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FIRE PROTECTION HISTORY-PART 210: 1900 (SPRINKLER PROTECTION STATE-OF-THE-ART, CIRCA 1900)

By Richard Schulte

The fourth Annual Meeting of the National Fire Protection Association was held in late June 1900 in New York. Among the subjects discussed at this meeting was the technology of sprinkler protection, sprinkler system installations and sprinkler system water supplies (as it was known and understood in 1900). The following is a transcript of this discussion:

"*Wednesday, June 27, 1900.*

President Crosby in the chair.

The first business was the presentation of the report of the Committee on Tests and Accepted Facts by Mr. Blauvelt, chairman.

TESTS AND ACCEPTED FACTS.

Mr. Blauvelt. *On behalf of the Committee on Tests and Accepted Facts I may state that most of the subject matter, which will be open for considerable discussion, was prepared and circulated by mail among the membership some time ago, and we have received replies from a great majority of those to whom it was sent.*

I wish to state that if any one was left out, associate or active member, it was through inadvertence. I was not in Chicago at the time the mail was sent out, but I gave the list of members to our people there, and I think every one received a communication; if any one was omitted it was unintentional.

As you are well aware, and as the preface to the report announces, this whole thing was designed as a sort of catch-basket in which to put our expressions to see if we can arrive at some consensus of opinion with reference to the adjustment of rates and the practical working tests of apparatus. If there is no objection I will ask the Secretary to read the sections one by one, except that when we come to pressure tanks it would seem to me unneccessary to deal with each section under that head separately, and they all might be read and passed upon as a whole, unless some member wished to discuss some particular sections.

The President. If there is no objection we will proceed in that manner.

TESTS AND ACCEPTED FACTS.

Preface.

Designed as a current memorandum of facts and practices relating to fire protection in matters too miscellaneous for formal rules, yet upon which a majority view of the members of the National Fire Protection Association is deemed as contributing to harmony and good practice.

Automatic Sprinklers.

Limit of Reasonable Ordinary Service.

Ordinary sprinkler systems, as designed, do not provide for the opening of over 25 to 50 sprinklers at one time. The few fires opening more than 50 sprinklers are due to extraordinary conditions which should have been realized in advance, and with which a sprinkler system equipped according to ordinary rules should not necessarily be expected to cope. Where it is obvious that more than 50 sprinklers would probably open, inspectors should (unless the water supply is exceptionally adequate) report discouraging a full credit for sprinklers.

Mr. Cabot. *I do not wish to be unreasonable about this, but I do think that, at least for my section of the country, the middle part of that paragraph is unfair–"and with which a sprinkler system equipped according to ordinary rules should not necessarily be expected to cope." I don't think those words belong in there, so far as New England is concerned. I think we do expect our sprinkler systems to be ready to deliver water from 50 heads or 60 heads or 100 heads, if they are in a building on one floor, and I trust that this meeting will not go on record as saying that throughout this country the sprinkler system is not expected to take care of a 50-head fire.*

Mr. Fiske. *I would like to ask the Committee a question, the reply to which will perhaps apply to some other matters in this report, that is, of what particular value is such a statement as this? What is to be gained by the community at large or by this organization by any such printed statement as this? If there isn't some worthy reason for making such a statement, and going on record with such a statement, why should we do it? I would like the Committee's ideas on that.*

Mr. Blauvelt. *I will state that in any branch of engineering there is always some limit fixed. If we build a locomotive we don't expect it to pull over 50 cars, or 100 cars, or 200 cars, or whatever the number may be. There is considerable talk among underwriters, among junior inspectors, as if they looked upon a sprinkler system as a tree which should shed water from the ends of all its branches, and as if a sprinkler system were designed to inundate buildings indefinitely. I think it is very well for us to make some expression which will go to correct that idea.*

We know very well that with our standard sprinkler equipment, a tank at standard elevation and a standard equipment of piping, we can't expect to operate more than from 25 to 50 sprinklers; and we also know from our records that fires which open more than 25 to 50 sprinklers are due to extraordinary conditions which should have been realized in advance. The object of making such an expression is to give an indication of what the power of a sprinkler system, generally speaking, is intended to be. We have already, in our sprinkler rules, stated that sprinkler equipments are designed primarily to extinguish incipient fires. I think it would be well to make some expression–and I may say that this expression has not been objected to in correspondence, and, therefore, judging from the correspondence which has been returned, the members seemed to think it was very well to make some such expression– of our opinion that sprinkler systems are not only designed for incipient fires, but that in the broad sense they are not intended to inundate buildings indefinitely; in other words, that we are not to expect practical impossibilities.

Mr. Hexamer. *Mr. President, in reply to Mr. Blauvelt's statement that 25 or 50 sprinklers is a maximum, I would like to call attention to the fact that the New York rules and the Philadelphia rules provide for a tank capacity. Now, we have been able to live up to that rule in Philadelphia without trouble, and the rule is to the effect that 50 per cent of the sprinklers on any one floor shall be supplied for 15 minutes at the rate of 15 gallons per minute, and we figure out the tank capacities according to that rule. I think in that case we could get water enough for 100 sprinklers in any one room for 15 minutes' use or less.*

The Secretary informs me that there is no rule as to tank capacity in the National sprinkler rules; but I can see no reason why the statement should be made, as suggested by Mr. Cabot and Mr. Fiske, that a sprinkler system "equipped according to ordinary rules should not necessarily be expected to cope." I fully agree with Mr. Cabot, and I think that the clause might be understood by the layman to mean that we don't think as much of sprinklers as we say we do.

Mr. Trowbridge. *It seems to me this first section where it says "where it is obvious that more than 50 sprinklers would probably open, inspectors should . . . . report discouraging a full credit for sprinklers," is a very sweeping statement, because our records on cotton mills show that there isn't a cotton mill in the country of any size at all but what may have 250 sprinklers on a floor.*

Mr. Blauvelt. *You might quote the report as it reads. It says "unless the water supply is exceptionally adequate."*

Mr. Fiske. *Following up the remark of the last speaker concerning this last clause of the paragraph, I cannot see any reason why this organization should ask inspectors to discourage the full credit for sprinklers, and it doesn't yet appear to me what that last sentence is in there for, or why this organization should go on record in any such manner. It is a question for the inspector or the individual or the company to decide, whether a sprinkler system is of sufficient value or not.*

Mr. Cabot. *I think this whole discussion comes principally on the difficulty, which the remarks thus far have made quite evident to me, as to the definition of an adequate water supply. Now, Mr. Blauvelt, if I understand him, would consider that a first-rate tank supply was an adequate supply; yet I do not think I am overstating the case when I say that at least 90 per cent of the New England risks would not be considered as sprinkled with merely a tank supply. There is the rock which we are splitting on, so far as I can see. If Mr. Blauvelt is prepared to accept a tank as an adequate supply, I quite agree with him as to the rest of the paragraph, but I do not think that we are prepared, and I do not think our rules lead us to the point where we would today accept a tank supply, if any other supply is possible, as an adequate supply.*

Mr. Blauvelt. *Mr. Cabot has touched on just what is intended to be recognized. In our Secretary's report, and also in all the figures which have been compiled which I know of, we find that 50 sprinklers put out over 90 per cent of the fires of record.*

Mr. Cabot. *You mean 50 or less.*

Mr. Blauvelt. *Fifty sprinklers or less put out more than 90 per cent of the fires of record. Now, I think we are all agreed that where more than 50 sprinklers open, that is, in the remaining 10 per cent of fires of record, the large number of sprinklers opening is due to some special conditions; and my sense of the usefulness of an expression of this kind is in dealing with an assured who has a poor sprinkler equipment and a very exaggerated idea of its extinguishing power. That is, he may have a low-pressure city water supply, no better than his tank, the tank at a low elevation, and the conditions such that the inspectors in the field do not think he is justified in expecting his sprinkler equipment to succeed, with a very large area and very inflammable stock–such conditions as Mr. Cabot has just referred to.*

Now, it seems to me an expression of this kind is a useful support to the inspector. He can simply turn to this paragraph, which does not limit in any way the area of the sprinkler system, and he can say to such a man: "Your city water supply is not exceptionally adequate, and it is obvious to my mind that more than 50 sprinklers would open, and I feel like putting some discount on your protection." It seems to me it gives the inspector some support in making precisely the kind of criticism which Mr. Cabot has just made with reference to these tank supply risks, or risks which are similarly situated, and it takes away from the assured some of the ability which he now has to claim that his fire equipment is as good as any.

Mr. Hexamer. *Mr. President, I am quite sure that a number of associations have the same rules in relation to sprinkler allowances that we have; that is, they grade the allowance by percentage according to the water supply, a smaller percentage for one supply than for a tank and possibly street connections. We even go so far as to reduce the percentage of allowance for sprinklers where floor openings exist. And I would like to call Mr. Blauvelt's attention to the fact that in some risks, like large department stores, for instance, it is more than probable that more than 50 heads will open, even at a small fire.*

Mr. Blauvelt. *But you do there what this expression in the report implies, you do provide an exceptionally adequate water supply for those exceptional conditions.*

Mr. Hexamer. *Certainly.*

Mr. Blauvelt. *And it seems to me that a clause like this will be a support to the inspector in talking to the assured.*

Mr. Hexamer. *Then I don't like the statement "with which a sprinkler system e-quipped according to ordinary rules should not necessarily be expected to cope." "Ordinary rules"–what is the understanding of ordinary rules? A tank supply?*

Mr. Blauvelt. *Well, you know our ordinary rules permit a tank as the sole automatic source of supply.*

Mr. Hexamer. *Certainly.*

Mr. Blauvelt. *And you know very well we have got lots of risks which are equipped strictly according to the rules, and no more, in which we can't expect to put out a fire which is going to open more than 50 sprinklers.*

Mr. Hexamer. *It also seems to me that the last clause, "Where it is obvious that more than 50 sprinklers would probably open," etc., is taken care of in most associations by their rules in regard to the water supply; and I don't see why we should put this on record as the opinion of this Association, especially as it is a question of allowance in rate. Full credit is not given where the water supply is inadequate.*

Mr. Blauvelt. *Exactly.*

Mr. Hexamer. *Unless it is exceptionally adequate.*

Mr. Blauvelt. *And we are simply stating here that the men are justified in not doing it.*

Mr. Hexamer. *It doesn't read exactly that way. I would like to ask the Chair whether it is in order to make amendments?*

The President. *It is.*

Mr. Hexamer. *Then I will move to strike out everything beginning with the word "Where," in the third from the last line–strike out the entire clause. Adopted.*

Mr. Hexamer. *There seems to be some doubt about this clause: "The few fires opening more than 50 sprinklers are due to extraordinary conditions," etc. There seems to be some question as to the latter part of that clause, "should not necessarily be expected to cope."*

Mr. Cabot. *I would like to amend that clause by striking out the words, "equipped according to ordinary rules," and substituting therefor the words, "equipped with tanks as the only automatic supply."*

Mr. Blauvelt. *Won't you say primary supply?*

Mr. Cabot. *No, I don't think so; because you might have a pressure tank and a very good 90-pound water supply, which is what we have in Boston. "Equipped with tanks as the only automatic supply"–that, I think, is what Mr. Blauvelt wants to hit.*

Mr. Blauvelt. *That is not quite what I wanted. I would explain to Mr. Cabot that the intent of this is a little broader than that. There are a good many risks having extraordinary conditions. Now, what constitutes an extraordinary condition is something very variable. There are some plants having a very excellent water supply, but there are large tanks of benzine paint in them; other risks have a very excellent water supply, but they have large quantities of loose cotton, and open windows in the summer time; there are risks which have extraordinary drafts, and various other extraordinary conditions, large quantities of greased hemp, and so on. Then other*

risks will have an ordinary amount of adverse conditions, such as you refer to, and have a gravity tank as the sole source of supply. Now, the practical probability of putting out a fire in any one of these cases would be about equally poor--where you have very difficult conditions, very dangerous combustibles, to deal with; you are dealing with ordinary water supplies which are extensive and as well arranged as it is reasonable to direct as a matter of general rule, and you still, when you have extraordinary conditions, will have the extreme probability of a very large number of sprinklers opening. But the owners of these plants do not realize that. A man who has a sprinkler equipment in thinks his sprinkler equipment is fit for anything. He paid for it, and he understands it can do anything on earth. Now, this whole section is intended to assist the inspector in telling such a man that there is a limit of reasonable ordinary service to a sprinkler equipment, and then he can point out to him the extraordinary adverse conditions of his risk and make a demand on him for an exceptionally adequate water supply to meet the extraordinary conditions, or tell him he can't make as favorable a report on his equipment under the existing conditions as he could on an ordinary equipment designed for ordinary conditions.

The Secretary. *Mr. President, I think a method of settling this which may be satisfactory to Mr. Blauvelt, inasmuch as it will contain such a statement as he wishes, would be to let the paragraph read as follows: The first sentence as it is, " Ordinary sprinkler systems, as designed, do not provide for the opening of over 25 to 50 sprinklers at one time." And then: "The few fires opening more than 50 sprinklers are due to extraordinary conditions which should be realized in advance," and stop there, leaving the rest of it out, changing the words "have been " to "be." That simply calls attention to the particular fact which he wants to make prominent.*

Mr. Cabot. *I accept that amendment.*

Mr. Anderson. *Mr. President, why wouldn't it be better to strike the whole thing out? I think everybody who has been doing this business knows it depends upon the size of the equipment and the size of the room and the water supply. I had rather see the whole section stricken out than to have it altered in this way. It is an instruction, really, to our inspectors, and every local board can give its instructions to the inspectors; and I think they always consider, when they look at a risk, the area, the number of heads in the room, and the magnitude of the fire that is likely to occur, and make their requests in regard to the water supply accordingly.*

Mr. Cabot's amendment, as modified by the amendment suggested by the Secretary, was adopted.

Mr. Anderson. *I am not willing to vote to approve the paragraph as amended. I think we must all realize that in such risks as Wanamaker's, for instance, more than 50 heads are likely to open at one time, and I am not willing to go on record as saying that we expect to have only 50 heads open when we may expect to have 100 open.*

Mr. Hexamer. *We do not say we do not expect to have only 50 opening. We say that fires opening more than 50 heads are due to extraordinary conditions which are realized in advance.*

Mr. Anderson. *I think we do realize it, and why should we put that in at all?*

The Secretary. *If we should add the words "and provided for," after the word "realize," so it will read, "which should be realized and provided for in advance," would that meet your objection?*

Mr. Anderson. *That I wouldn't object to.*

Mr. Blauvelt. *I would state that if the amendment proposed by Mr. Cabot is passed, with the addition of the words "and provided for," that would fill the intent of this paragraph, which is to support the inspector who goes to a risk where these things have not been provided for.*

The amendment to insert the words "and provided for" was adopted, and the paragraph as amended was approved.

MINIMUM PRESSURE AT SPRINKLER.

The minimum pressure under which any sprinkler can operate fairly is 2[-]½ pounds. This pressure to be taken at the sprinkler fitting and when water is flowing from the sprinkler. This pressure can only be expected to deal with a moderate amount of combustible.

Mr. Hexamer. *I would like to ask the Secretary if I correctly understood from his report yesterday on operation of sprinklers that the average pressure at which sprinklers have operated in all the fires reported was 54 pounds.*

The Secretary. *Yes, sir.*

Mr. Hexamer. *That appears to me to be a very large figure, and of course it must be taken for granted that quite a large number of heads will operate at as low as eight or ten pounds' pressure at an extreme end.*

The Secretary. *Yes; that was the pressure on the sprinkler from the automatic supply before the opening of the heads, Mr. Hexamer. That 54 pounds is the pressure on the system before the opening of the heads.*

Mr. Hexamer. *The static pressure?*

The Secretary. *The static pressure. After the operation of a number of heads it drops down materially, particularly on the branches and small lines. This two and a half pounds, I believe, is a pressure furnishing eight gallons a minute, is it not, Mr. Blauvelt?*

Mr. BLauvelt. *I have forgotten now.*

The Secretary. *I think that is it, eight gallons a minute.*

Mr. Fiske. *I should like to ask the same question in regard to this paragraph as I did to the first, and that is, of what value is this statement?*

Mr. Blauvelt. *In reply I would say it is of the same value as the preceding section. Where an inspector visits a risk having a poor water supply and very long lines of sprinklers, and it is claimed that the equipment is all right, that it has been passed, that it is up to standard, as good as anybody's, and there is all that kind of talk, if he can show the assured at once he has to have a certain pressure to begin with to operate his equipment, and then follow that down and tell him if he don't believe it he can take a line of sprinklers and put it down in the yard and put a gauge on it, he will get him disposed of pretty quickly. It will save labor and save discussion to have some of these main facts that we are all acquainted with put on paper.*

Mr. Fiske. *I can't see how that proves anything at all to any one.*

Mr. Blauvelt. *It doesn't prove anything, but it is simply that we recite and accept the fact, and people will very frequently take that in lieu of proof. That is just the idea. Travelling around the country you can't stop to prove all these matters, and the more quickly you convince the assured the better.*

Mr. Fiske. *If he will agree at once that he hasn't more than two and a half pounds on every sprinkler in the risk there would be no difficulty about it. The probability is he has at least eight or ten pounds. When you endeavor to tell him that if a number of the sprinklers are opened up there will be some of them which won't have more than two and a half pounds, he says: "How do you know it?" Well; you don't know it. You are pretty sure they won't, but you can't make it any more definite to him than that. But suppose you could; I hate to see a thing like this go out, because it is going to make the men that you go among feel that two and a half pounds is a satisfactory pressure; that is, that we would accept such a pressure. I don't see why it wouldn't*

tend to convey such an idea, that the sprinkler can operate fairly under two and a half pounds pressure. Of course we know that if we carry out our rule we are not going to get inside of that two and a half pounds pressure on a long line, and I don't like to see such a statement as this going out, because it may give a wrong impression.

The Secretary. *It has been my pleasure to be a member with Mr. Blauvelt on this Committee on Tests and Accepted Facts, and I will start off by giving him the credit of practically all the work of the Committee. Covering as the report does such a large range of topics, there have been matters in which I could not agree entirely with him, and this is one of them. It seems to me this statement as to two and a half pounds pressure is a dangerous one to make, if it is to go before the assured at all; and that brings us back to the point raised by Mr. Cabot and Mr. Fiske some time ago as to just what is the object of this list of tests and accepted facts. If it is merely for discussion among our members here, to be educational to that extent, to draw out our ideas, and perhaps to get a majority opinion here in this meeting for the guidance of our inspection force, it is all very well and a good thing; but if it is to go before the public, I think it would be–and I take this one point as an illustration–a very bad thing to issue a pamphlet containing an expression of our opinion that two and a half pounds is the minimum serviceable pressure, because I am afraid it will not be understood that that is the pressure with the water flowing, and that in order to get that as the minimum pressure throughout long lines of small pipes, with a large number of heads open, there must be a pressure of perhaps 60 pounds maintained at the riser. If it is Mr. Blauvelts idea that this is to be sent out to the assured in any way, I would like to raise an objection to this paragraph, at least.*

Mr. Blauvelt. *I don't think there is any intention of giving it out to the assured; but I think that in talking with the assured you must have some starting-point, and you can work from that back to the water supply.*

Mr. Hexamer. *It seems to me it will cover part of the objection raised by the Secretary if a little change is made in the first line, and meet, perhaps, the rest of the objection by calling attention to the second sentence there as to where the pressure shall be taken. I move this amendment: "The minimum pressure to operate a sprinkler fairly is two and a half pounds." Then we go on to say that the pressure shall be taken when the water is flowing.*

Mr. Wilmerding. *I agree with preceding speakers, that there seems to be no necessity whatever for this item. We have our sprinkler rules and regulations, and I fear this is interfering with those. I should be very sorry to have it adopted.*

Mr. Hexamer. *At the same time, Mr. President, this is an expression of our ideas and of accepted facts, and while I would deprecate the use of any statement of this kind with the assured, or by the assured, I think it is perfectly proper to put it among our accepted facts that a sprinkler can only operate fairly at a certain pressure. I think, however, it would be well if the section began with a reference to the value of sprinklers as a fire extinguisher, and then came to the question of the pressure. It might read in this way: "The value of automatic sprinklers for extinguishing fires depends on the pressure at which they operate"; and then follow with the statement that "the minimum pressure under which any sprinkler can operate fairly is two and a half pounds." I think if it can be qualified in that way most of the objections would be removed.*

Mr. Blauvelt. *That would be agreeable.*

The Secretary. *And I would like to add to that suggestion to continue by explaining that in order to hold up two and a half pounds at the end of a line, with the other heads open on that line, it would necessitate a much higher pressure at the riser.*

Mr. Robinson. *I should like to suggest that the word "greatly" be put in there– "depends greatly upon the pressure."*

Mr. Hexamer. *Yes, of course.*

Mr. Wensley. *Let me suggest that we go on to the next section, and a little later come back to this, when someone has prepared the amendment in proper form. I move to lay this section on the table. Adopted.*

WORKING MINIMUM PRESSURE ON PIPING.

A fire calling for the operation of sprinklers as near the reasonable limit of sprinkler service as hereinbefore defined– say 25 to 50 sprinklers–if it occurs near the ends of sprinkler lines, will require fully 10 to 20 pounds pressure to overcome friction within the pipes and also furnish from 2[-]½ to 5 pounds pressure for the sprinklers at ends of lines most remote from the water supply.

Mr. Robinson. *I should like to ask if the Committee is prepared to say that from 10 to 20 pounds will do that under all conditions of service on a long line.*

Mr. Blauvelt. *It will require fully that.*

Mr. Robinson. *You give the impression 20 pounds would be the maximum, and I think Mr. Crosby said a little while ago it might require 60 pounds to do it if the line was long enough.*

The President. *If there is no objection or criticism to be made, we will pass to the next section.*

PAINTED OR SIMILARLY COATED HEADS NOT TO BE TESTED.

Sprinklers which have been bronzed, painted, white-washed or otherwise wrongly coated shall not be given the benefit of test. Owners are expected to have them satisfactorily cleaned or replace them. Whitewash coating is inexcusable as sprinkler heads can be temporarily covered with paper while ceiling is being whitewashed.

Mr. Hexamer. *With regard to this matter, I will say that I have taken up the question of the deterioration of sprinklers, and it has been suggested to me by a chemist that possibly the painting of sprinkler heads with the new aluminum paint now on the market might prevent acid and other fume deterioration; and before putting this section entirely on the list of accepted facts, I should like to have an opportunity to investigate that proposition further.*

Mr. Blauvelt. *That may not be wrongly coating the head.*

Mr. Hexamer. *That is the question I want to get at.*

The Secretary. *This does not refer, Mr. Hexamer, to painting to prevent corrosion of the heads, but to the coating of the heads when the ceilings are being decorated, etc.*

Mr. Hexamer. *I understand that, but I want to prevent any possible misunderstanding.*

Mr. Blauvelt. *You would like to have it made more clear, Mr. Hexamer, that it refers to heads "bronzed, painted, whitewashed or otherwise wrongly coated," contrary to the intent of the underwriters,–something of that kind? The intention is that the assured shall not be at liberty to coat these sprinklers without the consent of the underwriters.*

Mr. Hexamer. *I have no objection to it as it stands; I simply wanted to call attention to that point.*

Mr. Cabot. *I should like to ask Mr. Blauvelt, through you, Mr. President, if he means that under certain conditions he would allow the assured to paint his heads.*

Mr. Blauvelt. *I will state, Mr. Cabot, that if I am fool enough to do that it would be a matter of my own administration, and something that the Association would be in no way responsible for under this paragraph.*

Mr. Cabot. *Exactly; but what I want to get at is what the Committee means by this language. They say "wrongly coated." Now, do they mean that they can be rightly coated with ordinary paint? Personally I am of the opinion that they can be, and I think I have tests which settle that, and what I want to get at is what the Committee mean. They say "or otherwise wrongly coated." Now, do they mean that if the assured comes to them and specifies what he is going to put on to the head, or comes to any one of us and produces a paint which we fairly believe will not injure the sensitiveness of the head, it is to be allowable to test them, or do they want to exclude all painting, whitewashing or bronzing, except such work as is referred to by Mr. Hexamer?*

Mr. Blauvelt. *I will state that the Committee had no desire to place any restriction on coating applied by consent of the underwriters, and it would be entirely agreeable to have that expression "wrongly coated " changed.*

Mr. Cabot. *Then wouldn't it be fair to amend by striking out "bronzed, painted, whitewashed or otherwise wrongly coated" and say "improperly coated"? Isn't that what Mr. Blauvelt means?*

Mr. Blauvelt. *I prefer to retain those expressions, because they are more specific in dealing with the assured; but if you object to the expression "wrongly coated "-*

Mr. Cabot. *What is "wrongly coated"? Is whitewashed wrongly coated, or bronzed wrongly coated, or not? That is what I want to get at. Apparently it is, and now we want to settle that thing one way or the other, it seems to me. What is the opinion of the Committee? They have studied the matter.*

Mr. Blauvelt. *I will state we have sections dealing with that later, and for the immediate present, if it should read "Sprinklers which have been bronzed, painted, whitewashed or otherwise coated without the consent of the underwriters shall not be subject to test," that will give all the latitude you desire, will it not?*

Mr. Cabot. *As I understand, that would exclude bronzing, painting, or whitewashing?*

The Secretary. *As a member of the Committee, answering Mr. Cabot, and following out Mr. Blauvelt's suggestion, I would suggest that the sentence be amended to read in this way: "Sprinklers which have been bronzed, painted, whitewashed, or otherwise coated, except by advice of the underwriters, shall not be given the benefit of test."*

Mr. Cabot. *I think that is all right.*

Mr. Robinson. *I don't know about that, Mr. President. I think perhaps an underwriter might advise people to coat sprinklers in an entirely wrong way if he didn't know what he was doing.*

The Secretary. *"Underwriters having jurisdiction "; that is the phrase.*

Mr. Robinson. *I don't know about that, either. There is a chance there for advice to coat sprinklers wrongly.*

Mr. Wensley. *I suggest this, after the word "coated," insert "except properly to protect them from corrosion."*

The Secretary. *We don't want to allow the assured any leeway in putting on any sort of preparation they desire to prevent corrosion. If the thing that is put on is all right, they may put it on after a head is corroded and cover it all up, and the next inspector who comes along can't tell whether it is a new head which has been coated or one that is green with corrosion. The assured should not be allowed to daub on paint or stick up their sprinklers with anything, except with the advice of the underwriters having jurisdiction. I think Mr. Robinson will consent to that.*

Mr. Robinson. *Yes.*

Mr. Anderson. *I should like to ask if in case some of the heads in a large establishment are coated through the ignorance of the contractor, and the owner comes and asks us to test those heads to see if they are right, can we refuse to do so? I think not. I think we had better strike out the whole paragraph.*

The Secretary. *It is not necessary to strike it all out to meet Mr. Anderson's objection, which simply refers to one part of it, where it says "shall not be given the benefit of test." You might change that and say " must be given a test."*

The President. *The Chair is a little in doubt as to what amendments have been offered here.*

The Secretary. *I offered an amendment that the word " wrongly" be stricken out, and that after the word "coated" the phrase "except by advice of the underwriters having jurisdiction" be inserted.*

Mr. Wilmerding. *I should like to have it explained again what the value of this particular section is, for I don't see any at all. It seems to me we are treading on very dangerous ground here without gaining anything by it.*

Mr. Wensley. *We are running across these conditions repeatedly, and the assured says that the sprinkler heads are all right, and they will even submit them to be tested. I think there is a good deal of force in what the Chairman of the Committee said a little while ago, that if we have this on record as showing the concensus of opinion of the insurance inspecting fraternity that the assured should not coat their heads, we are accomplishing all that can be asked.*

Mr. Cabot. *Following up what the last speaker has said, Mr. President, is not what we mean, not that we shall not test these heads, but that that thing ought not to be done. Now, is it reasonable for us, as a body of thinking men, to say we won't test a head because a man has put some paint on it? I have tested heads, and it hasn't been done once merely, but a good many times, which were just as good after a year's painting with a particular kind of paint, with a particular kind of bronze, as an absolutely new head. Now, I think we shall make fools of ourselves if we say we won't test them.*

The President. *Will the Secretary read the amendment again as he offered it?*

The Secretary. *I will offer the amendment in this form: "Sprinklers should not be bronzed, painted, whitewashed or otherwise coated except under instructions by the underwriters having jurisdiction."*

The President. *Do you strike out "shall not be given the benefit of test?"*

The Secretary. *Yes.*

The amendment was adopted, and the section as amended approved.

Mr. Hexamer. *Now, to come back to the minimum pressure at the sprinklers, I would like to offer the following: "The value of automatic sprinklers for extinguishing fires depends largely on the pressure at which the heads operate"; following then with the clause as printed.*

Mr. Cabot. *I would like to ask Mr. Hexamer whether he would not be willing to substitute for that an inversion of the first two sentences; that is, having his sentence precede, and then going on: "The pressure shall be taken at the sprinkler fitting, and when water is flowing from the sprinkler, and the minimum pressure," and so on. That is, so as to be sure to have it understood that the pressure is not the static pressure, but the working pressure.*

The President. *Will you please state your amendment once more, Mr. Hexamer?*

Mr. Hexamer. *My amendment was simply to take the paragraph as printed, preceding it with the following additional words: "The value of automatic sprinklers for extinguis*[h]*ing fire depends largely on the pressure at which the heads operate." Then continuing: "The minimum pressure under which any sprinkler can operate fairly is 2 1-2 pounds" –that follows in proper sequence–"the pressure to be taken at the sprinkler fitting and when water is flowing from the sprinkler "– " the pressure to be taken at the sprinkler," instead of beginning a new sentence there–and continuing: "This pressure can only be expected to deal with a moderate amount of combustible."*

Mr. Fiske. *I would like to state again that I do not like the 2 1-2 pounds. The general layman doesn't know the difference between static pressure and any other kind of pressure, and if we put this sort of thing out and spread it around through our papers to the local boards and the assured and everybody else, they are going to get the idea that 2 1-2 pounds pressure is enough. They won't understand it, and I fear they will take it wrong. I should like to see the whole article stricken out.*

Mr. Blauvelt. *I will state, Mr. President, that the section we have already passed, referring to the working minimum pressure on piping, contains a reference to the working minimum on sprinklers, and I don't know but that which has already been passed covers the ground sufficiently, and I should not be opposed to striking out this passage.*

Mr. Hexamer. *I am satisfied with that. I will withdraw my amendment and accept Mr. Blauvelt's motion to st*[r]*ike out the entire section relating to the minimum pressure at sprinklers. Adopted.*

LOCATION OF INJURY BY CORROSION.

> *Corrosion of sprinklers seldom affects the water valve or seat, whether of metal, porcelain or glass, but principally attacks the fusible solder and small parts secured by same. Soft adhesive coatings are deemed most successful in protecting sprinklers against corrosion.*

Mr. Cabot. *I hate to get up and object to every one of these things, but I must object to the words "fusible solder." I don't believe corrosion affects, and I don't believe there is any evidence to show that corrosion affects fusible solder; and I stand here and make that statement after having made tests every year from 1884 to the present time.*

Mr. Hexamer. *I have been delegated a committee of one to prepare a paper on deterioration of sprinklers, and I have taken up this particular question in that paper. I would like to have this section laid on the table until such time as I have an opportunity to express my views.*

The section was tabled.

PRELIMINARY TEST FOR CORROSION.

An inspector visiting and suspecting corroded sprinklers may properly take a few sample heads and dip them quietly (without washing) in water at boiling point, which will be 212 degrees F. If the heads open with a good snap action within thirty seconds they may be considered as serviceable. Failing to pass such test, sample heads should be further tested by usual hot oven test.

Mr. Fiske. *I think this is a very interesting section, and I should like the Committee to give us a little idea of this method of testing. It is entirely new to me, and if we can test heads that way, I think it is a good thing to know about it. I should like to know how long it ordinarily takes a sprinkler under those conditions, tested in this way, to operate.*

Mr. Blauvelt. *I may state that the object of suggesting an expression to the effect that this may properly be done is to assist inspectors in the field who want to get suspected sprinklers disposed of, to give them a preliminary test as a matter of saving time, instead of taking them off and sending them in, and so on. If you take an ordinary sprinkler and dip it into boiling hot water, you will find that the head will open almost right away–in a very few seconds. If you take a sprinkler which has been corroded–and I might remark here that corrosion does attack the fusible solder, as well as the small parts secured by the same–it will simply go off slower in hot fluid, just as it will go off slower in a hot-air oven. A sprinkler which will go off in water at the boiling point within thirty seconds, if put in a hot oven will go off in from one to one and a half minutes at 250 to 300 degrees temperature. You are all very well aware hot-oven tests are exceedingly uncertain. When I say what a hot oven will do, I don't believe any of you know what it means, for I don't believe any of you have got any hot ovens which will act alike.*

Since this was sent on to the Secretary I have gone further with this matter, using hot fluid for higher temperatures –using oil. Now, with a sprinkler dipped quietly in oil at 240 degrees which will wait one minute before opening, if that sprinkler is plunged in an oven at 400 degrees temperature, it will take it from two to three minutes to open. And it has been the custom in the West among inspectors not to condemn sprinklers if they would go off at 400 degrees or under, hard heads at 450 degrees or under, providing the head in a hot oven would open in some sort of reasonable length of time, something like two or three minutes. So I think I may say this test I have found to be inside of the usual hot-oven test applied in the office; and I feel safe in passing a head, I feel confident it would pass in the office, if I passed it in the field in this way. By using this method it is rapid, and very convincing to the assured if it doesn't open promptly, and it is a practical time-saving matter.

I speak of this at some length, because I hope sooner or later we will use nothing but hot fluid tests. I favor oil in some cases. There are some forms of caustic corrosion clogging the sprinklers where, in the case of heads that we are going to allow considerable time on, you might object to water as being too much of a solvent. But where you object to water on account of the solvent properties, thinking that loosens up the sprinkler, you can then use oil. The lubricating quality of the water or of the oil I don't think amounts to anything to assist the sprinkler. The sprinkler has no pressure on it. It is under just as much a handicap with the water-test as the oil. All I can say is that by testing heads in the field in this way, and then going in and testing the same samples in the office, I have found this field-test to be within what we have considered a fair test in the office, and I think it is a proper thing to do, and is valuable as a labor-saving method.

Mr. Hexamer. *I have been very much interested in what Mr. Blauvelt has said about the fluid test, and I think if that could be restricted to an oil-test, by having various oils boiling at various temperatures, it might be made of considerable value. I rather think, however, that the use of water would be very inaccurate, as wherever corrosion occurs it is preceded by the fact that the acid attacks the metal and forms a soluble salt. Wherever a large incrustation of corrosion is caused on a sprinkler there is always soluble salt. In cases where an acid attacks a metal and forms an insoluble salt the incrustation is but a film, the smallest kind of a film; so that if a sprinkler were dipped into boiling hot water and left thirty seconds, considerable of the soluble salt would necessarily dissolve, and that would render the test inaccurate.*

Mr. Blauvelt. *I admit that the hot water would have some solvent action; but, as I have said, we have no accurate tests, no set of rules, no accurate hot oven. There is no accurate or decisive method of testing sprinklers to decide whether they shall be condemned or not. But admitting the solvent action, and without doubt it does, to some extent, take place in thirty seconds, if they won't go off in thirty seconds dipped in hot water–boiling hot water–because that requires the use of no thermometer, and the test is intended simply as a rough, preliminary test, then it is time to send them into the office. They may pass in the office with the hot-oven test, and may not.*

The Secretary. *What length of time is required for a clean, new head to go off under these conditions?*

Mr. Blauvelt. *Five or ten seconds.*

Mr. Fiske. *It seems to me it is a question whether, if they went off in hot water, they might not fail to go off in hot air, and if that limit was reduced any would it help to avoid such a thing as making our test at the factory, and having it work properly, and then finding later on that the head was not satisfactory in the hot oven?*

Mr. Blauvelt. *I can only speak from my own experience, and I have found the field-test is inside.*

The Secretary. *I can imagine that the Association, through its Committee on Automatic Sprinkler Devices, will have to enter upon the subject of tests to some extent during the ensuing year, and perhaps it would be well if this matter were laid over and referred to that Committee. It is pretty hard to get a majority expression of opinion on a paragraph like this, which mentions a certain degree of heat and a certain number of seconds, because only one of us has made the tests, and we don't all know just what the result will be.*

Mr. Wilmerding. *I move that this be laid over, as suggested by the Secretary, for further consideration by the Committee on Sprinklers.*

Mr. Hexamer. *Mr. President, that suggests to my mind whether it would not be better to recommit this whole matter. The discussion already had on a few of these sections has indicated to me that it will be impossible to come to a fair majority expression of opinion on any one of them. It might take us all day to go over this long paper. I would therefore move you, Mr. President, that this list of Tests and Accepted Facts be read, and that the paper then be referred back to the Committee, and that the members be requested to give the subject careful consideration, and to communicate with the Committee on any points which, in their opinion, seem to be necessary to be considered. I do not mean by that to shut off all discussion at this meeting, but it seems to me it will be impossible to take up all the sections in this paper seriatim and get a fair expression of opinion in regard to them.*

Mr. Wensley. *May I ask if it will be necessary to read all this? We have plenty of printed copies, and each one of us can take a copy.*

Mr. Blauvelt. *I think this is a very improper time to lie down on this entire report. I don't think the Association has ever had any report before it which has been so extensively circulated among the members, and which has been the subject of so much correspondence. I did not bring all the correspondence with me from Chicago, but a majority of the members of the Association have already expressed in writing their views on these points, and it seems to me if we have any time for discussion, this is the time to proceed with it. There are a number of these sections that the Association may desire to table, but I certainly favor going on and making such progress as we can. If there are men here who wish to reconsider what they have already expressed in writing, well and good.*

Mr. Hexamer. *I hesitated about making the motion for fear it might be taken in just this way by Mr. Blauvelt, as Chairman of the Committee, and, if there is no objection, I will withdraw it.*

HARD HEADS IN SKYLIGHTS.

Cases have occurred where the sun's rays would set off ordinary sprinklers in skylights, also where heat from exposing fires drifting over the roof of a sprinkled building would, without breaking the skylight glass, set off the sprinklers and do water damage without any actual attack of the exposing fire. Underwriters in most or at least many cases prefer sprinklers less sensitive than the most sensitive type for use in skylights.

Mr. Robinson. *I would like to object to any general rule about putting hard sprinklers in skylights, or any general expression in regard to it, for the reason that I believe it depends very largely on the size of the skylight and the surroundings. I should hate to see a skylight containing 150 or 180 sprinklers, or some such number as that, covering, perhaps, a very important part of the risk, over a light well, perhaps that are not sensitive. I had rather run my chances on their opening from any exposure to the sun's rays. I therefore move that we strike this section out. Adopted.*

NOT VERY IMPORTANT.

The extinguishing power of a given quantity of water does not greatly differ whether it issues from a sprinkler in coarse or fine drops of spray, but a coarse spray is preferable.

Mr. Stratton. *I should like to ask how it is determined that coarse spray is preferable to fine in the distribution? Was that determined by an actual test at fires?*

Mr. Blauvelt. *It is the concensus of opinion, that is all.*

Mr. Stratton. *I think the extinguishing power of an automatic sprinkler depends more upon the equal area that it covers than upon whether the water issues in coarse or fine drops.*

Mr. Blauvelt. *That is true. We say it "does not greatly differ."*

Mr. Stratton. *What is the advantage of publishing that statement? Won't it give some man who has got a poor distributing sprinkler the right to refer to it, and to say that his sprinkler complies with it, and that it is better than a fine sprinkler?*

Mr. Anderson. *I move that this section be stricken from the report of the Committee. Adopted.*

MUTUAL FREEZING IS A RARE OCCURRENCE.

The idea sometimes expressed that one sprinkler will cripple another by spraying and " freezing " it or other neighboring sprinklers is an error except in extreme cases where sprinklers may be within two or three feet of each other. In such cases a division board may be used.

Mr. Wensley. *I suggest the use of the word "chilling " there, because it is not a technical word, for "freezing."*

Mr. Wilmerding. *I should like to ask how this has been proven. We are making the statement here that this is an accepted fact, and we ought to have a little positive proof of it, I think, before we put that out as an accepted fact. I would also call attention to the fact that our action in regard to every one of these things has lacked unanimity. Now, if we are going to put out a paper containing a list of accepted facts, I think we want great unanimity of opinion as to every one of the items.*

Mr. Wensley. *I have made a good many tests of sprinkler heads, and undoubtedly the water inside the head,–the head was in a hot oven,–was warm; in fact, the water that issued from the pipe after we got through with the head was decidedly warm, it was hot. And that is the usual condition. We have had a good many tests made, I won't say a good many,–we have had a number of tests, in which a slight leakage of water through the head has chilled the solder so much that the head wouldn't open.*

Mr. Fiske. *I don't understand that the remarks just made have any bearing whatever upon what Mr. Wilmerding said. What he said was that he wanted to know where the facts were which supported the statement that that is an error.*

Mr. Wensley. *I should like to make myself a little more clear. If hot water issuing from the sprinkler will chill the solder, cold water issuing from any sprinkler will most certainly do that.*

Mr. Wilmerding. *This says it will not.*

Mr. Wensley. *I beg pardon; I didn't notice that. I don't agree with that.*

Mr. Cabot. *I move that this section be stricken out. Adopted.*

Dry Pipe Systems.

ALLOWABLE TIME FOR ACTION OF OLD SYSTEMS.

Dry pipe systems installed prior to the recommendation (passed at March, 1896, meeting in New York) limiting dry systems to about 500 heads are not subject to criticism on time action unless more than two minutes are required for water to flow from time of opening any single sprinkler, however remote from the water supply.

Mr. Cabot. *I move to strike this section out. I don't think I want anybody to tell me whether or not I shall criticize a sprinkler system, and I don['t think you do.*

Mr. Blauvelt. *Mr. President, I must say I am surprised at the disposition of the members of the Association to be unwilling to assist each other toward some expression as to when to criticize or not the time action of large and overloaded equipments. We have large and overloaded equipments, and we certainly have them which are subject to criticism as to time action. Now, if you are going to force every individual to stand on his own authority in deciding as to whether an equipment is too slow or not, that is very well, but you have certainly made no progress. I should like to have some expression which would support me in my statement that a sprinkler system was too slow, if it was an overloaded equipment, and I think there are other men who have the same view.*

Mr. Cabot. *I think Mr. Blauvelt entirely misunderstood me. I haven't any intention of asking this Association not to endorse him in any statement criticize a sprinkler system. What that paragraph says is that prior to a certain date we shall not criticize them; and I object, Mr. President, to having any man, I don't care who he is, unless he is my employer, tell me what I am to criticize and what I am not to criticize. If he will strike that out and say that all sprinkler systems shall come up to the rules, I think he will get what he wants.*

Mr. Wilmerding. *I think all these things are very good suggestions to inspectors, but my objection to them is that we are putting them out as accepted facts, and I think we ought to be very careful about doing that. I cannot speak too strongly about it. We will get into trouble, I am sure we will. Opinion will change; a fact never changes. Either the title of this paper is wrong, or else the subject-matter treated of in it is wrong.*

Mr. Stratton. *Mr. President, I would like to ask the Chairman of the Committee if it was his intention in making up this paragraph to illustrate that a large number of sprinklers in a large sprinkler equipment must necessarily take some time in emptying of air; is that the idea?*

Mr. Blauvelt. *What I mean to say is that irrespective of the condition you have just mentioned, there are some sprinkler systems which are slower than two minutes. I think some sprinkler equipments under the present rules, in fact, I know that there are some installed under the present rules, which takes more than two minutes for their action.*

Mr. Stratton. *How many heads?*

Mr. Blauvelt. *I won't say "installed under the present rules"; I will say installed under the present rules with the amount of leeway which it is customary to give. The rule is not exactly for 500 heads. I will say a sprinkler system of 700 heads.*

Mr. Stratton. *It takes two minutes?*

Mr. Blauvelt. *Yes; two minutes.*

Mr. Stratton. *To empty all the air?*

Mr. Blauvelt. *I mean to get good, solid service out of one of the sprinklers.*

Mr. Stratton. *Now, for the sake of an illustration, is that a one-story or a four-story or a six-story building? A long building or a high building?*

Mr. Blauvelt. *It is a six-story building, not very long.*

Mr. Stratton. *And the sprinkler opened on top?*

Mr. Blauvelt. *Yes. The idea is to give an inspector some support for criticizing these overtime and overloaded systems. Now this may not be correctly expressed, and I have no objection to any criticism Mr. Cabot may make of the form of expression; but it does seem to me extraordinary that this body is not willing to make some expression which will assist the men in the field in insisting upon the equipment needed.*

Mr. Cabot. *That is exactly what I want to do, and what I think Mr. Blauvelt is not doing by the use of these words–"are not subject to criticism." I object to any man telling me what I shall not criticize. You ought to strike out the word "not."*

Mr. Blauvelt. *That is all right.*

Mr. Cabot. *Then you don't want the section at all, if you strike out "not." What is the use of it? Of course, you will criticize what you are not told not to. I don't see the use of that paragraph; if you do, I wish you would explain it.*

Mr. Stratton. *Mr. President, I was trying to help Mr. Blauvelt explain to the Association what this paragraph was intended to accomplish as a guide, and I asked for a sample case; and he suggests 700 heads in a high building, where it takes two minutes to get the air out. Now, I think that information is valuable, but if the next system of 700 heads should be in a one-story storehouse, or a long, one-story building, everything on one floor, there would be quite a difference in the time of getting out the air and getting an effective water distribution. I don't know that you can cast around this subject any kind of a safeguard better than to test the system–first of all, have a man who knows and is reliable to take charge of it, and then test it; and if it doesn't go in the ordinary time that it takes to discharge the air from the pipes, it doesn't make any difference whether it is an old or a new system.*

Mr. Blauvelt. *Then if this should read "Dry pipe systems installed prior to the recommendation . . . . . are subject to criticism on time action," if more than so much time is required, would that be satisfactory?*

Mr. Cabot. *I am perfectly satisfied with that, if you want to say that.*

Mr. Stratton. *I don't see what reference the time when the system was installed has to the question at all. If it takes too much time to get the air out of the system, if it isn't in time to have the water get to the fire before the building is all on fire, it isn't good for anything.*

Mr. Cabot. *I think our rules put a limit upon the time that a system of this sort shall take.*

The Secretary. *There is no time limit in the rules.*

Mr. Cabot. *Then if what we want to say is that we think two minutes is as long as a sprinkler system ought to take, why don't we say it?*

Mr. Blauvelt. *I would be very glad if you would say that, but I am afraid in that way you would criticise some equipments under the present rules. If you are willing to do that, so much the better.*

Mr. Cabot. *I don't know anything about it. All I care about is being stopped from criticizing. I move to strike the section out, Mr. President.*

Mr. Hexamer. *I think Mr. Blauvelt's amendment changing the section should be voted upon. I should like to have Mr. Blauvelt read it again.*

Mr. Blauvelt. *I would like to ask you, Mr. Hexamer, whether you are willing to have this apply to all sprinkler systems?*

Mr. Hexamer. *Dry pipe, yes.*

Mr. Blauvelt. *Then I would make it read: "Dry pipe systems are subject to criticism on time action if more than two minutes are required for water to flow from time of opening any single sprinkler, however remote from the water supply.*

The Secretary. *I should like to object to that. We have sprinkler regulations which allow 500 heads on a dry valve. Now, this proposed majority opinion here may come in conflict with those regulations. We don't want to subordinate the sprinkler rules to these accepted facts in that particular, and I think we are safe to fall back on those rules. That 500 head limit is very much better than the conditions we used to get. We have all seen dry systems with over 1,000 heads on them, one dry valve; and I doubt if we are going to run into any obstacle in this respect. And then, if we want moral support in order to get a long-action system cut up, we can turn to our rules and get it. The rules say 500 is the limit, and we can get our moral support from that. I think, rather than to change this so it will come in conflict with our rules, it would be better to pass the original motion to strike the paragraph out.*

Mr. Hexamer. *I think the rules probably take care of it.*

The section was stricken from the report.

ALLOWABLE TIME FOR ACTION OF SPECIAL SYSTEMS.

The time action of usual systems or with dry pipe valve at foot of riser is controlled by the limitation of Rule 6, Section I, of the Sprinkler Equipment Regulations. Where, through choice of underwriters, dry pipe valves are located in an exterior pit or at a central header or other location removed from the base of the riser, no criticism as to time action shall apply unless more than ninety seconds are required for issue of water from any single sprinkler after opening of same.

The President. *If there is no criticism we will pass it.*

ALLOWABLE LEAKAGE.

A dry pipe system is satisfactorily tight if it does not leak more than a few pounds a week. If it leaks as much as ten pounds in a week, inspectors are justified in asserting that it leaks too much and, that assured must take steps to correct the same. A dry pipe system which is leaking badly is in need of mechanical repair and cannot be expected to "take up" by admitting water to the system. New dry pipe systems should not leak more than two to five pounds per week before being accepted.

Mr. Cabot. *I think that is a very dangerous thing to say. I don't think we want to go on record as saying that two pounds, ten pounds, fifteen pounds, or five pounds is the proper amount of leakage. What is right in a 20-sprinkler risk is not right in a 200-sprinkler risk, nor a 400-sprinkler risk. It all depends upon the number of heads, the length of pipe, the condition of the building, and a hundred other questions. We can't very well state this as an accepted fact when we have got to take all these things into consideration.*

Mr. Wilmerding. *I move the section be dropped.*

Mr. Hexamer. *I can see no reason why some limit should not be made. In all engineering matters, as Mr. Blauvelt has remarked before, limits of effectiveness are given, and if you provide limits large enough, there is no objection to establishing them.*

Mr. Cabot. *I would like to ask Mr. Hexamer if such a limit is not always given in the terms of the conditions which the work is to meet? This is not given in any terms. You wouldn't say all bridges shall carry 5,000,000 pounds; but you say here–all sprinkler systems.*

The section was stricken out.

REPEATED DRAINING NEEDED.

> *A dry pipe system which has been filled with water cannot be drained completely at once. Employees in care of sprinklers must, in all cases, drain the dry system daily until fully drained.*

Mr. Hexamer. *I would like to have Mr. Blauvelt explain, if he will, what the intention of that is. I don't quite catch it.*

Mr. Blauvelt. *That refers to the care of the equipment by the assured. People who have a new equipment put in, the first time they drain the system do not realize, ordinarily, that condensation from the wet interior of the pipes will continue to trickle down, and may freeze in the drains. I think an expression in regard to that will be useful.*

Mr. Stratton. *Mr. Blauvelt, wouldn't the suggestion that the system be drained daily be likely to lead to some difficulty? They would have to let the air out every day to drain the water out, wouldn't they? Or how could it be accomplished?*

Mr. Blauvelt. *All dry pipe valves have drains, and you simply blow the water off until the air appears. It says "until fully drained," and you stop getting water–and there you are.*

Mr. Robinson. *Mr. President, I think that is a good expression to leave in this manual, if you want to call it that, because the ends of the various lines in a dry pipe system do not let go the water; you have practically a vacuum which holds it for some time, and it is a fact that you will sometimes find for a number of days the water back on the dry system. I think we all know that. I don't see anything in this section that is objectionable.*

The President. *The section stands.*

REMOVAL OF SEDIMENT.

> *The practice of repeatedly filling and emptying dry or wet sprinkler systems with the idea of washing out sediment is erroneous and is condemned. Such sediment can only be removed by being washed by forcible current out through the ends of sprinkler lines or contrariwise by coupling hose to ends of sprinkler lines and washing sediment backward through main drain or riser.*

Mr. Cabot. *I doubt if we want that last sentence. I don't believe we want to wash out sediment if we can help it. I don't think we want to allow it to be inferred that sediment is permitted in a great deal of the country. I fully understand that in some parts of the country the water is so made up, chemically, and carries such an amount of material in flotation, that there will be sediment; but I don't think, for instance, in New England, we want to go on record as saying we want to wash out a sprinkler system.*

Mr. Fiske. *I move to strike out the second sentence.*

Mr. Wensley. *Which is the more important, to convey to the minds of some people in New England, who have good water, that sediment is not allowed, or to express our opinion that in other places, where we find that there is a very decided sediment, that must be gotten out of the system? I think the second clause of the section is a good one.*

Mr. Fiske. *You wouldn't want the assured to go and do a thing like this without the knowledge of the underwriter. Even if there was much sediment there, you wouldn't want the assured to hitch on to the ends of their sprinkler lines and do as they pleased with the sprinklers. If there is any washing out of sediment to be done, I think it should be done with the knowledge of the underwriters and under their supervision.*

Mr. Cabot. *Mr. President, we are talking here about accepted facts. Now, it is not an accepted fact in a very large portion of this country that there should be or may be sediment expected in a sprinkler system. If we put this out before the public–and I assume that what we print we shall put before the public–we assume right off that sediment is to be expected wherever there are sprinkler systems used, and that that sediment is to be gotten rid of by washing out with hose. I don't think that is a safe thing to do.*

Mr. Sullivan. *Mr. President, I have torn out old equipment where we have taken out 2 inch and 2 1-2 inch pipe, and we couldn't push a half inch pipe through them on account of the sediment. They were filled up solid with sediment, and we had to take the whole system out. There are many places where they use dirty water, and something must be done when the pipe gets filled with sediment.*

Mr. Cabot. *I still think Mr. Fiske's point is a good one–that we don't want the assured to be in the habit of hitching a hose on to the end of a sprinkler system and washing it out.*

The Secretary. *I move the adoption of the first clause of the paragraph only. Adopted.*

Mr. Wilmerding. *Does this adopt the section headed ," Dry Pipe Systems " as amended?*

The President. *You have approved of that section of the Committee's report, and, later on, you will have the whole report before you.*

Mr. Wilmerding. *We have not adopted it finally.*

The President. *No.*

Dry Pipe Valves.

FAIR TEST PRESSURE.

> *Dry pipe valves should not leak nor show distress under 200 pounds pressure, however applied.*

No objection.

CONSTANT SERVICE WANTED.

Great importance attaches to constant service. Thus dry pipe valves which require frequent repairs or tedious adjustments are defective in that they cause corresponding interruptions to the sprinkler service.

No objection.

OLD AND NEW FAILURES.

The dry pipe valves which have failed recently and in the past, or are now considered as obsolete, will usually be found to have been dependent upon "blow of falling weight," "rubber diaphragm," "hydraulic piston" or "spiral spring" as essential features. No rust test can be considered unreasonable as applied to a dry pipe valve, even to corroding parts to one-eighth inch deep from original surfaces.

Mr. Hexamer. *I should like to ask what is meant by the last clause.*

Mr. Blauvelt. *What I mean by that is that there are dry pipe valves which have to stand their service in artesian waters, which are fitted with delicate parts, thin diaphragms, etc., which get out of repair and cause interruption of service. There are other dry pipe valves in the market which can stand exceedingly severe corrosion, and I think an expression of that kind is important as showing our adverse opinion of dry pipe valves with little pieces in them, thin diaphragms and small parts. We want good thick, rugged parts which will stand these artesian waters.*

Mr. Hexamer. *What I don't understand is the final clause which says "even to corroding parts to one-eight inch deep from original surfaces." What is the necessity of calling attention to such extensive corrosion?*

Mr. Blauvelt. *If you object to that, if you think that is too deep, very well.*

Mr. Fiske. *I understand we are likely to have a Committee on devices appointed, and I move that this entire section be tabled to be taken up by that Committee. This seems to be a question of devices.*

The Secretary. *I hope you will not take any definite action today relating to specifications for dry valves which would hamper that Committee during its coming year's work. I think it will go into the question in a careful way, and that the proper action, after reading these sections through and discussing them, would be simply to refer them to the incoming committees to act upon, because these are largely specification matters.*

The President. *Then proceed with your reading, Mr. Secretary.*

RANGE OF AIR PRESSURES.

A dry pipe valve should not ordinarily require more nor less than twenty to forty pounds air pressure to hold the valve securely closed, and should ordinarily release at not more nor less than five to ten pounds air pressure.

Dry pipe systems designed to be maintained or released at unduly high or low pressures have been found faulty in service and are deemed impracticable.

HAVE BUT ONE SHUT-OFF POSSIBLE.

A dry pipe valve should not have any device additional to the main shut-off gate whereby the dry pipe valve can he made inoperative; in practice such cocks, screws, cams or adjustments are abused by employees, who with temporary intent set them so that the valve will not operate and thereafter neglect to readjust properly.

Mr. Robinson. *Wouldn't the adoption of that perhaps embarrass some Committee?*

The President. *I understand the suggestion is made that this whole section be referred.*

SELF CONTAINMENT.

Inasmuch as many dry pipe valves are in warm basements or similar locations where no closet nor other enclosure is provided, it is highly desirable that a dry pipe valve be self contained and with no exterior mechanism subject to obstructions or tampering.

ALL WILL WATER COLUMN.

All dry pipe valves thus far designed, or apparently likely to be designed, are subject to crippling by water column, and the various styles now in the market do not differ from each other to any important degree as to this liability. It therefore behooves all persons in charge of dry pipe valves to guard against this liability by regularly inspecting and draining any and all types of dry pipe valves.

Mr. Cabot. *This doesn't seem to me to be a section which would naturally be referred to a Committee, and I don't believe this organization is going on record as saying that every dry pipe system we have got in this country is subject to crippling by water column in any such broad sense as that would imply to the ordinary manufacturer, merchant, or to the assured in general. That is a pretty serious criticism of our action for the last ten years, if we allow that to go before the public as it stands.*

Mr. Stratton. *I move that the section be stricken out. Adopted.*

A HIGH DEGREE OF EXCELLENCE NECESSARY.

In view of the great need for perfect reliability in dry pipe systems and the fact that although the best of the dry pipe systems now approved are good, yet all have admitted imperfections, and in view of their being no need to merely multiply devices, it is recommended to underwriters having jurisdiction to approve no new dry pipe system except it can fulfill as great a number of desirable ends as any dry pipe system hitherto approved.

Mr. Cabot. *I would like to ask Mr. Blauvelt whether "systems " in that paragraph doesn't mean apparatus rather than the outfit in any building?*

The President. *The Chair would suggest that if you are going to refer this to a Committee later on, it may not be necessary to discuss it very much now.*

Mr. Cabot. *I didn't suppose this paragraph would be referred.*

Mr. Blauvelt. *It does mean systems or apparatus.*

Mr. Cabot. *Kind of apparatus?*

Mr. Blauvelt. *Different dry pipe systems or apparatus, yes.*

Fittings.

Any fitting having an arm or stem protruding through a stuffing box and intended to be operated by the action of the water, is objectionable in a supply main.

Exterior shut-off valves of a sort liable to become inoperative or inaccessible or lost in or by dirt, ice or snow are to be avoided wherever possible.

Pressure regulating valves of all types and most types of meters are excessively objectionable in water supply mains.

The President. *Now, gentlemen, what will you do with the section on dry pipe valves?*

Mr. Hexamer. *I move it be referred to the incoming Executive Committee for distribution and assignment. Adopted.*

Gravity Tanks.

FROZEN TANKS.

Gravity tanks should be reported out of service when coated over with ice, because a comparatively thin coating of ice may be strong enough to bridge over the water in the tank, and, by forming a vacuum, hold up the water and prevent the tank from emptying. Gravity tanks should be reported as out of service when they contain less than two-thirds of the water which they should contain for sprinklers.

Mr. Cabot. *While I would be very glad indeed to help Mr. Blauvelt in the kind of work he has to do, I should entirely object to being told that I must report a tank out of service because it is two-thirds full, when my instructions to inspectors are that they shall sit down alongside the tank until it is filled. I should also object to a tank thin coated with ice being reported out of service, because we have in the list which the Secretary has read to us a well authenticated account of a tank coated with ice, and the fire put out by the automatic sprinklers supplied only from that tank.*

The Secretary. *I would say, Mr. Cabot, in one of the cases reported there was no water came out of the tank at all, and yet the fire was put out by the water in the pipes. Is that the one you refer to?*

Mr. Cabot. *I am merely giving the facts as they have been reported to me.*

Mr. Blauvelt. *I will say that the object of an expression of that kind, while it may not be suitably worded, is to justify an inspector in making that criticism to the assured. Of course the inspector is expected to have the ice broken up or the tank filled before he leaves the premises; but it seems to me wise to have some sort of limitation as to the amount of neglect that can be tolerated on the part of the assured. When I go to a man and find his tank two-thirds full he says, "That is all right; I am going to fill it right up." I say to him, " That is all right; you will fill it up, but my report will have to state that I found your tank out of service, one-third down, and that is just as bad a neglect on your account as though your tank was empty, for I can't give you any credit for it." That is the idea in making this expression.*

Mr. Cabot. *Mr. President, that is a very fair statement from Mr. Blauvelt. What he means is that he wants to put in his reports to the company a criticism of such tanks as are found coated with ice or two-thirds full; and I don't think there is any man in this room who would object to his saying that. But, speaking for the city of Boston only– and I know that is a very small place and cuts very little ice either on sprinkler tanks or anywhere else–if I report a sprinkler system out of service our rules require that the assured shall return to the company the entire amount of rebate which he has received for that sprinkler system; and, therefore, I object to so much of that as is covered by the words "out of service." If he will say, "Gravity tanks should be reported as not in serviceable condition," or "defective "–*

Mr. Blauvelt. *" Not in serviceable condition" is acceptable.*

Mr. Cabot. *Out of service means it will not work. Now, a tank may or may not work, but " not in serviceable condition " means an entirely different thing. It means it is not as good as it ought to be–not as good as it was designed to be. It doesn't seem to me it is very important, however, to tell the assured that a tank which is not full is not as good as a tank which is full. If he can't see that, I don't believe putting it in printers' ink will help him.*

The Secretary. *This is one of the topics which I took issue with Mr. Blauvelt about prior to the report of the Committee, and I feel at liberty, therefore, to speak against it now. It seems to me that there is no need of the section whatsoever, and it contains some points that are undesirable, in my opinion. If the assured is allowed to know or to understand that he is safe so long as his tank is not more than one-third empty, you are conveying an impression to his mind which you don't care to have him receive. The impression you want to put there is that the tank must always be full, and the fraction two-thirds is something which shouldn't be put before him by the underwriters. The constant effort should be to keep the tank full; and I don't believe it is a proper matter for us to take up, as to what the various inspectors shall report to their companies as to whether a tank is not in service or is in service, due to the fact that it is a certain fraction empty. I had rather have the section stricken out entirely.*

Mr. Fiske. *I will make that motion, Mr. President. Adopted.*

KIND OF TANK.

Metal tanks are preferred to wooden tanks.

Mr. Cabot. *I should like to know why, Mr. President?*

Mr. Blauvelt. *Because there is less interruption of service from metal tanks.*

Mr. Cabot. *I don't believe, Mr. President, that is an accepted fact. I don't believe five men in this room, whom I can name, would prefer an iron tank, under certain conditions of water, to a wooden tank. There are certain waters which act, as Mr. Blauvelt himself has said, very strongly on iron, and in such cases iron tanks are not preferable to wooden tanks. Here is a man on my left who says he has known an iron tank to corrode out in five years. Therefore I say it is not an accepted fact, and I move that the section be stricken out. Adopted.*

Notes on Gravity Tank Capacity and Height.

NO EXACT ACCURACY NEEDED.

The capacity of tanks as given in reports is exact for all practical purposes, if stated within 5 per cent of the true actual capacity.

Mr. Wilmerding. *I doubt the wisdom of making any such statement as that, that accuracy is not needed. I think that is a very dangerous thing to establish as an accepted fact. I move the section be stricken out.*

Mr. Blauvelt. *I would like to speak on this. I do not think that this body should object to stating what it thinks is practicable in matters where we are now very badly off as to accuracy. We know very well that if a dozen inspectors report on the same tank, they will vary very greatly as to its capacity. Now, there wouldn't be any particular comment to make on those variations if the reports were within 5 per cent of each other. It is not necessary to know within a very few gallons just what a tank will hold; it doesn't make any particular difference whether it is reported as 9,800 or 10,200 gallons; but I do think it is better to deliberately allow some leeway in estimating tanks, and try to arrive at some approximate rule which will make these reports more uniform. The reason why this and the succeeding expressions in relation to the measuring of tanks are brought in is simply to save the officials of the companies any confusion of mind they suffer from by receiving reports as much at variance with each other as they are now.*

Mr. Wilmerding. *I want again to explain my position, and to reiterate that I do not object at all to the expressions contained in this paper as the views of Mr. Blauvelt or of the Committee. I probably should agree with a good many of them personally; but I do object to their going out as statements of fact, and I shall object to every one of them unless it is a well known fact which has been proven. I wanted to explain to Mr. Blauvelt personally.*

Mr. Blauvelt. *Mr. Blauvelt is not in the least sensitive about this; in fact, Mr. Blauvelt thinks he is in a position to deride some of you gentlemen, because you have already expressed yourselves on paper.*

Mr. Wilmerding. *I have not.*

Mr. Blauvelt. *I know you haven't all done so, but a majority of the members of this Association have already expressed themselves as favoring most of these things. Now, if you don't care to agree on them, very well. It is perhaps unnecessary for me to say anything as to my personal feelings, but several members have been kind enough to make allusion to them, and I will state that I am not at all sensitive on any of these points. The work of this committee has been entirely a labor of love, and*

done solely with the object of getting hetrogeneous matters on paper which are now the subject of loose gossip and disagreement among inspectors and the cause of confusion in their reports. I think it is something which would assist the inspectors and cause them to be a little more coherent in their reports; and another good result would be that the assured would receive more uniform treatment, and the reports which go into the companies would receive more uniform treatment.

Mr. Stratton. *I think Mr. Wilmerding's views are correct, that if we publish in our records as a part of our transactions anything that is entitled to be considered an accepted fact, and as so endorsed by this organization, it should be pretty near accurate, and should be unanimously approved by the members as a commonly accepted fact by all. Now, the fact is that when inspectors make mistakes about tanks, we can't correct them here, and this section will do no good. If inspectors vary in their opinion as to the capacity of a tank, and it is commonly accepted that they should vary 5 per cent, it might be all right for us to understand it among ourselves, but why should we put it on paper? I don't see the desirability of making any reference to it at all. If we have three inspectors or six inspectors, and they all get around to a certain risk within a year, and they can't tell within 5,000 gallons the capacity of a tank which has been there all the while, we had better get a new lot of inspectors; but anyway let us not put out any such expression as is contained in this paragraph.*

The motion to drop the paragraph from the report was adopted.

FAIR RULE FOR WOODEN TANKS.

> *Wooden gravity tanks whose interior is not readily accessible may have capacity estimated by the following rule. All measures in feet.*
>
> *"Take external diameter near bottom of tank and deduct six inches, square this, and multiply product by outer height, beginning at overflow (or, if no overflow, then at four inches from top) and deducting eight inches at bottom to allow for chime, nipple, etc. Multiply this product or cube by 5.87 for capacity in gallons."*

Mr. Hexamer. *I would like to ask Mr. Blauvelt whether all preceding the last multiplication gives the cubic contents of the tank?*

Mr. Blauvelt. *You mean the figures 5.87?*

Mr. Hexamer. *You say "multiply this product or cube by 5.87"; is everything preceding that the cubical contents of the tank?*

Mr. Blauvelt. *The contents in gallons.*

Mr. Hexamer. *What I want to bring out is, shouldn't that be 7.85 instead of 5.87?*

Mr. Blauvelt. *No; 5.87.*

Mr. Hexamer. *My impression was that there were about seven and a half gallons in a cubic foot.*

Mr. Blauvelt. *You don't get the cubic feet here, you understand. This takes off the corners.*

FAIR RULE FOR IRON TANKS.

Multiply the square of the external diameter by the outer height in same manner as for wooden tanks, except deduct four instead of eight inches at bottom. Multiply this product by 5.87.

Mr. Cabot. *In view of what Mr. Blauvelt has just said, I think we should make an observation here that this only applies to cylindrical tanks. I have in my jurisdiction at least two tanks which are not cylindrical, and they will hold only about 3,500 gallons, according to his figures.*

Mr. Blauvelt. *We will have it that way, cylindrical.*

FAIR RULE FOR PRESSURE TANKS.

Multiply the square of the external diameter by the length over the body sheets plus six inches allowance for bulged ends. Multiply this product or cube by 5.87.

TANKS HAVING EXCESS CAPACITY.

Where all of tank capacity is not solely for sprinklers it is preferable to state in a report the total capacity and also what capacity is reserved for sprinklers.

FAIR RULE FOR MEASURING HEIGHT.

In measuring elevation of tank above highest sprinklers, take highest sprinklers of highest general level of sprinklers, disregarding odd sprinklers in monitors, elevator head, or tank tower, unless there be roof houses or large monitors having a dozen or so sprinklers, in which case the measure may be taken from such sprinklers. Measurement should include several inches up on side of tank to approximate top of outlet pipe from tank.

Mr. Cabot. *I object to that last section entirely. I don't know why we shouldn't measure from the highest head there is in the risk. We can, and we ought to.*

Mr. Hexamer. *We do.*

Mr. Cabot. *I move it be stricken out.*

Mr. Hexamer. *Before that is done I should like to state that I know of cases where we have ten to a dozen heads in the tank tower.*

Mr. Blauvelt. *Above the tank?*

Mr. Hexamer. *No; for above the tank we provide a small quantity of water in an elevated tank, to supply those heads, a secondary tank. We have several systems of that kind. I don't like the idea of disregarding the monitors. There may be a monitor 100 feet long, or 200 feet, with quite a number of sprinklers in it.*

Mr. Cabot. *That is excluded, Mr. Hexamer, by this rule, and I shall object to it. Take a large dry goods store, having a monitor which would require four heads over a light well extending from the top to the bottom of the building; I don't believe that Mr. Blauvelt would want to exclude those heads in his measurement of the height, because they would be the first heads to go off and the last heads to get shut off.*

Mr. Stratton. *I call for the reading of the sprinkler rules. I think there is some reference in them to this matter.*

The Secretary. [Reads the rule.] *I would like to suggest a very easy way out of this. It is my thought that in making an inspection report it should contain both facts, namely, that a tank was, say, 25 feet above the sprinklers in the highest room of the building, and also that there were other sprinklers in the monitors, elevator tops, etc., which it was only three feet above. I shouldn't think the report would be complete unless it did contain both those facts. We don't want to state one and leave the other out; both are essential to a complete inspection report on the subject.*

Mr. Cabot. *I would like to ask Mr. Blauvelt, through you, Mr. President, whether that is the intention of this paragraph. If it is, I have completely misunderstood it. I thought he meant laying out his system–measuring it for acceptance.*

Mr. Blauvelt. *No. The intention of this paragraph was to do something, if possible, to bring about some reduction of the confusion of reports in the offices. We send out men to inspect some sprinklered risk and to tell how high the tank is above the sprinklers. One fellow will have his own notion about it, and another will have another, and you read the various reports and you will find that they vary very greatly indeed.*

Mr. Cabot. *I wish to withdraw my motion, then, for I had no idea that was what Mr. Blauvelt was aiming at.*

Mr. Blauvelt. *My idea was–I won't say "my idea," but the idea of this paragraph; you have all had it before you, it has been in print, and you have seen it–the idea was to arrive at some general expression which would be a general guide to inspectors, and tend to reduce the great confusion which now exists.*

Mr. Cabot. *Then why not begin it in this way: "In making reports, inspectors are requested," etc.?*

Mr. Blauvelt. *That is all right.*

The President. *The Chair will suggest that you are not considering instructions to inspectors, but you are considering accepted facts. If this is an instruction to the inspectors it doesn't belong in this report.*

Mr. Cabot. *Then, Mr. Chairman, I will renew my motion to strike the section out. Adopted.*

Pressure Tanks.

Pressure-tank pressure should never pass into mains bearing hydrants.

Unless special "excess pressure" equipment with capacious accumulator can be maintained, pressure tanks should not be used on extensive underground systems or in connection with city water whose fluctuations will otherwise frequently unseat check valves. This because concealed leaks or check valves with dirt under check will rapidly destroy adjustment of water level at pressure tank.

Mr. Cabot. *I would like to amend the first paragraph of this section by striking out the words "pass into," and substituting therefor the words "be allowed on."*

Mr. Blauvelt. *That is all right.*

Mr. Cabot. *Then I would like to amend the second paragraph of the section by striking out the words "or in connection with city water." Because, if I understand that –I may be very stupid, Mr. President, undoubtedly I am–if I read that as I ought to it means that I can't put a pressure tank on a system in the city of Boston without putting on a "capacious accumulator," and I don't know what a "capacious accumulator" is. I move to strike out after the word "systems" the whole of that first sentence, so it will read "Unless special excess pressure equipment can be maintained, pressure tanks should not be used on extensive underground systems." The last sentence will remain as it is. Adopted.*

ADJUSTMENT.

A pressure tank is more quickly made useless by misadjustment than any other source of water supply. But when well made and once put in good order, is easier to keep in condition than any other domestic supply under equally suitable conditions.

Mr. Cabot. *I move to strike out the second sentence. I don't think that is our experience. Adopted.*

The Secretary. *If any of it is to go, I think the whole of it ought to go, for one sentence balances the other.*

Mr. Fiske. *I move to strike out the whole section. Adopted.*

WATER LEVEL.

Pressure tanks are designed to be filled with water to an exact point. The correct water level for horizontal tanks is, viz.:

5 feet diameter, water level 8 inches above center.
5 feet 3 inches diameter, 8[-]*1/3 inches above center.*
5 feet 6 inches diameter, 8[-]*3/4 inches above center.*
5 feet 9 inches diameter, 9 inches above center.
6 feet diameter, 9[-]*½ inches above center.*
6 feet 6 inches diameter, 10[-]*½ inches above center.*

Mr. Stratton. *I should like to ask the Chairman of the Committee if those figures coincide with the rules on sprinkler pressure tanks for water levels.*

Mr. Blauvelt. *Yes.*

Mr. Stratton. *They do not conflict with them at all?*

Mr. Blauvelt. *No.*

MARKING.

This line should be marked or painted plainly on tank head beside gauge glass. A variation of over 1 inch above or below the water level prescribed, injures the desired service of the tank.

For tanks in vertical position the proper water level is at two-thirds the height measured on the length of the tank body sheets, omitting the bulged ends.

WORKING PRESSURE.

The initial air pressure required to expel all water (and have the last of the water leave the tank under working pressure) is 75 pounds. A good practice is to allow the air pressure to vary from 75 to 80 pounds.

Where a pressure tank is so improperly located as to be much below the level of highest sprinklers, then underwriters having jurisdiction must determine the extra air pressure requisite for making tank effective. Tank must be built to stand such extra pressure.

Mr. Cabot. *I move to amend the first paragraph of the last section read by adding after the word "water" the first time it appears in the first line the words "from tanks located as described in the rules." Adopted.*

REQUISITE TIGHTNESS.

A pressure tank when in good order will not leak more than 2 pounds air pressure per week, and leaks badly if it loses as much as 5 pounds per week.

It is preferable that the air supply pipe be shut off close to tank to cut off possible leakage in this pipe.

Mr. Cabot. *I think the same criticism is fair on this that I made as to the allowable leakage on a dry-pipe system. I think it depends on so many circumstances that we cannot state that as an accepted fact.*

Mr. Hexamer. *The conditions here are different.*

Mr. Cabot. *That is true.*

Mr. Mackinney. *Do not the sprinkler rules have something to say about the cut-off in the air pipe to the pressure tank?*

The Secretary. [Reads from the rules.] *"Both air and water connections to be fitted with check and stop-valves located near tank."*

Mr. Mackinney. *I think this covers it. It says "preferably," and then we have a rule which requires it to be near the tank.*

Mr. Cabot. *I think this is another thing entirely from what Mr. Mackinney refers to. This says it shall be "shut off," and I think Mr. Blauvelt is quite right about that. One makes the location, the other makes the point that it shall be shut, and I think that is the most important.*

CAUSE OF LEAKS.

A pressure tank is not affected by air leaks in the piping of dry pipe sprinkler system, and is only affected by air leaks in the tank itself, except that leaks in water pipes connected to the pressure tank will, in causing the pressure tank to lose water, also cause a reduction of air pressure.

When water pipes connected to pressure tanks are in good order they will not cause the above mentioned trouble to the extent of allowing the pressure tank to lose more than one inch of water per month.

Mr. Cabot. *I move to strike out the second paragraph, because I believe that implies we consider it lawful for a pressure tank to lose an inch a month. I don't think we want to go on record as saying that. Adopted.*

GAUGE GLASS.

The cocks at gauge glass should be kept closed, only opening these cocks when necessary to note water level; this course lessens the chances of leakage, or of a break at gauge glass with resultant water damage.

FILLING TANK.

Loss of water from a pressure tank should be replenished by direct (power or hand) pumping against pressure of tank.

The practice of blowing off air pressure and replenishing tank by city pressure is objectionable in that it interrupts the tank service and may permit dirt to get under city check valve and subsequent leakage from pressure tank into city mains.

Mr. Cabot. *I move to strike out the last section read. I don't think Mr. Blauvelt would be willing, under certain conditions, to have his tanks refilled in that way. He knows, of course, that air is absorbed by water under pressure, as all gases are, and if a tank is empty and the pressure is put back simply by pumping the water back into it, in a very short time you won't have any air in the tank*[.] *This says that the way to fill a sprinkler tank is by pumping back into it, and the result of that, in the hands of an average engineer, will be to get the pressure in the same way.*

Mr. Robinson. *I don't know as I quite understand you Mr. Cabot.*

Mr. Cabot. *If you replenish without letting down the pressure on your tank, you will get an increased pressure from the pumping in of an additional amount of water; and after the engineer has done that once or twice he will use that method and only that method of getting his pressure; and the result will be that after that has happened, judging from the experience we have had with one tank, after that has happened three times he will have less than an eighth of the tank air instead of one-third.*

Mr. Blauvelt. *You have already provided for his water level.*

Mr. Cabot. *Yes, I know, but you don't want to start him doing that sort of thing in any way.*

Mr. Blauvelt. *Do you want to say it shall be replenished to the correct water level?*

Mr. Cabot. *I don't want it to be done by pumping against the pressure of the tank. There is no need of it. If a man is intelligent, the fact he has got his pressure off won't militate against his getting it on again.*

Mr. Robinson. *Do I understand you advocate leaving the air in the tank?*

Mr. Cabot. *I do most decidedly, where we have got a secondary supply.*

Mr. Robinson. *I should strongly object to that.*

Mr. Cabot. *I understand perfectly that Mr. Robinson would in the case he has in mind, and I think he would be perfectly right. If I had to handle a case where the primary supply was a pressure tank I should feel exactly as he does; but I don't, and under the conditions I have I object to allowing a man to pump any against the pressure. He can get along just as well without it, and have a good supply on the system all the time.*

Mr. Blauvelt. *You object only to the first paragraph?*

Mr. Cabot. *Yes, that is all I care about, to strike out the first paragraph simply.*

The first paragraph of the section was stricken out, the section as amended was approved, and then the entire section under the head of "Pressure Tanks" was approved.

Steam Pumps.

TEST WITH REGULATOR.

Where a steam pump is acting as primary supply and is controlled by an automatic regulator, it is an incomplete test to merely open a small vent and note the action of the regulator. The pump should be operated up to its rated capacity, leaving the pump solely to the control of the regulator, and the regulator should maintain the water pressure to within 20 per cent of the pressure at which the regulator was set. Failing this, the regulator spring, or regulator, should be changed.

Mr. Robinson. *I would like to know why the Committee arrived at 20 per cent.*

Mr. Blauvelt. *I will state the Committee arrived at 20 per cent because you can't have pumps and automatic regulators which will act alike, and figuring from somewhat independent sources we have come to the conclusion that 20 per cent is about fair. Most regulators will fall off from 10 to 15 per cent, but when they get so they will fall off 20 per cent they surely are injuring the service, and it is time to demand a change of the regulator.*

Mr. Robinson. *Aren't you pretty large there? You suggest or state that a man doesn't need to change his regulator unless it is as badly off as 20 per cent; wouldn't it be better to say 10 per cent?*

Mr. Blauvelt. *Very well. I will accept 10 per cent.*

Mr. Robinson. *I think in some of our risks, where we are trying to regulate to a little closer point than that, it might be advisable to make it 10 per cent.*

Mr. Stratton. *May I ask the Chairman just what he means by this variation of 20 per cent? Do you mean that if the pump is set to operate at 80 pounds you allow the pressure to drop 20 per cent, that is, to a point 16 pounds less, before it acts, and call that the minimum of variation which you will allow?*

Mr. Blauvelt. *No. What I mean to say is that with the regulator set at 80 pounds and crawling under the action of the pump that is operating as a primary supply, the steam on the pump and the pump controlled by the regulator, and the pump has no slip or leakage, if you open up the pump and give it vent to the rated capacity as stated on the capacity plate on the pump, the pressure will fall off almost invariably. I have in my life seen two pumps where, for some occult reason, the regulator would raise the pressure. I never saw that but twice. I have seen a few pumps where the pressure will hold up, but ordinarily the pressure falls off. In starting up a pump with the regulator set at 80 pounds I expect it to fall off 10, but if it falls off as much as 20 per cent, I feel justified in telling them it is not giving satisfactory service and in demanding a change of the spring or regulator.*

Mr. Stratton. *I have come to believe that a good deal of criticism which is applied to automatic regulators is due to the gauges getting out of order on the pumps, the pressure gauges, especially where they have the pump constantly in operation. And I think that if those who have had extended experience with the use of regulators would reflect on this question, they would have some very good points that they would like to bring out here in discussing this subject, if this is the time to do it.*

Mr. Blauvelt. *I don*[-]*t think the matter of the gauge has anything to do with this. If your gauge is light or heavy it will show a proportional falling off at the time the test is made.*

Mr. Stratton. *I don't see why we should allow such a wide range of variation.*

Mr. Blauvelt. *I am perfectly willing to accept Mr. Robinson's view and make it 10 per cent. I have suggested 20 per cent, and sent it around by mail to everybody, and no one has objected to it up to this time. Now, if you think it should be less, very well.*

The President. *Did you make it as a motion, Mr. Robinson?*

Mr. Robinson. *I didn't make it as a motion. I am not prepared to accept it at 10 per cent.*

The Secretary. *If the Association is not ready to approve of this as an accepted fact, perhaps it is one of the paragraphs which may be laid over. We don't want to recognize it as an accepted fact when there are only two members who speak about it, and one says 10 pounds and the other 20.*

On motion of Mr. Lemmon it was voted to strike out the paragraph.

ADJUSTMENT OF REGULATOR AND RELIEF VALVE.

> *A fire pump in automatic service should maintain about seventy-five pounds or at least not less than sixty pounds pressure at the pump, for buildings of one story or moderate height. For taller buildings the pressure should usually effect from thirty to forty pounds pressure at level of highest sprinklers.*
>
> *Relief valve at pump should be set at twenty to thirty pounds higher than pressure exerted by pump, whether for sprinklers or hose.*

SPECIAL AUTOMATIC PUMP CONDITIONS.

Where a fire pump does not take suction under head and operates through an automatic regulator, especially when regulator is held shut by pressure from pressure tanks or other high pressure standing in pump delivery main, then such a pump, because of its having no water vent, shall be deemed incompetent to maintain suction under lift, and if not provided with constant visible water vent or kept filled by the action of an auxiliary pump with similar water vent, shall not be recognized as a source of supply to sprinklers in grain elevators or similar service. No method of priming will be considered as equivalent to above provision.

Mr. Fiske. *I would like to ask if that doesn't mean source of automatic supply, in the last part of the section?*

Mr. Blauvelt. *Yes.*

Mr. Robinson. *I understand it means it should not be recognized as a source of supply if it can't be relied upon.*

Mr. Fiske. *I understand it is only the automatic regulator that cannot be depended on, not the pump.*

EXCESSIVE INTERNAL LEAKAGE IN FIRE PUMPS.

Steam fire pumps having internal slip of ten per cent or more, slip too much and should be repaired.

The section on "Steam Pumps" is approved as amended.

Underground Work.

FAIR PRESSURE TEST.

On new underground work, or new additions to underground work, it shall be deemed a fair test, that the entire system of underground mains shall be tested for two hours to 150 pounds pressure, plus 10 pounds for each story above the first story of the highest building to be protected by sprinklers or hose, up to 200 pounds. In the case of periodical or special inspections of plants not having newly installed work, a reduction of time to one hour may be made if no defects show.

MARGIN OVER FIRE DEPARTMENT PRESSURE.

If a two-thirds increase over any pressure on underground mains proposed for any use of public fire steamer, or Holly system, or fire boat, shall call for a higher pressure than called for by above-described test, then such higher pressure shall be deemed a fair test pressure under same conditions as to duration of test.

FAIR WATER HAMMER TEST.

It shall be deemed fair treatment to water hammer underground mains while under the above tests by quickly and repeatedly opening and closing a hydrant. No tenderness is to be shown because of lead or other joints. All tests are designed to test the pipe, and joints poorer than the pipe must be made good.

Mr. Cabot. *I should like to ask Mr. Blauvelt what he means by that second sentence in the last section read: "No tenderness is to be shown," etc. Does he mean he isn't going to let up on the test? If so, why not say it?*

Mr. Blauvelt. *Well, suggest how to say it.*

Mr. Cabot. *Say that the tests shall be made without reference to lead joints or other joints.*

Mr. Blauvelt. *Very well.*

Mr. Cabot. *I make a motion to amend by changing the second sentence so it will read: "Tests shall be applied without reference to how joints are constructed." Adopted.*

LAY DEEPER AS COLD IS GREATER.

Underground mains should be buried in earth at an approximate depth of 2 feet, plus 1 inch for each Fahrenheit degree of usual winter temperature below the freezing point of water.

Mr. Fiske. *Is that an accepted fact?*

Mr. Hexamer. *We lay pipe five and six feet.*

Mr. Blauvelt. *You will find that about matches with your practice.*

A Member. *I think not. The average temperature in New England, or in the latitude of Boston, is not far from 20 above. I know that, because I took the trouble to ask Mr. Smith, the local observer. That would be three feet deep.*

Mr. Fiske. *I move that that be stricken out. Adopted.*

ANTI-FREEZING PROTECTION FOR MANHOLE PITS.

Fill the bottom of the pit with earth to level of bonnet on check valve. Place a deck or false wooden cover about a foot below the upper or cast iron or plank cover proper, of the manhole. Place several inches of mineral wool, tanbark, or sawdust on the false deck or cover; also a similar layer over bonnet of check valve if exposure is severe.

Mr. Cabot. *I don't believe I fully understand this, but if I do I don't think it is possible to do it. What this says is that you are to take the upper cover and put a deck over it. Now, we have two manhole pits in a driveway, and we can't put a deck over them.*

The Secretary. *It says to put a deck about a foot below the upper or cast-iron plate. In other words, temporarily the iron manhole top, which is on the surface of the road, and build this deck about a foot below it.*

Mr. Cabot. *Then the last part of it would not be possible. Several inches of mineral wool or tan bark in a driveway would look funny.*

The President. *You have got some eight or nine inches to spare then. On this deck is where the mineral wool is placed, and the deck is put below the cover, so that there is room enough for several inches of it.*

The section on "Underground Work " as amended was approved.

Miscellany.

USE THE OUTSIDE SHUT-OFF.

Where sprinkler systems have post indicator valves outside of building and also inside gates at foot of risers, it is desirable to use the outside post indicator gate for all periods of repair or other disablement of the sprinkler systems, leaving the inside valve open, thus never losing control of the system.

Mr. Cabot. *I shall have to move to strike that out, because that means you have got to shut off your whole system whether you have got a section valve or not.*

Mr. Hexamer. *I should like to ask Mr. Blauvelt's idea about that before that motion is put. He may have something in mind which we don't understand. Can you give us an example, Mr. Blauvelt?*

Mr. Blauvelt. *The idea of that is this: We have seen from our fire records submitted by the Secretary, also our general experience has taught us, that one of the great dangers of sprinkler failure is a fire occurring at the time of an interruption of the service; and the intent of an expression of this sort is to lead people to handle their sprinkler systems in such a manner that the controlling valves will always be accessible. Now, where the branch valve on the floor is shut off for repairs to the system, there being, say, a branch valve right in this room, I believe it is safer to shut off all the floor, that is, outside of the building, while you are making those repairs, knowing that no matter on which floor a fire may occur– you must expect, and you must have watchfulness of the system at that time–knowing then you have absolute control of the system, and that whether a fire occurs here or on some other floor, you can get to that indicator post and can use it, I believe you are in a more secure position than you are in taking the chances that the fire may occur on this floor, and you may not get to that valve, and you may have a severe fire which will carry away all the equipment, because of your inability to reach the valve. In addition to that, I favor something which will cause the outside indicator posts to be used occasionally, in order that the assured shall keep them in order, discover that they are out of order, if they are out of order. As matters stand at present these outside indicator post valves are put in the yard, but the inside gates are used altogether, very frequently leaving the control of the sprinkler system subject to fire at the time the inside gates are shut off, and I am inclined to think the part of wisdom is to encourage the use of the outside valves.*

Mr. Stratton. *I don't see how that can be accepted as a fact for general government and guidance. For instance, we have a 6-inch pipe running into a mill, controlled by a post indicator in the yard, and repairs are necessary in a sub-division of the sprinkler equipment which is controlled by a special valve. Now, I contend that to shut the valve which controls the portion of the sprinkler system in which you make repairs or make alterations, and leave it on from the indicator and riser on the rest of the building, is safer than to shut it all off and then disconnect a portion of the pipe from which you would lose the water if you turned it on from the outside. By that process you would cripple your whole system, whereas, to shut off the small portion on which you are making repairs would leave all the rest of the automatic system just as accessible and controllable by the outside valve as before. I think it would be questionable whether we could all agree upon this as a fact for general government.*

Mr. Blauvelt. *I think this might be loosened up a little by saying that it is usually desirable to use the outside post. I think it will be beyond dispute that it is usually preferable to use the outside post indicator gate, that you will usually have a more secure control of your protection. I think that is the principal usefulness of the outside indicator gate.*

Mr. Stratton. *I don't take that to be an accepted fact, that that is the function of a post indicator valve. I contend it is to fall back on in an extremity, when the building is wrecked, or something has occurred by which you have lost control of the water in the building and it can no longer do its service through sprinklers and cannot be reached or controlled by the internal valves. Then you fall back on the basis of supply, on the post indicator, to save that water. That is what it is for; it is not for general use.*

Mr. Blauvelt. *I think what you have just said, Mr. Stratton, is entirely opposed by the conditions that exist in practice, where buildings are sprinklered in places exposed to freezing, and intended to be turned on in case of fire. We then are very particular to put the valve, whether it be post indicator or other, where it is always accessible in case of fire.*

Mr. Stratton. *That is an entirely different thing. That is a special arrangement, and not the general function of the post indicator.*

Mr. Blauvelt. *Now, we cannot deny that inside valves are subject to fire attack, while the outside post indicator valves are usually not subject to fire attack. And I maintain that that is part of the usefulness of the outside post indicator gate, and that this section calls attention to that–to that usefulness of the post indicator gate–in addition to its use following up sprinkler failure, as you have already described. I believe in recognizing the post indicator gate for all it is worth.*

The Secretary. *As there does not seem to be a unanimous opinion on this subject I move we strike out this section. Adopted.*"

[**Discussion Continues on Other Subjects**]

Viewed over a century later, the discussion on sprinkler protection and sprinkler systems above seems to be a bit primitive, however, many of the issues debated in the discussion above where eventually addressed in later editions of the sprinkler installation standard.

Of particular interest is the discussion on the number of sprinklers expected to operate in a fire and the minimum (residual) pressure required for a sprinkler to operate properly.

In 1900, the concept of hazard classifications for sprinkler system had not been developed as of yet, hence, opinions on the number of sprinklers expected to operate would be expected to vary depending upon one's viewpoint and experience with various building occupancies.

Clearly, it was recognized in 1900 that the hazards of occupancy varied and that it was expected that the number of sprinklers which would operate would also vary depending upon the hazard of the occupancies. What appears not to have been recognized at this point in time is the fact that the flow from a sprinkler would have an impact on the system's capability to control a fire and that better control of a fire could be achieved with fewer sprinklers operating when the flow from the operating sprinklers was increased. (In other words, using the today's terminology, the greater the density achieved, the smaller the operating area of sprinklers which would be expected.)

Also of interest is the discussion of the minimum operating pressure required for a sprinkler to operate properly-2-1/2 psi. Today, the accepted pressure required for the proper operation of a sprinkler is 7 psi. Obviously, the sprinklers manufactured and utilized in 1900 differed greatly from the spray sprinklers manufactured and installed today. The change in the design of sprinklers from "old style" sprinklers to "spray sprinklers" utilized today occurred in the early 1950's.

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Source: "*Proceedings of the Fourth Annual* [NFPA] *Meeting*", New York, 1900.