivalent to that prescribed in the code in quality, strength, compatibility, effectiveness, fire and water resistance, durability and safety."

c) In addition, National Building Code Guidelines, give explicit powers to the Director General of Fire Services to remove hardships and practical difficulties in implementing provisions of National Building Code."

"As per Clause 3.4.2 of Part-IV of NBC, 2016: Exceptions and deviations to the general provisions of requirements of individual occupancies are given as applicable to each type of occupancy in 6.1 to 6.9. In case of practical difficulty or to avoid unnecessary hardship, without sacrificing reasonable safety, local head, fire services (Director General, SDR & Fire Services) may consider exemptions from the Code."

d) NBC-2016, 6.7 Industrial Building , 6.7.2.3 The following shall apply to high hazard industrial Occupancies:

NOTE : All high hazard industrial occupancies shall have automatic sprinkler system or '**such other protection**' as may appropriate to the particular hazard.

e) In place of water-based sprinkler system by treating the alternative system under '**any other**' indicated in sl.no.12 of the form no.10 under rule 26(1) of A.P. Fire and Emergency Operations&LevyofFeeRules,2006.

6) About Water sprinklers:

Activates automatically with in the first few minutes of a fire breaking out. Sprinkler systems are designed to Limit damage to the building and Property, in case of unmanned/unnoticed areas. Otherwise, the fire exposed areas of building get over heated and decomposes concrete material leading to structural failure.

As per Table-7 part-IV of National Building Code guidelines prescribes installation of water sprinkler system in the following places:

- i. Any Building having the Basement/Cellar area exceeding 200m².
- ii. Residential Buildings height more than 45 meters.
- iii. Hotel Buildings, where Floor area exceeding 1000 m² on any floor and Hotel Buildings height more than 15 meters.
- iv. Institutional Buildings height more than 15 meters.
- v. Assembly Buildings height more than 15 meters.
- vi. Business Buildings height more than 15 meters.
- vii. Mercantile Buildings height more than 15 meters.
- viii. Industrial Buildings comes under Moderate Hazard and High Hazard.
- ix. Storage Buildings, irrespective of area and height.
- x. Hazardous Buildings, irrespective of area and height.

So, National **Building Code (NBC)** Guidelines prescribe Sprinklers to protect buildings and their occupants from fire in almost all structures/buildings. **However, these systems are typically intended to protect structures, not building contents or the ongoing operations of the business inside a building. Therefore, Hardships/Practical difficulties have arisen in various applications.**

7) The Conventional water Sprinklers System:

Automatic Sprinkler System is a Water Based System with water pipes fitted with sprinkler heads at suitable intervals and heights and designed to actuate automatically, control and extinguish fire by the discharge of water". This requires installation of centralized Down comer/Wet riser system so that we maintain and get required water pressure 24/7 and 365 days in the pipes that connect to sprinklers, as and when the sprinklers get activated due to heat or rise in temperature.

The disadvantages of such centralized system of maintaining water pressure, we have discussed and to overcome the practical difficulties/Hardships involved such system, we have notified "decentralized system" in Gazette.

8) The practical difficulties/hardships faced with water sprinklers:**i. Installing Sprinklers in Urea Go-down at Nagarjuna Fertilizers Limited:**

The Nagarjuna Fertilizers and Coromandal Fertilizers Company, Kakinada is a manufacturer of fertilizer products like Urea, Ammonium Phosphate, Potash...etc. The plant is located right near the seacoast of Kakinada. As per NBC, it is required to provide Automatic Sprinkler System at storage warehouse as per table-7 part-IV. If any of the water sprinkler malfunctions and water gets leaked, the stored material gets damaged. **Because of these technical reasons the company hesitated to install sprinklers in their go-downs. But the department denied to issue No Objection Certificate on this account for '4' years. Thus, in those areas, the traditional Automatic water Sprinkler System technically is not appropriate.**

ii. Installing Sprinklers in ITC Virginia Tobacco Godowns:

The ITC, Guntur is a leading tobacco buyer and quality tobacco exporter. They store Virginia tobacco (highest quality tobacco in the country, a premium product) at their go-downs. As per the National Building Code guidelines, the fire department personnel have insisted upon installation of sprinklers system in their godowns. But the Company hesitated, so the NOC was denied for two years on this account. If any malfunctioning of Automatic Sprinkler system occurs, the quality of the tobacco meant for export purposes will be degraded and it leads to huge damage to the value of the stored material. **Therefore, mandating installation of sprinklers system causes genuine hard ship to the company.**

iii. Installing Sprinklers in Electronic Industry:

Foxconn and Cell one, electronic manufacturing Industries are situated at Sri city, Tirupati respectively in the State. Every Electronic Industry has a process to deal with the semiconductors, which are highly water sensitive in nature. As per the NBC guidelines, Automatic Sprinkler System has been insisted upon by the fire department, however, it is not technically appropriate to install. If Automatic Sprinkler System provided in the said Industry malfunctions, it may lead to vigorous and violent reaction. **Therefore, it is a genuine practical difficulty.**

iv. Installing Sprinklers in Cold Storage Godowns:

There are about 278 Cold Storage Godowns existing in the State. Every Cold Storage Godown maintains the ambient temperature between (-2°C to 6°C). As per NBC guidelines, Fire Department insisted upon installation of sprinkler system. If Automatic Sprinkler System is provided, the water inside the Sprinkler system pipes gets frozen as the temperature inside the Cold Storage Godown sometimes goes below 0°C and the purpose of the Sprinkler system will not be served.

*Most godowns are used for storing red dry chillies, any water leakage from sprinklers will result in discoloring/damage to the red chillies. In addition, the sprinkler system occupies lot of economic space of the godown. **Due to the above two critical reasons, which present genuine practical difficulties, none of the cold storages godowns in the State have installed such sprinklers and are functioning without obtaining any 'NOC' from the fire department unable to meet impractical conditionalities.***

V. Corrosion Environment: *Andhra Pradesh is having 981 KM of coastal line and major cities and industrial Occupancies are located near to sea. The corrosive nature of atmosphere near the sea, results in development of holes in iron pipes used in down comer or wet riser system that is necessary for working of water sprinklers system. Therefore, it is challenging to maintain the water sprinklers in working condition as they require continuous maintenance and frequent replacement.*

In fact, to overcome such leakages in pipes, many managements be closing valves to stop circulation of water at pressure in those pipes thus defeating the very purpose of installation of the system.

In fact, in 2020, in Swarna Palace @ Vijayawada, the management unable to maintain the frequently rusting/leaking pipelines, have stopped water from circulating in the fire pipes. For many days, nothing happened. But when, the fire accident happened on 9th Aug, 2020, the inmates tried in vain to get water from the preinstalled pipes, as there was no water, resulting in death of 10 people.

Therefore, in corrosive coastal environment, we need to reduce/eliminate use of iron/GI pipes and find alternatives to this genuine and serious practical difficulty.

Vi) Pharmaceutical/Chemical Industries:

1. Solvent yard:

*Solvents include different volatile chemicals like toluene, ethanol, methanol, benzene etc., and toxic chemicals like ammonia, chlorine..etc. These solvents are Poisonous and corrosive. Any water leakage results in chemical reactions with the solvents and chemicals stored. In fact, water is not the right medium to fight Fires in such chemical storage areas technically. Still Fire Department has been insisting on Sprinkler system installations citing NBC Guidelines. **The pharma industry managements have given representation citing it as a genuine particular difficulty.***

2. Processing/Manufacturing areas:

*In all pharma manufacturing blocks, most of the chemicals used in the manufacturing process are water reactive chemicals. Any accidental release of water from the sprinklers may cause spontaneous fire / explosion. In view of that, it is not recommended to provide the sprinkler system in these processing blocks and **hence it needs to be removed supplanting with better system.***

3. Formulation unit:

Especially in Drug Formulation Units, the water in sprinkler/Down Comer System can foster microbial growth, which is dangerous for safe making of drugs as per FDA regulations. Hence, the sprinkler system is not advisable in such plants/industries.

Vii). In Addition, the Conventional automatic sprinkler system are not Technically feasible to be installed in the following premises:

- 1) where the water reactive materials are stored.
- 2) where crane movement up to roof level of the building.
- 3) Where Electrical Traction with testing process is carried out.
- 4) Where, Electronic goods/Servers are located.
- 5) Where painting process is undertaken.
- 6) Where the ambient temperature is maintained below 4°C.
- 7) Where processing of non-metals which are water reactive, is carried out.
- 8) Where Boiler areas/Silos areas are located.
- 9) Where the height of single roof building is more than 17 meters.
- 10) Where the Operation theatres, X-ray theatres and Radiation related Activities are carried out.
- 11) Where Cable galleries, Electrical Transformer are located.

9) The alternatives to Water Sprinkle system:

The following are the alternatives to water sprinkler system:

- a. Installation of Temperature and Heat Sensors connected to hooters.
- b. Aerosol Automatic extinguishing devices.
- c. Dry Chemical Powder modular system.
- d. CO₂ flooding system.
- e. N₂ flooding system.
- f. The clean agent flooding system.

10) Temperature or Heat Sensors work during Fire conditions:

"Temperature Sensor" is a device that will trigger the alarm whenever it sense the temperature above a designed temperature and also sends alerts and messages to the concerned people including the Fire Service Department.

11) The aerosol extinguishing system:

The aerosol employs a fire extinguishing agent consisting of very fine solid particles and gaseous matter to extinguish fires.

Aerosol Equipment can be used in all class of Fires in confined Area. It has different models:

- *Manual Model*
- *Electrical Model*
- *Thermal Model (Which can also be used with Sprinkler Activation as an alternate to water Sprinkler System)*

Advantages:

- *Installation is very easy*
- *Do not require Pipe, Pumps & Water etc.*

12) Dry Chemical Powder modular system works:

(i) Smothering, cooling and shielding heat transfer contribute to the fire extinguishing characteristics of dry chemical agents. Dry chemical suppression not only offers protection for local areas or specific pieces of equipment but can also be used as a total flood system for enclosed rooms or spaces. These chemical agents are nonconductive and are used to protect a variety of fire hazards such as electrical transformers, flammable liquids and fuel truck loading racks.

(ii) Pharmaceutical industry:

In the process, where water reactive chemicals are used, Dry Chemical modular System built with temperature sensitive bulb can be very effective alternative to water sprinkler system.

13) N₂ flooding system works:

It uses nitrogen gas to displace oxygen from the fire source to put off the fire. Due to its inert and lightweight physical properties, Nitrogen gas is an excellent choice for use in closed electrical systems.

14) Co2 flooding system:

A fixed installation designed to displace the oxygen with Co2 in the enclosed buildings/ godowns and thus extinguish the fire.

15)Clean agent fire suppression system:

Clean agents as electrically non-conductive, volatile, or gaseous fire extinguishing agents that do not leave a residue upon evaporation. Clean agent fire suppression systems help extinguish fires in their incipient stages. They use gas instead of water to put out the fire without causing damage. When heat or smoke is detected, a signal is sent to the system that sends the clean agent directly to the hazardous area, usually within 10seconds.As the clean agent fills the room, the heat is absorbed which suppresses the fire.

Some examples of facilities that commonly use clean agent fire suppression systems include:

- *Laboratories and medical facilities with equipment*
- *Spaces that house critical building infrastructure*
- *Flammable liquid storage areas*
- *Museums*
- *Digital data repositories and record repositories*
- *Libraries*
- *Telecommunication centers*
- *Server rooms*

16) In view of the circumstances as explained above and in accordance with section13(2) of AP Fire Service Act,1999,the Director General, Fire Services clarifies that the word 'Satisfaction' includes the above six alternatives to conventional Water Sprinkler system as mentioned in Para.9 in all types of structures/Occupancies. However, the choice is left to the managements.

PRATAP MADIREDDY,
*Director General,
AP State Disaster Response
and Fire Services.*