Report of Committee on Water Cooling Towers

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(rep. National Automatic Sprinkler & Fire Control Assn.)

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This report has been submitted to ballot of the Committee, which consists of 6 voting members, of whom 5 have voted affirmatively and 1 has not voted. Mr. Bishop has not returned any ballot.

The Committee on Water Cooling Towers presents for official adoption amendments to the 1961 Edition of NFPA No. 214, Standard on Water Cooling Towers. Not shown in the proposed amendments because of its editorial nature, is the renumbering of the standard so that paragraphs prefixed by a letter will be identified by four digit numbers.

Standard No. 214 is published by the NFPA in Volume 4 of the National Fire Codes and in separate pamphlet form.

Proposed Amendments to Standard on Water Cooling Towers

NFPA No. 214 — 1961

1. Change the title of Part II. “Types of Towers” to “Definitions.”

2. Add the following new 112:

112. Cooling towers of combustible construction are those of wood frame construction as defined by NFPA No. 220, Standard Types of Building Construction, and those in which the fill or fill decks are of combustible material.

3. In 134 change “should” to “shall”.

4. Add new 135 as follows:

135. An automatic vibration controlled switch should be provided to automatically shut down fan motors.
5. In part 15. Fire Protection, revise 151, 152 and 154 as follows:

151. GENERAL.

1511. Consideration shall be given to the following factors in determining the extent and method of fire protection of induced draft cooling towers:

   a. Important to continuity of operation
   b. Size and construction of tower
   c. Type of tower
   d. Location of tower
   e. Water supply
   f. Value of tower

NOTE: Fire records for atmospheric and mechanical forced draft towers do not indicate the general need for automatic fire protection systems. However, exposure protection may be necessary as provided in 154.

1512. Depending on factors indicated above where a fire protection system is required, one of the following general types of systems may be used (See Appendix):

   a. Open head deluge system
   b. Closed head dry pipe system
   c. Wet pipe automatic sprinkler system

152. FIRE PROTECTION SYSTEM DESIGN.

1521. Types of Systems.

   The counterflow tower design lends itself to either closed or open head systems. Therefore, wet pipe, dry pipe, or deluge systems may be used. Where water supplies are adequate, the deluge system usually provides a higher degree of protection.

   The crossflow design is such that it is difficult to locate sprinklers in the most desirable spots for both water distribution and heat detection. This situation can be solved by separating these two functions and using separate water discharge and detection systems. The open head deluge system does this and, therefore, is the type of system most applicable to crossflow towers.

   In large multicell towers, normal water supplies may be inadequate for deluge systems. Closed head systems (dry or wet) could be considered in these cases. Authorities having jurisdiction should be consulted as to the type of system to be used.
1522. The fire protection system should be designed on a rate of application basis as follows:

a. Under fan decks of counterflow towers an average water density of 0.5 gpm per square foot (including fan opening).

b. Under fan decks of crossflow towers a water density of 0.33 gpm per square foot (including fan opening).

c. Over fill areas of crossflow towers a water density of 0.5 gpm per square foot.

1523. Pipe sizing shall be based on hydraulic calculations to give an even distribution of water throughout the protected area. The discharge from any one head or nozzle shall not vary from the specified rate of application more than plus or minus 15 per cent and the total discharge from a system shall not be less than the specified rate of application.

1524. Where deluge systems are used, an adequate number of heat detectors shall be installed. They shall be located in the path of natural air flow through the tower.

In counterflow and crossflow towers, heat detectors should be located under the fan deck around the circumference of the fan opening. Some towers may require heat detectors within the fan opening.

Where rate-of-rise detectors are used, they shall be spaced not over 15 feet apart. In pneumatic type systems, for detectors inside the tower, there should be no more than one per mercury check in towers operating year round in cold climates, and two per mercury check in towers used during the warm months only or year round in warm climates. There may be four detectors per mercury check when the detectors are located outside the tower.

Where fixed temperature detectors are used, they shall be spaced not over 8 feet apart. Temperature rating should be selected in accordance with operating conditions but should be no less than intermediate.

Where heat detectors are inaccessible during tower operation, test detectors, accessible from the ground or roof, should be provided for each circuit. In the case of pilot head operated systems, an inspector's test connection shall be installed on the pilot line.

1525. A heat detector and water discharge outlet shall be provided over each fan drive motor when the motor is so located that it is not within the protected area of the tower.
1526. Provision should be made to interlock the fan motors with the sprinkler system so that the cooling tower fan motors will be stopped upon actuation of the system.

NOTE: Consideration should be given to any unusual or abnormal operating or climatic conditions in the design and selection of equipment for the fire protection system.

154. EXPOSURE PROTECTION.

1541. A tower of combustible exterior located less than 100 feet from any hazardous materials or structures should be properly protected by an automatic water spray system on the exterior of the tower.

1542. Systems for exterior protection should be designed with the same attention and care as interior systems. Pipe sizing shall be based on hydraulic calculations. Water supply and discharge rate should be based on 0.15 gpm per square foot for all surfaces being protected.

6. Add the following new Appendix:

APPENDIX

The use of antifreeze systems in cooling towers has been frequently recommended. While in theory this type of system would function, the use of antifreeze systems in cooling towers presents problems not encountered in the usual antifreeze application. Due to the inaccessibility of the piping during normal operation of the cooling tower, it is practically impossible to do any maintenance work or to make routine inspections. The corrosion problem can be quite serious in cooling towers, and leaks in the system will not readily become apparent. This would result in loss of the antifreeze solution and could result in freezing of the system. Also, there are many areas where local ordinances prohibit the use of these systems.

7. In the references to NFPA standards change the first sentence to read:

The following standards are mentioned in the foregoing text and are useful for reference.

and add the following reference:

220. Types of Building Construction (NFC 4)

8. Add the following new figures to the standard:
Figure 1111. Types of atmospheric towers.
Figure 1112. Types of mechanical-draft towers.
Figure 152a. Typical deluge fire protection arrangement for counterflow towers.
Figure 152b. Typical deluge fire protection arrangement for
counterflow towers.
Figure 152c. Typical deluge or dry pipe fire protection arrangement for counterflow towers.
Figure 152d. Typical deluge or dry pipe fire protection arrangement for counterflow towers.
Inspectors Test Valve Accessible
From Grade Or Building Roof

Heat Detector
Over Fan Drive
Motor With Heat
Collector 18" In
Least Dimension

Open Sprinkler
Over Fan Drive
Motor

Figure 152e. Typical deluge fire
protection arrangement for cross-
flow towers.
SECTION A-A

Figure 152f. Typical deluge fire protection arrangement for crossflow towers.
Figure 152g. Typical deluge fire protection arrangement for crossflow towers. See Note following caption of Figure 152h.
Figure 152h. Typical deluge fire protection arrangement for crossflow towers.

Note: Where air seal boards prevent installation of cooling tower nozzles on drift eliminator side of fill, this nozzle location should be used.
81. Who May Vote at Annual Meetings.

Voting at Annual Meetings shall be limited to Organization Members and Associate Members of the National Fire Protection Association as specified in Article 3 of the Articles of Association.

82. Authority of the Annual Meeting.

In respect to reports of Technical Committees, the Annual Meeting may:

(a) Adopt a report as presented, or
(b) Return a report in its entirety to the responsible Technical Committee for further study, or
(c) Accept a proposed amendment or amendments to a report with specific authority to the Board of Directors to act in the name of the Association on the proposal(s) and the report as a whole following consultation with the Technical Committee, or
(d) Accept a proposed amendment or amendments to a report with the understanding that its adoption is subject to the provisions of Paragraph 84.

NOTE: An “amendment,” as used herein, is defined as a change in substance or intent whether it involves substitution, revision, or withdrawal made to a report at the Annual Meeting.

83. Adoption of Reports as Presented.

A standard, code, recommended practice, or amendments thereto that by majority vote is found acceptable to the Annual Meeting as presented by the Technical Committee and as preprinted shall become an Official or Tentative NFPA document (in accordance with the Committee’s requests) as of the date of the action taken by the Annual Meeting.

NOTE: All Official documents are thereafter published by the Association with authority to the Executive Office of the Association to take care of any necessary editorial details which do not result in any change of intent or substance. Tentative documents are published by the Association when circumstances warrant and the Technical Committee requests such action.

84. Handling Proposed Amendments from the Floor of the Annual Meeting.

Each amendment proposed and acted on favorably at an Annual Meeting under the procedure of Paragraph 82.(d) shall prevail unless objection is raised by the Technical Committee involved within thirty days following the first business day after adjournment of the Annual Meeting at which the action is taken. The Technical Committee shall report its views to the Technical Secretary of the Association and to the Chairman of the Board detailing the reason and nature of its objection, after which the Board shall accept or reject the amendment, revert to the wording of the previous edition, accept a proposed rewording submitted by the Technical Committee, or adopt another course of action in the name of the Association.

See also Pages v–viii for Additional Guidance on Procedures