1899 FIRE ALARM CODE

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Thank You

Forward

By Charles Aulner

Today it is easy for professionals in the fire alarm industry to take the codes for granted. In the case of the fire alarm code, it started with the 1899 edition. Since this first attempt at writing the code in 1899, professionals from many industries and many generations have been involved in building the code requirements we follow today. Literally thousands of professionals have participated in writing the fire alarm code over the years, and they all participated as volunteers. We all owe them a debt of thanks for their hard work.

More importantly, many people have lost their lives in the code development process. New code requirements come about directly as a result of fire protection failures. When things go wrong, we as an industry say…oops…how can we prevent that from happening again. The death, destruction and mayhem caused by fires of the past have had a direct impact on the code writing process. It is also important to consider how many lives have been saved as a result of the requirements included in the code. The one thing we have learned through history, code compliance saves lives.

For me, the discovery of the 1899 edition of the code happened when I happened to be in Boston teaching a Fire Alarm Class. As part of this trip in 2003, I decided to visit NFPA headquarters in Quincy, a suburb of Boston. I decided to visit NFPA's technical library. When I walked in, a librarian approached and asked how she could help. I really did not know what to say, so the first thing that entered my mind, being a fire alarm professional, was do you have the fire alarm code? She asked what edition? I responded with what is the oldest edition?

Through our research, we discovered that the oldest edition was dated 1899, and it was 6 pages in length. The library did not have an actual printed copy of the code. The only thing they possessed was a photocopy with meeting notes from when it was adopted. Both the meeting notes and the code requirements are included in this reprinting.

As I read through this document, I was really surprised by some of the things I discovered. All of the participants in the conference were dedicated to the improvement of the industry, just as I have seen so often in teaching classes all over the country. We see that throughout our industry today as well. Mostly what I see when I read these pages is the shared knowledge and experience of dedicated professionals trying to make a difference.

One of the key things in the meeting notes section is the concern for fire alarm systems and fire sprinkler systems to work together. This is a real life issue which is really clarified in these pages. The interconnection of fire alarm systems and fire sprinkler systems in a building is essential for saving lives. If the fire sprinkler system actuates first, the affects of the fire are temporarily suppressed. Eventually though, the fire will overcome the sprinkler system, and then the fire alarm system will actuate and call the fire department. By the time the fire department would respond to such a fire, the building would be totally engulfed in fire with no hope of saving it. Interconnecting fire alarm and fire sprinkler systems dates to the very beginning of the code writing process.

I hope that you find this little book as interesting as I did. Further, I hope this gives everyone who reads it a new perspective on the codes. I hope we all can realize the true value of what the codes represent and appreciate all the hard work our industry has devoted to saving lives.

GENERAL RULES AND REQUIREMENTS FOR THE INSTALLAION OF WIRING AND APPARATUS FOR AUTOMATIC FIRE ALARMS, HATCH CLOSERS, SPRINKLER ALARMS, AND OTHER AUTOMATIC ALARM SYSTEMS AND THEIR MANUAL AUXILIARIES

1. Wires Inside Buildings.

(a) Must be equivalent in conductivity and tensile strength to No. 16 B. & S-copper wire.

(b) Must have an approved insulated covering. (Note.-In permanently damp places a solid rubber covering at least 3-64 inch in thickness, covered with a substantial braid, will be required. For open work in dry places, a filled braided covering at least 1-32 inch in thickness will be required. For moulding and tubing a rubber or filled braided covering at least 1-32 inch in thickness will be required. Samples of all cables should be submitted to the inspection department having jurisdiction before being installed.)

(c) Unless encased in approved tubing or thoroughly filled moulding must, except as hereinafter provided, be run in plain sight and supported entirely on non-combustible insulators placed not more than 8 feet apart and so arranged that the insulating covering of the conductors will come in contact with no other substance than the designed support, the protecting bushings and the connecting instruments.

(d) Must be protected from abrasion and from accidental contact with other conductors. (Note.-Substantial boxing or iron conduits must be used on side walls. Wires should be run over rather than under all pipes, and their coverings must be separated from contact with all pipes by a sold insulating substance creating a separation of at least ½ inch. Special attention must be paid to the mechanical execution of the work. Careful and neat running, taping of wires and attaching and securing of fittings is required.)

(e) Must be installed as far as practicable without joints. Where joints are necessary they must be mechanically and electrically secure and covered with an insulation equal to that of the conductors.

(f) Must in bay construction follow contour of ceiling and not be strung from beam to beam. In joisted construction they must run parallel with joists or else have a 4-inch wide wood backing strip with knobs or cleats fastened to the bottom of this strip.

(g) Must, where exposed to mechanical injury, between battery, transmitter, testing apparatus, annunciator, and gong (if any) on outside of risk, be enclosed in boxing, moulding or iron conduit.

(h) Must, when passing through iron, brick, stone or any damp partition, or through any floor, be protected by approved bushing. (Note.-Glass and porcelain are approved for bushings. Where, from the nature of the case, it is impossible to use glass or porcelain, approved flexible conduit-such as circular loom-may be used. Except where cables are used, wires of opposite polarity to be run through separate bushings.

(i) Where wires enter building, they must be bushed, have drip loops, and be kept at least 6 inches apart.

2. Wires Outside Buildings

(a) Must be equivalent in conductivity and tensile strength to No. 12 galvanized iron wire.

(b) Must have an approved insulation covering. (Note.-For aerial wires a good weather-proof covering consisting of a thoroughly saturated and filled braided covering at least 1-32 inch in thickness, will be approved. Samples of all cables used for underground construction should be submitted to the inspection department having jurisdiction.)

(c) Aerial wires must be provided near the point of entrance to the building with an approved heavy current protector.

(d) Aerial wires must be supported entirely on glass or porcelain petticoat insulators, at least every 150 fee, and run as far as possible over rather than under electric light or power wires.

(e) Wires of opposite polarity to be run on separate insulators and to be kept at least 12 inches apart.

3. Thermostats for Automatic Alarms

(a) Must be placed throughout premises, including inside of all closets, in basements, lofts, elevator wells and under stairs. Special instructions must be obtained relative to placing them under large shelves, decks, benches, tables, overhead storage racks and platforms, and inside small enclosures, such as drying and heating boxes, caul boxes, tenter and dry room enclosures, chutes and cupboards. No portion of the premises shall be accepted without the written consent of the inspection department having jurisdiction.

(b) Must never be farther from walls and partitions than one-half the distance between thermostats in the same direction.

(c) Under smooth ceiling must not be at a greater distance than 12 feet in either direction.

(d) Under open joisted ceilings they shall not be at a greater distance than two feet in either direction; but when bays are formed by timbers, 8 to 12 feet from centre to centre, supporting the joists, a line shall be placed as near as possible in the centre of the bay, the distance between thermostats at right angle to joists not being greater than 10 feet. Thermostats shall be placed at the bottom of joists not being greater than 10 feet. Thermostats shall be placed at the bottom of joists.

(e) Under mill ceilings there must be a line as near as possible in the centre of each bay. In 8-feet bays or over, thermostats to be not more than 10 feet apart. In bays under 8 feet, not over 12 feet apart. (Note.-Floors supported by timbers 5 feet or over from centre to centre will be considered "mill construction;" where timbers are less than 5 feet from centre to centre, "joist construction.")

[Note.-Section (c), (d) and (e) of Rule No.3 may be modified by insurance organizations having jurisdiction, for buildings not equipped with automatic sprinklers and for buildings equipped with automatic sprinklers if provided with a satisfactory alarm valve service.]

4. Thermostats for Hatch Closers Must Be Placed.

(a) At the top of the elevator well or hoistway equipped, and

(b) On the ceiling below each floor opening, in such numbers and so arranged in each case as may be determined by the inspection department having jurisdiction.

5. Manual Alarms.

Used as auxiliaries to automatic alarm systems must be located near all main and at each floor exit, also a hand switch manual alarm near test box for testing purposes.

6. Batteries.

(a) Must be located in a cool, dry place as near as possible to annunciator, transmitter and testing apparatus.

(b) Must not be subjected to excessive changes in temperature.

(c) Must be enclosed to prevent mechanical injury: but be easily accessible for inspection.

(d) Dry batteries will not be approved.

7. Annunciator or Indicator.

(a) Must be located on outside of all risks equipped, in an accessible place where it will be readily seen by firemen responding to an alarm

(b) Must have an index for each floor, and where floors are subdivided by fire walls for each section of floor.

(c) Must not be installed where it will be subjected to severe jarring.

(d) Must be so arranged that indexes can be easily re-set by hand.

8. Automatic Alarm Systems Operating Without Central Stations.

(a) When on open circuit, system must be so arranged that one break will not disable fire alarm.

(b) When on closed circuit, system must be so arranged that break will give an immediate and continuous alarm. This alarm must be distinct from fire alarm.

(c) When part of outside closed circuit, must not be less in size than No. 16 B. & S. and have an approved insulation, be supported entirely on porcelain knobs or cleats, independent of all inside circuit wires or cables, and where subject to mechanical injury, be protected by mechanical boxing, leaving an air space around wires.

(d) Must nominally test free from all grounds.

(e) Wires of the outside closed circuit to be kept at least 2 inches apart.

OUTSIDE WIRES

(a) When on open circuit, system must be so arranged that a single a break outside building will not disable more than one outside connection.

(b) When on closed circuit, system must be so arranged that a break will give an immediate and continuous alarm. This alarm must be distinct from fire alarm. System must be so arranged that on notification by this alarm, a ground may be thrown on at principal outside connection and system then be in working order.

(c) When on closed circuit system with large number of risks with common outside connection, must be arranged on the loop system with not more than 12 risks on any one loop.

OUTSIDE CONNECTIONS

Must have two outside connections from every risk equipped. These connections should be chosen from the following, choice being made in the order given:

First: Fire department house within 2,500 feet, having permanent men and horses stationed therein. (Note-In certain large cities, the above connection alone will be required.)
Second: Fire department house within 2,500 feet, having "bunkers" and horses at night.
Third: House of engineer or fireman of risk when same is within 1,200 feet.
Fourth: House of owner or superintendent of risk when same is within 1,200 feet.
Fifth: House of chief engineer or foreman of local fire department when either is within 1,200 feet.

When it is impossible to obtain any of the above, special instruction shall be obtained from the inspection department having jurisdiction.

Connection to city or town fire alarm box is not allowable.

GONGS

(a) Must be either vibrating bells or of the electro-mechanical type.

(b) When vibrating bells are used, all bells must be of the regular vibration pattern (not single stroke), and the system must be so arranged that the failure of any one bell to vibrate can in no way interfere with the proper giving of alarm at other points. When additional bells, not called for by "rules" are installed, they may be of the single stroke pattern.

(c) A not less than 6" weather-proof gong shall be located on the outside of each risk equipped, placed as near as possible to (preferable "over") annunciator.

(d) A not less than 6" gong shall be placed at each outside connection.

(e) Where several risks run to a common outside connection with outside wiring on open circuit, there must be a separate indicating vibrating bell for each risk, the various circuits being kept entirely independent of each other.

(f) Where several risks run to a common outside connection with outside wiring on a closed circuit with electro-mechanical gong striking numbers, the gong shall have an annunciator showing numbers, a tell-tale to show how far gong is run down, and when it is desired to have some arrangement for cutting gong out of circuit, an indicating switch showing plainly whether gong is in or out of circuit.

TRANSMITTERS

(a) Must be enclosed in a dust-proof case and securely locked: clock-work to be wound from outside of case. Must be located near testing apparatus.

RELAYS

(a) Must be located in a dust-proof case.

(b) Must have a spring knife-edge contact point in addition to the ordinary relay contact.

(c) Where more than one relay is needed, independent relays must be used.

TESTING APPARATUS

(a) When all wires of system are not under constant battery test, there shall be a testing apparatus located inside the risk as near as possible to annunciator. Entire test to be made daily, by operation of mechanism which, after test is completed, shall automatically leave system in normal condition, or else give a continuous trouble alarm.

(b) Shall record on dials continuity of all inside and outside open circuits, and shall ring all open circuit bells, a proper record not being obtained when any of these are out of order: shall also throw indexes of annunciator. Weakening of batteries shall prevent the recording on dials before it has progressed sufficiently to impair fire alarm.

(c) Where outside closed circuit system with transmitter and electro-mechanical gongs are used, there must be a test of transmitter, outside circuit and gongs at least once a week. This test shall be made by closing the manual alarm switch at risk, and a record of test shall be kept at fire department house. There shall be a system of ground detectors at fire department house which may be used to determine whether the outside closed circuit system is grounded.

Additional Rules Relating to Board Supervision

[Note.-All thermostat systems installed must have received the written approval of the board having jurisdiction.]
No changes in approved apparatus or system shall be made without the written approval of said board.
Extension of installation in any risk, due to changes in construction, must receive the inspection and approval of said board.
Thermostats set to operate above 155 degrees, test being made with thermostat immersed in water, will be considered high test thermostats.

COMMITTEE MEETING NOTES

Mr. Cabot- *For the Committee on Thermo-Electric Fire Alarms I have a very short report to make. So far as I can learn, the rules which were recommended at the last meeting by this Association have only been adopted for use in the Insurance Association of Providence, and in the New England Insurance Exchange. I am informed by the Exchange inspector that about twenty-five thousand thermostats, located in seventy to seventy-five plants have been installed under these rules; and that they have had no difficulty in getting absolute compliance with the rules in this territory; and that while the increase in cost is, of course, appreciable it is not sufficiently serious to prevent the installation of this standard system; and the results are very far superior to anything obtained under the old rules, although the old rules were the result of a great deal of thought and care on the part of those interested. I believe we may say we have had the new rules tried in a fair field, and that all the objections raised at the meeting at Chicago have failed, unless the cost is to be considered.*

Mr. Hexamer*- If my recollection serves me correctly, the important point in the debate at Chicago was the spacing. I believe the matter was referred back to the Committee.*

Mr. Anderson*- We have, in the city of New York, something over two thousand buildings equipped with automatic fire alarms, while not more than two hundred and fifty are equipped with sprinklers. I think the spacing provided for in these proposed rules adds materially to the cost, and for that reason I should be willing to make some modifications. I think we should adopt a rule that the thermostats should not be more than ten feet from the walls and in other directions not more than twenty feet apart. I would move that the spacing be ordered in that way.*

Mr. Hexamer*- I agree with Mr. Anderson in regard to the spacing, but at the same time, I would like to bring out all the points. There are different classes of thermostats, and the spacing for one class might not do for another. I believe there are sensitive thermostats which will go quicker by a direct heat wave than others will. Two will fuse at the same point in water, but will fuse differently when exposed to direct heat. I have seen tests made of sprinklers, and thermostats, both set for 165 degrees, both opening at the same point in hot water, where the thermostat opened by heat, when in position, in one quarter of the time that it took the sprinkler to open. I recollect a test in Philadelphia where three rows of sprinklers were properly spaced, making in all twelve sprinklers, and six thermostats. One sprinkler was directly over the point where the fire was generated. A fire was started and the six thermostats were opened by the heat wave before the sprinklers were opened, although these were directly over the fire. The result was extraordinary. It shows conclusively to my mind that the close spacing necessary for sprinklers is not necessary for the sensitive thermostat.*

A Member*- I was present at a meeting between the representatives of the Chicago Underwriters' Association, and the thermostat men, in which the latter advanced no objection in requiring future installations to be of a higher grade. We have had two fires in the last two months in which the thermostats were placed very much nearer to the fire than the sprinklers, but in each locality there was an open elevator shaft. The sprinkler system at a greater actual distance was opened first and the thermostats cooled and failed to operate at all.*

Mr. Goddard*- As I understand the present rules parties may modify the distance between the thermostats as required by the rules. In our territory I presume nine-tenths of our thermostats are in sprinkled risks. We insist upon the spaces given in the rules and find no difficulty in enforcing the rules. The thermostat companies and the insured make no objection. It has not made so much of a change with us as it has, perhaps, in some other places, but we cannot find, on the part of the insured,*

any serious objection. If we should approve of thermostats with twenty feet spacing and a man thereafter decides to equip with sprinklers, he has go to re-equip because the thermostat system, which was good in an un-sprinkled risk, is not good in a sprinkled risk. A man would rather put in his equipment correctly at first, and it would not do any harm to have the thermostats near to each other, and you are working no hardship except a few dollars and cents. A man generally gets twenty-five or thirty per cent on his investment when he puts in his equipment, and we call that, in any business, a pretty good investment. If we require a change in the equipment it is perfectly reasonable that a man should say to us, "Why didn't you tell me this to begin with?" In New York they are assuming tremendous risks. Even if the New York Board is ready to modify that distance, I do not see any hardship to anybody in leaving the rules as they stand. I don't think we ought to accept of twenty-foot spacing. Many of the heavy losses have been under the old spacing where the sprinkler has gone off first and cooled the thermostat, and we have had a heavy water damage. I think the few dollars it is going to cost to increase the number of thermostats will be paid off by thereby avoiding one heavy water damage where the sprinkler would go off and cool the thermostat. There is no sprinkler that I know of that will go off at less than 160 degrees. I do not think there is any more sensitive thermostat than the Bourdon spring, but we have not found that twenty-foot spacing in a sprinkler risk gave adequate protection.

***The Secretary**- I would like to call attention again to the fact that this Association has no authority in the way of promulgating regulations and rules. If we come together and decide upon a set of thermostat regulations, we simply declare that they are such rules as appear to us to be the best regulations which can be adopted through out the country, governing that subject. If we adopt these rules as printed in the transactions of the last annual meeting, we leave it to the discretion of the underwriters having jurisdiction for buildings where there are no automatic sprinklers. If we accept these rules, they will go forth as our best judgment for thermostat regulations, and it seems to me too bad to let down the standard at all. We are not theorizing on the subject of thermostats. We have come to know that they have got to be placed about as close as sprinklers; and if they are spaced that closely we are even then taking chances as to whether the fire which may occur will operate the thermostats before the sprinklers. We have had fires occur where the thermostat was found to be O.K., but where the heat instead of going directly to the thermostat went three feet off to one side and operated the sprinkler first. We don't want to base our regulations on the best that thermostats can do, but we must consider the worst they can do. We must consider the cases where the thermostats directly a over the fire were not operated, while the sprinklers some distance away, were operated, which is an occasional mishap. These rules, exactly as printed in this book, have been in force in New England for a year or more. We have had a great deal to do with the thermostat companies. We find the rules pleasantly received by them. They come and express their gratification at having definite rules on which they can figure, one against the other. We have had no complaint on account of increased expense. If it has increased the cost of installation we have had no notice of it. It seems to me the influence which should govern us is the thermostat failures which have occurred from defective spacing. We have proof of that in many cases where we have paid heavy water damages.*

***Mr. Wilmerding**- In Philadelphia we have not found such spacing necessary, and I agree with Mr. Hexamer it largely depends upon the thermostat. If, in New England the thermostats require such spacing would it not be well for them to adopt such a spacing, but not ask us and New York City to adopt it.*

***Mr. Cabot**- I should like to ask the Committee whether they believe any thermostat is more sensitive and will work any quicker under ordinary circumstances than the Bourdon spring. Mr. Hexamer intimated, in speaking of thermostats, that 150 degrees was the lowest point at which they can operate. We can show you several thousand thermostats which will operate at 135 degrees every*

time. We have met this experience in Boston. We have had four fires where the automatic alarm had failed to work although the spacing was less than that which Mr. Anderson has suggested, and the last fire occurred within three weeks. The thermostat was one foot nearer to a gasoline fire which comes as near duplicating the test Mr. Hexamer spoke of as I can conceive. The fire was caused by a careless boy setting fire to a heap of sawdust saturated with gasoline. The thermostat was one foot nearer the fire than the sprinkler was, but we never got the alarm.

***Mr. Hexamer**- The temperature is not the whole point in regard to the sensitiveness of the thermostat. The time is the measure of the sensitiveness. I stated that in our test we were able to melt the sprinkler and the thermostat with exactly the same temperature in hot waster and in exactly the same time; but the thermostat acted much quicker than the sprinkler in the hot oven test. In addition to its sensitiveness it acts quicker. The particular thermostat I had in mind is so arranged that it is insulated. The heat is confined to the particular point where it is wanted and not carried off by the body of the metal.*

***Mr. Goddard**- In the Bourdon device you have the vaporization and explosion of an extremely volatile fluid like ether. You can set it so low that breathing upon it will operate it. I will guarantee there is not a thermostat which, set at the same temperature as the Bourdon spring, will operate under any conditions as quickly as the Bourdon spring. That, you can prove by experiment in the ordinary heat you get from a common fire. We must consider, however, the liability to draughts which we have with large area risks. We are not protecting little rooms like this, but our risks cover large areas. The Bourdon spring thermostat will be acknowledged by any one familiar with the devices, as being, probably, the most sensitive thermostat that there is on the market, and as Mr. Cabot says, if they fail it is on account of the spacing. Our spacing here has never been over sixteen feet and we have had four failures within a comparatively recent time. We have had failures with extremely sensitive thermostats in sprinkler risks caused by bad spacing. If we give Boards the privilege of extending the spacing in unsprinkled risks I don't see what anybody can want more. If the opinion of the Association agrees with the gentlemen from New York and Philadelphia we had better adopt it. We want to make our rules so good that the Association will take them because they are so good.*

***The Secretary**- The point made by Mr. Hexamer has not, in this discussion, been acknowledged by any of the New England members. We also realize the difference between the operating point of quick and slow tests of two thermostats. They would go at the time in hot liquid but would go at different times in hot air. I want to say further, that the more we have given this subject consideration here about, the more convinced we have become that with this best spacing we are not going to prevent the occasional operation of the sprinklers ahead of the thermostats. The question came up some time ago as to whether the thermostats were not being thought too much of. That fact being in mind there has been a tendency to install sprinkler-alarm valves in addition to thermostats, due to the fact that we cannot, in every case, catch the fire by the thermostats, and if they fail we have the water damage. When the valve is installed in addition to the thermostat we may allow more lenient spacing's, but I think we had better get both together if we can.*

***Mr. Hexamer**- I should like to ask whether these cases that have been spoken of have been proved to be due to the failure of the thermostat or the electric system.*

***Mr. Cabot**- In each case we have gone through a regular course of procedure, taken out the thermostat and tested it, and put in another and tested the system, and in every case the system has worked well except; in the fire.*

***Mr. Robinson-** The few cases I have noted were due to the failure of the thermostat.*

The Secretary*- I would suggest the following: "Should underwriters consider it desirable, Section C, D, and E, of Rule 3 may be modified for buildings not equipped with automatic sprinklers; and for buildings equipped with automatic sprinklers, if provided with a satisfactory alarm valve service."*

The amendment offered by the Secretary was adopted; and on motion of Mr. Hexamer the report of the committee, as amended, was likewise adopted, reading as follows:

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