

1991

Industrial Commission of Utah v. Mor-Flo Industries : Brief in Opposition to Certiorari

Utah Supreme Court

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Recommended Citation

Legal Brief, *Industrial Commission of Utah v. Mor-Flo Industries*, No. 910403.00 (Utah Supreme Court, 1991).
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BRIEF

910403

IN THE UTAH SUPREME COURT

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| INDUSTRIAL COMMISSION OF UTAH, |) | |
| Petitioner, |) | |
| |) | |
| v. |) | |
| |) | |
| MOR-FLO INDUSTRIES, INC., and |) | CERTIORARI DOCKET NO. 910403 |
| POLARIS WATER HEATERS/ |) | |
| ARLINGTON PLACE, |) | APPELLATE CASE NO. 900510-CA |
| |) | |
| Respondents. |) | |

ON WRIT OF CERTIORARI TO
THE UTAH SUPREME COURT

BRIEF OF RESPONDENTS IN OPPOSITION TO CERTIORARI

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UTAH

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CITATION OF COURT OF APPEALS OPINION

Mor-Flo Industries, Inc. and Polaris Water Heaters v. Board of Review of the Industrial Commission, 166 Utah Adv. Rep. 17 (CA, August 2, 1991)

CONSTITUTIONAL PROVISIONS AND STATUTES

Section 35-7-5 et seq. U.C.A. (Addendum A).

Selected provisions of the Boiler and Pressure Vessel Code published by the ASME (1986 edition) as adopted in §35-7-5 et seq. U.C.A. (Addendum B).

Selected provisions of the 1986 Addenda to the ASME Code as adopted in §35-7-5 et seq. U.C.A. (Addendum C).

Selected provisions of the 1988 Addenda to the ASME Code as adopted in §35-7-5 et seq. U.C.A. (Addendum D).

The State of Utah Boiler and Pressure Vessels Rules and Regulations. (Addendum E).

Section 58-56-4 U.C.A. (Addendum F).

Section 26-15-3 U.C.A. (Addendum G).

Selected provisions of the Uniform Plumbing Code as adopted in §§58-56-4 and 26-15-3 U.C.A. (Addendum H).

Selected provisions of the American National Standards Institute, Z21.10.1 as adopted in §§58-56-4 and 26-15-3 U.C.A. (Addendum I).

Selected provisions of the American National Standards Institute, Z21.10.3 as adopted in §§58-56-4 and 26-15-3 U.C.A. (Addendum J).

STATEMENT OF THE CASE

Nature of the Proceedings Below

In August 1989, the Safety Division of the Industrial Commission of Utah (the "Division") sent a letter to The Arlington Place condominiums requiring the removal from service of the Polaris water heaters ("Order for Removal") located there. The Division claimed that the Polaris did not comply with the Utah Boiler Code. (R. 10, 13-14). The Division argued that because the Polaris is used to provide both heated potable water and space heating, it is no longer a water heater (which would be exempt from the boiler code) but becomes a hot water heating boiler (subject to the boiler code). (R. 16-18). On September 27, 1989, Mor-Flo Industries, Inc. ("Mor-Flo"), the manufacturer of the Polaris, timely requested a hearing for review of the Order for Removal. It was and is Mor-Flo's position that the Polaris continues to be a water heater exempt from the Utah Boiler Code even when it is used to provide space heat. (Opinion, 2).

On March 22, 1990, an administrative hearing was held before Administrative Law Judge Janet L. Moffitt. At the hearing, James C. Parsell, Safety Director for the Division ("Parsell") and Charles W. Allison ("Allison") of the National Board of Boiler and Pressure Vessel Inspectors testified on behalf of the Division. (R. 2, 6, 28). Gary J. Bosma ("Bosma"), Vice President-Sales, Engineered Products, of Mor-Flo and Richard Hendricks ("Hendricks") of Mountain Fuel Supply Co. testified on behalf of Mor-Flo. (R. 2, 36, 63).

On May 4, 1990, Administrative Law Judge Moffitt issued Findings of Fact and Conclusions of Law and Order (the "Initial Order") and ruled that the Order for Removal of the Polaris units issued by the Division be enforced.

On May 31, 1990, Mor-Flo timely submitted its Motion for Review of the Initial Order to the Industrial Commission of Utah ("Industrial Commission"). On August 22, 1990, the Industrial Commission of Utah affirmed the Initial Order enforcing the Order for Removal (the "Order").

On October 10, 1990, Mor-Flo timely filed its appeal with the Utah Court of Appeals. Amicus Briefs were filed in support of Mor-Flo by the American Gas Association, The Gas Appliance Manufacturers Association, First Co. and State Industries, Inc. On August 2, 1991, the Utah Court of Appeals issued its Opinion unanimously reversing and vacating the Order.

On September 3, 1991, the Industrial Commission filed its Petition for Writ of Certiorari with this Court.

The Utah Regulatory Program

Section 35-7-5 et seq. U.C.A. adopts the Boiler and Pressure Vessel Code published by the American Society of Mechanical Engineers ("ASME" or "ASME Code") for enforcement in Utah. (R. 9). The ASME Code is a construction code for boilers and pressure vessels to protect the health and welfare of the public. The Division has also issued The State of Utah Boiler and Pressure Vessel Rules and Regulations ("Utah Boiler Code"), which is substantially the same as the ASME Code. (R. 9). The Utah Boiler

Code expressly incorporates all of the provisions of the ASME Code. See Utah Boiler Code, Part II, §1(a). No provision in the Utah Boiler Code or ASME Code addresses the use of otherwise exempt residential-size water heaters to provide both potable water and space heating. (R. 19-20).

Sections 58-56-4 and 26-15-3 U.C.A. adopt the Uniform Plumbing Code for enforcement in Utah. This code is enforced and administered by the Utah Department of Health. The Uniform Plumbing Code incorporates by reference the standards published by the American National Standards Institute ("ANSI"). (R. 63-64; Opinion, 5). ANSI sets forth the construction standards for residential-size water heaters and virtually all types of gas-burning appliance equipment. (R. 51). ANSI contains express provisions governing the use of water heaters to provide both potable water and space heating. (R. 49). The Polaris complies with those standards. (R. 50-53).

Statement of the Facts

Mor-Flo manufactures water heaters, including the Polaris. Mor-Flo does not manufacture boilers. (R. 36-37). The Polaris is a residential-size water heater built to ANSI specifications under Utah law, which has an optional coil attachment and blower for the purpose of space heating. (R. 37, 42, 43, 50-53). The Division has never argued that the Polaris does not meet the ANSI construction standards nor its definitions. (R. 22-23).

In a typical residential-size water heater, including the Polaris, cold water enters the water heater from a cold water

supply system, and the water is then heated to carefully controlled temperature zones within the water heater. The heated water leaves the water heater through pipes that lead to hot water taps in kitchens and bathrooms. (R. 38).

Optional piping, called a recirculating loop, can be added to water heaters, including the Polaris. A recirculating loop is typically used (for example, in hotels or motels) where it is desirable to immediately have hot water at the faucet in each room. Often, a hotel's or apartment building's water heating system is a long distance from the water heater, and, consequently long piping runs from the water heater to the various rooms. Without a recirculating loop, a tenant would have to wait a long time for cold water to drain out of these pipes before receiving hot water. The addition of a recirculating loop causes hot water to continuously circulate from the water heater to the faucet (and back to the water heater), so that when the tenant turns on a faucet, hot water is immediately available for use. (R. 38-40). The ASME has determined that a water heater used with a recirculating loop does not become subject to the ASME Code. (R. 40-41; Trial Exhibit R-2). Consequently, a Polaris with a recirculating loop is not regulated by the ASME Code or the identical Utah Boiler Code. (R. 41).

The Polaris can be used to provide both potable water heating and space heating. When this is done, a pipe is attached to the Polaris water heater that is essentially the same as a recirculating loop and is sometimes called a coil. When the owner

desires space heat, heated water is circulated through this coil, and a fan (which is not a part of the water heater) blows air across this coil throughout the ductwork in the house. The water in the coil recirculates - in the same fashion as a recirculating loop - back into the Polaris water heater where it is reheated. Simultaneously, the water heater continues to provide hot potable water to faucets, dish washers, etc. (R. 42-45; Trial Exhibits D-1 and R-3). The Polaris water heater is not modified in any substantial way to provide space heat. The fan blowing air over the coil attachment does not change the operation of the water heater. (R. 42-45; Opinion, 2).

The Division acknowledges that the Utah Boiler Code does not prohibit the use of a water heater for both potable water and space heating. Likewise, nothing in the Utah Boiler Code expressly or impliedly states that a water heater used for space heating becomes a boiler required to be built to the ASME Code. (R. 18-20). The purpose of the Utah Boiler Code and the ASME Code is safety. (R. 25).

The Uniform Plumbing Code, through ANSI, expressly provides regulations for the use of water heaters that provide both potable water and space heating. (R. 49). See ANSI Z21.10.1 at §§1.30.6, 1.31.3 and ANSI Z21.10.3 at §§1.30.5, 1.31.3. The Polaris complies with the ANSI standards. (R. 50-53). Moreover, the American Gas Association has certified the Polaris to these standards. (R. 53). The purpose of the ANSI standards is safety. (R. 50-53).

The Utah Department of Health, which regulates water heaters through the Utah Uniform Plumbing Code (incorporating ANSI) has expressly stated that it does not have any safety concerns with respect to the use of water heaters, like the Polaris, to provide both potable water and space heating. (R. 25, 62). Furthermore, the Division cannot specify any safety concerns that it has with the use of water heaters to provide both potable water and space heating. (R. 25).

SUMMARY OF ARGUMENT

1. Rule 46 of the Utah Rules of Appellate Procedure sets forth the considerations for review of Court of Appeals decisions, and provides that review will only be granted for "special and important reasons." The Industrial Commission ignores the framework established by Rule 46 and does not even address its requirements. An analysis of Rule 46 demonstrates that the Industrial Commission presents no case suitable for review. The Industrial Commission merely reargues all of the same issues that the Court of Appeals has already examined and unanimously decided against the Industrial Commission. The issues presented by the Industrial Commission are not "special and important reasons" for review and are not sufficiently important to warrant this Court's attention.

2. In making its decision, the Court of Appeals fully and properly analyzed the statutory program of boiler and water heater regulations. As part of its analysis, the Court of Appeals

properly ruled that the Utah Boiler Code does not even have construction standards for the Polaris. The record unequivocally evidences this point.

3. The Court of Appeals properly weighed the evidence. The purported experts that testified on behalf of the Division had no expertise relative to the Polaris or the ANSI standards that govern the Polaris. These purported experts knew nothing about the construction of the Polaris or how it works. These purported experts had absolutely no basis to even form an opinion.

4. The Court of Appeals properly determined that no legitimate safety concern is furthered by imposing on the Polaris the construction requirements of the Utah Boiler Code because the safety of the Polaris is fully regulated by the Utah Department of Health.

ARGUMENT

I. **THE INDUSTRIAL COMMISSION HAS FAILED TO ASSERT ANY PROPER JURISDICTIONAL GROUND FOR REVIEW AND NO SUCH GROUND EXISTS.**

The Industrial Commission's Petition is defective because it does not meet the considerations for review set forth in Rule 46 of the Utah Rules of Appellate Procedure. In its Statement of Jurisdiction, the Industrial Commission's sole stated basis for jurisdiction is §78-2-3(5) U.C.A. (Industrial Commission's Petition, 3). That statute was repealed in 1986; and that statute never did provide any jurisdictional basis for review by this Court.

The Industrial Commission never attempts to explain the "special and important reasons" for the issuance of a writ as required under Rule 46. The Industrial Commission does not argue that any of the subsections of Rule 46 justify review. Indeed, an analysis of Rule 46 demonstrates that there is no reason for review. Rule 46 provides:

Rule 46. Considerations governing review of certiorari.

Review by a writ of certiorari is not a matter of right, but of judicial discretion, and will be granted only for special and important reasons. The following, while neither controlling nor wholly measuring the Supreme Court's discretion, indicate the character of reasons that will be considered:

(a) When a panel of the Court of Appeals has rendered a decision in conflict with a decision of another panel of the Court of Appeals on the same issue of law;

(b) When a panel of the Court of Appeals has decided a question of state or federal law in a way that is in conflict with a decision of the Supreme Court;

(c) When a panel of the Court of Appeals has rendered a decision that has so far departed from the accepted and usual course of judicial proceedings or has so far sanctioned such a departure by a lower court as to call for an exercise of the Supreme Court's power of supervision; or

(d) When the Court of Appeals has decided an important question of municipal, state, or federal law which has not been, but should be, settled by the Supreme Court.

None of the provisions of Rule 46 provide grounds for certiorari in this litigation.

Subsection A: The opinion rendered by the Court of Appeals does not conflict with another Court of Appeals decision on the same issue of law. The Industrial Commission does not claim that there is such a conflict. This subsection provides no basis for review.

Subsection B: The opinion rendered by the Court of Appeals does not conflict with a decision of this Court.¹ The opinion properly applies and follows existing precedent. The Industrial Commission does not claim that there is a conflict. This subsection provides no basis for review.

Subsection C: The opinion rendered by the Court of Appeals has not departed from the accepted and usual course of judicial proceedings. The Court of Appeals has properly followed the rules for reviewing agency decisions as set forth in §63-46b-16 U.C.A. The Court of Appeals has followed and correctly applied existing precedent. The Industrial Commission does not claim that there is any departure from the usual course of judicial proceedings. This subsection provides no basis for review.

¹In analyzing which standard of review to apply, the Court of Appeals applied this Court's recent landmark ruling in Morton Intern., Inc. v. Auditing Div., 814 P.2d 581 (Utah 1991). The Industrial Commission claims that the Court of Appeals analysis of this decision was inaccurate. Regardless, this argument is moot and provides no basis for review because the Court of Appeals ultimately accepted the reasonableness standard for review as requested by the Industrial Commission.

Subsection D: The issues presented by the Industrial Commission are not sufficiently important to warrant this Court's attention. The Industrial Commission does not argue that the Court of Appeals decided an important question of law. It did not. The Court of Appeals simply made a determination regarding which construction standard governs the construction of the Polaris water heater. (Opinion, 9-10). The Court of Appeals ruled that the Polaris should be constructed according to the clearly applicable Utah Plumbing Code. (Opinion 10). Nothing is unique about this opinion; it is a typical review of an agency action. This subsection provides no basis for review.

Rule 46 sets forth the framework for certiorari review of the Court of Appeals. The Industrial Commission did not even attempt to follow this rule. Instead, the Industrial Commission has resubmitted all of the same arguments that it presented to the Court of Appeals. All of those arguments were rejected. No basis exists for review under Rule 46. This Court should deny the Industrial Commission's Petition.

II. THE DECISION BELOW GAVE FULL CONSIDERATION TO THE ISSUES AND DECIDED THEM CORRECTLY.

The Industrial Commission argues that the Court of Appeals made certain errors in its Opinion and those errors justify review. The Industrial Commission is simply attempting to reargue the exact issues it presented before the Court of Appeals, and the record is no greater support for the Industrial Commission's arguments here than at the Court of Appeals. The law does not support any of these arguments.

The arguments presented by the Industrial Commission in its Petition for Certiorari encompass seven headnotes. Those arguments are repetitious and confusing. For the sake of clarity and brevity, Mor-Flo will not separately respond to each assignment of error claimed by the Industrial Commission. Instead, Mor-Flo will respond to the four central issues raised by the Industrial Commission.

A. The Court Of Appeals Properly Applied Utah's Statutory Program Of Boiler And Water Heater Regulations.

The Industrial Commission argues that the Court of Appeals did not fully examine the Utah Boiler Code and its legislative purpose. As support for this argument, the Industrial Commission takes out of context a statement made by the Court of Appeals in connection with its analysis of which standard of review to apply.

The Court of Appeals applied the intermediate standard of review (reasonableness and rationality) pursuant to this Court's earlier opinions. (Opinion, 5). This is the standard that the Industrial Commission argued should govern the appeal. (Industrial Commission's Brief, 3). Mor-Flo argued that the correction of error standard was the appropriate standard of review. (Mor-Flo's Brief, 7). In analyzing which standard to apply, the Court of Appeals stated:

In Morton Int'l, the [Supreme C]ourt acknowledged that UAPA did not change the applicable standard of review where the agency has been granted discretion, but the court noted that, "nothing in the language of section 63-46b-16 or its legislative history suggests that an agency's decision is entitled to deference solely on the basis of agency expertise or experience." Morton Int'l, 163

Utah Adv. Rep. at 36. The [Supreme Court concluded that "absent a grant of discretion, a correction-of-error standard is used in reviewing an agency's interpretation or application of a statutory term." Id. at 36-37. [Emphasis added.]

(Opinion, 4).

The Court of Appeals then ruled that it was unnecessary to decide if agency discretion was involved because even under the more deferential intermediate standard, Mor-Flo would prevail:

We need not review the Boiler Code in depth, nor refer to legislative history to determine whether to apply a correction of error or a reasonableness standard of review in this case, as we have concluded that, even utilizing the more deferential intermediate standard, the Commission's interpretation of the Boiler Code was not reasonable. [Emphasis added.]

(Opinion, 5). As a practical matter, the legislature did not grant the Industrial Commission discretion in this area, having adopted the detailed ANSI and ASME codes by statute. The Morton Int'l rule, therefore, requires no deference to the Industrial Commission and a correction of error standard be applied.

In its Petition, the Industrial Commission takes this quote out of context and argues that the Court of Appeals did not do an in depth review of the Utah Boiler Code. However, a full and proper reading of the Opinion reveals that the Court of Appeals limited its review of the boiler code only in connection with its decision regarding the standard of review. Once the Court of Appeals decided which standard of review to apply, it showed a full analysis of the two construction codes and their legislative purposes. (Opinion, 5-10). The Industrial Commission's argument

that the Court of Appeals did not fully analyze the various codes completely lacks merit and provides no basis for review.

B. The Court Of Appeals Properly Weighed The Evidence.

The Court of Appeals properly reviewed and weighed all of the evidence. "We do not grant a certiorari to review evidence and discuss specific facts," United States v. Johnson, 268 U.S. 200, 227 (1925). The Industrial Commission continues to argue that it presented expert testimony that the Polaris was a boiler. The record unequivocally demonstrates that the Industrial Commission has no expertise regarding the Polaris.

The Industrial Commission, through the Division, issued the Utah Boiler Code. See Utah Boiler Code. Accordingly, the Division is the group within the Industrial Commission that has expertise over the Utah Boiler Code. It is undisputed that the Utah Boiler Code does not address water heaters used to provide both potable water and space heating. (R. 19-20). Moreover, as revealed during the hearing of this action, the Division has no knowledge, let alone expertise, relative to the Polaris. The Division does not know what the Polaris is. (R. 20). The Division has merely seen the outside of the Polaris and does not know anything about its construction. (R. 25-26). Similarly, Allison, who testified on behalf of the Division, does not know anything about how the Polaris functions. He has not even seen a Polaris. (R. 32-33). Therefore, the Division (and, consequently, the Industrial Commission) has no expertise in this subject, and, in fact, is not even familiar with the Polaris.

In addition, the Industrial Commission and the Division do not even have experience with water heaters when they are of residential size, such as the Polaris. Those residential size water heaters are exempt from the Utah Boiler Code and are not under the jurisdiction of the Division. (R. 26-27). Finally, the Division has no experience with the application of the ANSI standards to water heaters. (R. 23-24).

Therefore, the purported Industrial Commission experts had neither expertise nor knowledge concerning the Polaris. They had no basis to form an opinion. Additionally, those experts were not even familiar with the construction standards already adopted by Utah for water heaters such as the Polaris. This argument has no merit and provides no basis for review.

C. The Court Of Appeals Properly Determined That The Utah Boiler Code Has No Construction Standards For The Polaris.

Mor-Flo demonstrated that the Polaris does not fall within the jurisdiction of the Industrial Commission because the Polaris is not a product regulated by the Utah Boiler Code. The Polaris is a water heater and is regulated by the Utah Department of Health. As partial support for its position, Mor-Flo produced evidence showing that the Utah Boiler Code does not have construction standards for the Polaris. The Court of Appeals agreed and ruled:

Furthermore, it is undisputed that the Utah Boiler Code and associated rules contain no construction standards applicable to combination units such as the Polaris. It would be absurd to require the Polaris to meet ASME requirements when there are no specific

construction requirements for combination units. [Emphasis added.]

(Opinion, 9).

Incredibly, the Industrial Commission continues to argue that construction standards exist for the Polaris under the Utah Boiler Code. The Industrial Commission, however, cannot identify those construction standards. (R. 18-19). The Division admits that the Utah Boiler Code does not address the use of a water heater to provide both potable water and space heating. (R. 18-19). There are not any construction specifications in the Utah Boiler Code for these water heaters. (R. 55).

In an effort to circumvent this problem, the Industrial Commission relies on the testimony of Charles W. Allison ("Allison") of the National Board of Boiler and Pressure Vessel Inspectors, who testified on behalf of the Division, for the proposition that the Utah Boiler Code contains construction standards for the Polaris. (R. 2, 6, 28). Yet, in his testimony, Allison does not specify what the construction standards are for the Polaris. In fact, a review of the transcript reveals that Allison did not testify that the Polaris can be built to specifications of the ASME Code or the Utah Boiler Code. (R. 31-32). Moreover, Allison admitted that he was not familiar with the Polaris; he has not seen a Polaris; he does not know how it works; and he does not know whether it meets the water heater exemptions from the ASME Code. (R. 32-34). Consequently, Allison provided no support for the Industrial Commission's argument that

the Utah Boiler Code contains construction standards for the Polaris.

The Industrial Commission has not identified a single construction standard for the Polaris in the Utah Boiler Code. The Industrial Commission is attempting to regulate the Polaris to a non-existent construction standard. The Industrial Commission's argument has no merit and provides no basis for review.

D. The Court Of Appeals Properly Ruled That No Legitimate Safety Concern Is Furthered By Imposing On The Polaris The Construction Requirements Of The Utah Boiler Code And That The Safety Of The Polaris Is Fully Regulated By The Department Of Health.

Even though there is no support in the record, the Industrial Commission continues to argue in a conclusory fashion that there are safety concerns regarding the Polaris. The Court of Appeals ruled:

. . . the Commission does not allege that the Polaris poses any kind of safety risk. The Commission's inspector did not identify any safety concerns regarding the Polaris. The purpose of the Utah Boiler Code is to promote the safety of the public by allowing the Commission to regulate boilers and pressure vessels for safety reasons. Accordingly, exempting the Polaris from regulation under the Utah Boiler Code does not defeat the purpose of the statutory scheme as the unit is incapable of reaching boiler temperatures and fits more narrowly under the definitional requirements for a water heater. The Polaris will be regulated for safety by the Department of Health as it is a residential size hot water heater subject to ANSI standards.
[Emphasis added.]

(Opinion, 9-10). This ruling is clearly supported by the record. The Division testified that the purpose of the Utah Boiler Code is safety. (R. 25-26). The Division testified that the Utah

Department of Health has no safety concerns. (R. 25).
Furthermore, the Division testified that it did not have any specific safety concerns relating to the Polaris. In fact, the Division could not specify one safety concern relating to the Polaris. (R. 25-26).

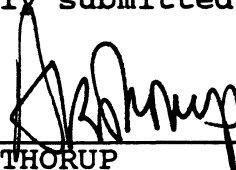
Moreover, the Polaris complies with the ANSI safety standards for use of a water heater that provides both potable water and space heating. (R. 50). The American Gas Association has certified the Polaris to the ANSI standards. (R. 53).

Therefore, there is no evidence in the record showing that there are any legitimate safety concerns with respect to the Polaris. Moreover, the Polaris is fully regulated for safety by the Department of Health. This argument has no merit and provides no basis for review.

CONCLUSION

For the reasons set forth above, Mor-Flo respectfully requests this Court to deny the Petition for Writ of Certiorari.

Respectfully submitted,



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ADDENDUM A

CHAPTER 7

BOILER INSPECTION LAW

Sunset Act. — Section 63-55-7 provides that Title 35 terminates on July 1, 1995.

| Section | Section |
|---|--|
| 35-7-1 to 35-7-4. Repealed. | |
| 35-7-5. Scope of act — Exemptions. | Inspection certificate — Suspension of inspection certificate — Duration — Standards of commission inspectors. |
| 35-7-6. Standards for construction and design — Special approved designs — Maintenance requirements. | 35-7-8. Fees. |
| 35-7-7. Annual inspection requirement — Inspection intervals, maximum — Insurance company inspections — | 35-7-9. Violation of act — Misdemeanor — Penalty. |

35-7-1 to 35-7-4. Repealed.

Repeals. — Sections 35-7-1 to 35-7-4 (L. 1945, ch. 72, §§ 1 to 4; C. 1943, Supp., 42-7-1 to 42-7-4), relating to boiler inspection, were repealed by Laws 1967, ch. 69, § 6. For present provisions, see 35-7-5 et seq.

35-7-5. Scope of act — Exemptions.

This act shall, except as otherwise provided herein, cover all boilers and pressure vessels used in industrial or manufacturing establishments, business establishments, sawmills, construction jobs and every place where workmen or the public may be exposed to the risks thereof. This act shall not apply to:

- a. Boilers subject to inspection, control or regulation under or pursuant to the terms of any law or regulation of the U.S. Government or any of its agencies.
- b. Air tanks located on vehicles used for transporting passengers or freight.
- c. Pressure vessels operated entirely full of water or other liquid which is not materially more hazardous than water, provided the temperature of the vessel contents does not exceed 150° F.
- d. Water heater tanks of the type commonly known as domestic water heaters.
- e. Pressure vessels meeting the requirements of the Interstate Commerce Commission for shipment of liquids or gases under pressure.
- f. Boilers and pressure vessels which are excluded from the Boiler and Pressure Vessel Code published by the American Society of Mechanical Engineers.

History: L. 1967, ch. 69, § 1.
Meaning of "this act". — The term "this act", referred to in this section, means Laws

1967, Chapter 69, which appears as §§ 35-7-5 to 35-7-9.

COLLATERAL REFERENCES

Am. Jur. 2d. — 26 Am Jur. 2d Electricity,
Gas, and Steam § 17.

C.J.S. — 82 C.J.S. Steam § 1.
Key Numbers. — Steam ⇐ 1.

35-7-6. Standards for construction and design — Special approved designs — Maintenance requirements.

For the purposes of this act the standards for the design and construction of new boilers and new pressure vessels shall be the latest applicable provisions of the Boiler and Pressure Vessel Code published by the American Society of Mechanical Engineers. This act shall not be construed as preventing the construction and use of boilers or pressure vessels of special design, subject to approval of the Utah Industrial Commission, provided such special design provides a level of safety equivalent to that contemplated by the Boiler and Pressure Vessel Code of the American Society of Mechanical Engineers. Boiler and pressure vessels, including existing boilers and pressure vessels, shall be maintained in safe operating condition for the service involved.

History: L. 1967, ch. 69, § 2.
Meaning of "this act". — See same catch-
line in notes following § 35-7-5.

COLLATERAL REFERENCES

Am. Jur. 2d. — 26 Am. Jur. 2d Electricity,
Gas, and Steam § 17.

C.J.S. — 82 C.J.S. Steam § 12.
Key Numbers. — Steam ⇐ 1.

35-7-7. Annual inspection requirement — Inspection intervals, maximum — Insurance company inspections — Inspection certificate — Suspension of inspection certificate — Duration — Standards of commission inspectors.

On and after July 1, 1967, each boiler used or proposed to be used within this state, except boilers exempt under Section 35-7-5, shall be thoroughly inspected internally and externally, annually (except as otherwise herein provided), while not under pressure, by the industrial commission or by inspectors approved and deputized by said commission as to its safety of construction, installation, condition, and operation. If at any time a hydrostatic test shall be deemed necessary by the industrial commission to determine the safety of a boiler, the same shall be made at the direction of the commission, allowing a reasonable time for owner or user to comply. Not more than fourteen months shall elapse between internal inspections of boilers, except not more than thirty months between internal inspections of large power boilers (those operated and monitored continuously with adequate maintenance, combustion, and water controls). The industrial commission may extend the inspection interval in writing when proper evidence has been presented as to method of operation, performance records and water treatment. All low pressure boilers (steam fifteen pounds per square inch pressure and water sixty pounds per square inch pressure, maximum) shall be internally and exter-

nally inspected at least biennially where construction will permit. Boilers inspected by deputized inspectors employed by insurance companies, if made within the time limits herein provided, shall be considered to meet the provisions of this act if reports of such inspections are filed with the Industrial Commission within thirty days after such inspection, and if such boilers are certified by such inspectors employed by insurance companies as being safe to operate for the purpose for which they are being used; and such inspection and filing of such report with the Industrial Commission shall exempt such boiler or boilers from inspection fees herein provided.

If a boiler shall, upon inspection, be found to be suitable and to conform to the rules and regulations of the Industrial Commission, the inspector shall issue to such owner or user an inspection certificate.

The Industrial Commission may at any time suspend an inspection certificate when in its opinion the boiler for which it was issued may not continue to be operated without menace to the public safety or when the boiler is found not to comply with the safety rules of the commission. Such suspension of an inspection certificate shall continue in effect until such boiler shall have been made to conform to the safety rules of the Industrial Commission and a new certificate is issued.

Inspectors deputized or employed by the Industrial Commission under this act shall meet at all times nationally recognized standards of qualifications of fitness and competence for such work.

History: L. 1967, ch. 69, § 3.

COLLATERAL REFERENCES

Am. Jur. 2d. — 26 Am. Jur. 2d Electricity,
Gas, and Steam § 17.

C.J.S. — 82 C.J.S. Steam § 14.
Key Numbers. — Steam, ¶ 4.

35-7-8. Fees.

The owner or user of a boiler required by this chapter to be inspected shall pay to the secretary of the Industrial Commission fees for inspection or for permits to operate in amounts set by the Industrial Commission pursuant to Subsection 63-38-3(2). The secretary of the Industrial Commission shall pay all sums so received to the state treasurer.

History: L. 1967, ch. 69, § 4; 1983, ch. 15,
§ 1; 1984 (2nd S.S.), ch. 15, § 46.

Amendment Notes. — The 1984 (2nd S.S.)
amendment substituted "chapter" for "act" in
the first sentence; added "pursuant to Subsec-

tion 63-38-3(2)" to the first sentence; deleted a
second sentence which read: "Such fees shall
not exceed \$100 per boiler"; and made minor
changes in phraseology.

COLLATERAL REFERENCES

C.J.S. — 82 C.J.S. Steam § 3.
Key Numbers. — Steam ¶ 3.

35-7-9. Violation of act — Misdemeanor — Penalty.

On and after July 1, 1967, it shall be unlawful for any person, firm, partnership or corporation to operate a boiler or pressure vessel to which this act applies in violation of this act. Such violation shall constitute a misdemeanor on the part of the owner, user or operator thereof, and be punishable for a fine not exceeding \$100 or imprisonment not to exceed ninety days or both, at the discretion of the court.

History: L. 1967, ch. 69, § 5.

Meaning of "this act". — See same catchline in notes following § 35-7-5.

ADDENDUM B

M

HEATING BOILERS



1986 ASME BOILER AND
PRESSURE VESSEL CODE



ASME BOILER AND PRESSURE VESSEL CODE
AN AMERICAN NATIONAL STANDARD

SECTION IV
Rules for Construction of
Heating Boilers

1986 EDITION

JULY 1, 1986



ASME BOILER AND PRESSURE VESSEL COMMITTEE
SUBCOMMITTEE ON HEATING BOILERS

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
United Engineering Center 345 East 47th Street New York, N.Y. 10017

Date of Issue — July 1, 1986
(Includes all Addenda dated December 1985 and earlier)

This code or standard was developed under procedures accredited as meeting the criteria for American National Standards. The Consensus Committee that approved the code or standard was balanced to assure that individuals from competent and concerned interests have had an opportunity to participate. The proposed code or standard was made available for public review and comment which provides an opportunity for additional public input from industry, academia, regulatory agencies, and the public-at-large.

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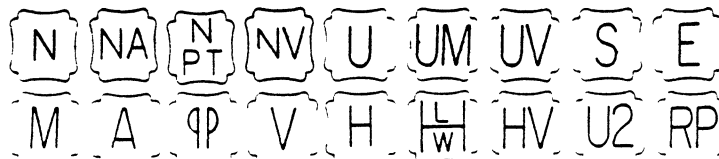
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Library of Congress Catalog Card Number 56-3934
Printed in the United States of America

Adopted by the Council of the American Society of Mechanical Engineers, 1914
Revised 1940, 1941, 1943, 1946, 1949, 1952, 1953, 1956, 1959, 1962, 1965, 1968, 1971, 1974, 1977, 1980, 1983, 1986

1986 ASME BOILER AND PRESSURE VESSEL CODE

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- II Material Specifications
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 - Part B — Nonferrous Materials
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- III Division 1
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 - Subsection NE — Class MC Components
 - Subsection NF — Component Supports
 - Subsection NG — Core Support Structures
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ADDENDA

Colored-sheet Addenda, which include additions and revisions to individual Sections of the Code, are published annually and will be sent automatically to purchasers of the applicable Sections up to the publication of the 1989 Code. The 1986 Code is available only in the loose-leaf format; accordingly, the Addenda will be issued in the loose-leaf, replacement-page format.

INTERPRETATIONS

ASME issues written replies to inquiries concerning interpretation of technical aspects of the Code. The Interpretations for each individual Section will be published separately and will be included as part of the update service to that Section. They will be issued semiannually (July and December) up to the publication of the 1989 Code. Interpretations of Section III, Divisions 1 and 2, will be included with the update service to Subsection NCA. Interpretations are not part of the Code or the Addenda.

CODE CASES

The Boiler and Pressure Vessel Committee meets regularly to consider proposed additions and revisions to the Code and to formulate Cases to clarify the intent of existing requirements or provide, when the need is urgent, rules for materials or constructions not covered by existing Code rules. Those Cases which have been adopted will appear in the appropriate 1986 Code Cases book: (1) Boilers and Pressure Vessels and (2) Nuclear Components. Supplements will be sent automatically to the purchasers of the Code Cases books up to the publication of the 1989 Code.

FOREWORD

The American Society of Mechanical Engineers set up a committee in 1911 for the purpose of formulating standard rules for the construction of steam boilers and other pressure vessels. This committee is now called the Boiler and Pressure Vessel Committee.

The Committee's function is to establish rules of safety governing the design, fabrication, and inspection during construction of boilers and pressure vessels, and to interpret these rules when questions arise regarding their intent. In formulating the rules, the Committee considers the needs of users, manufacturers, and inspectors of pressure vessels. The objective of the rules is to afford reasonably certain protection of life and property and to provide a margin for deterioration in service so as to give a reasonably long, safe period of usefulness. Advancements in design and material and the evidence of experience have been recognized.

The Boiler and Pressure Vessel Committee deals with the care and inspection of boilers and pressure vessels in service only to the extent of providing suggested rules of good practice as an aid to owners and their inspectors.

The rules established by the Committee are not to be interpreted as approving, recommending, or endorsing any proprietary or specific design or as limiting in any way the manufacturer's freedom to choose any method of design or any form of construction that conforms to the Code rules.

The Boiler and Pressure Vessel Committee meets regularly to consider revisions of the rules, new rules as dictated by technological development, Code Cases, and requests for interpretations. Requests for interpretation must be addressed to the Secretary in writing and must give full particulars in order to receive consideration and a written interpretation (see Mandatory Appendix covering preparation of technical inquiries). Proposed revisions to the Code resulting from inquiries will be presented to the Main Committee for appropriate action. The action of the Main Committee becomes effective only after confirmation by letter ballot of the Committee and approval by ASME.

Proposed revisions to the Code approved by the Committee are submitted to the American National Standards Institute and published in *Mechanical Engineering* to invite comments from all interested persons. After the allotted time for public review and final approval by ASME, revisions are published annually in Addenda to the Code.

Code Cases may be used in the construction of components to be stamped with the ASME Code symbol beginning with the date of their approval by ASME.

After Code revisions are approved by ASME, they may be used beginning with the date of issuance shown on the Addenda. Revisions become mandatory as minimum requirements six months after such date of issuance, except for boilers or pressure vessels contracted for prior to the end of the six-month period.

Manufacturers and users of components are cautioned against making use of revisions and Cases that are less restrictive than former requirements without having assurance that they have been accepted by the proper authorities in the jurisdiction where the component is to be installed.

Each state and municipality in the United States and each province in the Dominion of Canada that adopts or accepts one or more Sections of the Boiler and Pressure Vessel Code is invited to appoint a representative to act on the Conference Committee to the Boiler and Pressure Vessel Committee. Since the members of the Conference Committee are in active contact with the administration and enforcement of the rules, the requirements for inspection in this Code correspond with those in effect in their respective jurisdictions. The required qualifications for an Authorized Inspector or an Authorized Nuclear Inspector under these rules may be obtained from the administrative authority of any state, municipality, or province which has adopted these rules.

The Boiler and Pressure Vessel Committee in the formulation of its rules and in the establishment of maximum design and operating pressures considers materials, construction, methods of fabrication, in-

spection, and safety devices. Permission may be granted to regulatory bodies and organizations publishing safety standards to use a complete Section of the Code by reference. If usage of a Section, such as Section IX, involves exceptions, omissions, or changes in provisions, the intent of the Code might not be attained.

Where a state or other regulatory body, in the printing of any Section of the Boiler and Pressure Vessel Code, makes additions or omissions, it is recommended that such changes be clearly indicated.

The National Board of Boiler and Pressure Vessel Inspectors is composed of chief inspectors of states and municipalities in the United States and of provinces in the Dominion of Canada that have adopted the Boiler and Pressure Vessel Code. This Board, since its organization in 1919, has functioned to uniformly administer and enforce the rules of the Boiler and Pressure Vessel Code. The cooperation of that organization with the Boiler and Pressure Vessel Committee has been extremely helpful.

It should be pointed out that the state or municipality where the Boiler and Pressure Vessel Code has been made effective has definite jurisdiction over any particular installation. Inquiries dealing with problems of local character should be directed to the proper authority of such state or municipality. Such authority may, if there is any question or doubt as to the proper interpretation, refer the question to the Boiler and Pressure Vessel Committee.

The Specifications for base materials given in Section II, Parts A and B, are identical with or similar to those of The American Society for Testing and Materials. When reference is made in an ASME Material Specification to an ASTM Specification for which a companion ASME Specification exists, the reference shall be interpreted as applying to the ASME Material Specification. Specifications for welding materials given in Section II, Part C, are identical

with or similar to those of the American Welding Society. Not all materials included in the ASME Material Specifications in Section II have been adopted for Code use. Usage is limited to those materials and grades adopted by at least one of the other Sections of the Code for application under rules of that Section. All materials allowed by these various Sections and used for construction within the scope of their rules shall be furnished in accordance with ASME Material Specifications contained in Section II except where otherwise provided in Code Cases or in the applicable Section of the Code. Materials covered by these Specifications are acceptable for use in items covered by the Code Sections only to the degree indicated in the applicable Section. Materials for Code use should preferably be ordered, produced, and documented on this basis; however, material produced under an ASTM Specification may be used in lieu of the corresponding ASME Specification, provided the requirements of the ASTM Specification are identical (excluding editorial differences) or more stringent than the ASME Specification for the Grade, Class, or Type produced and provided that the material is confirmed as complying with the ASTM Specification. Material produced to an ASTM specification with requirements different from the requirements of the corresponding ASME Specification may also be used in accordance with the above, provided the material manufacturer or vessel manufacturer certifies with evidence acceptable to the Authorized Inspector or Authorized Nuclear Inspector that the corresponding ASME Specification requirements have been met. Material produced to an ASME or ASTM Material Specification is not limited as to country of origin.

When required by context in this Section, the singular shall be interpreted as the plural, and vice-versa; and the feminine, masculine, or neuter gender shall be treated as such other gender as appropriate.

STATEMENT OF POLICY ON THE USE OF CODE SYMBOLS AND CODE AUTHORIZATION IN ADVERTISING

ASME has established procedures to authorize qualified organizations to perform various activities in accordance with the requirements of the ASME Boiler and Pressure Vessel Code. It is the aim of the Society to provide recognition of organizations so authorized. An organization holding authorization to perform various activities in accordance with the requirements of the Code may state this capability in its advertising literature.

Organizations that are authorized to use Code Symbols for marking items or constructions which have been constructed and inspected in compliance with the ASME Boiler and Pressure Vessel Code are issued Certificates of Authorization. It is the aim of the Society to maintain the standing of the Code Symbols for the benefit of the users, the enforcement jurisdictions, and the holders of the symbols who comply with all requirements.

Based on these objectives, the following policy has been established on the usage in advertising of facsimiles of the symbols, Certificates of Authorization, and reference to Code construction. The Ameri-

can Society of Mechanical Engineers does not "approve," "certify," "rate," or "endorse" any item, construction, or activity and there shall be no statements or implications which might so indicate. An organization holding a Code Symbol and/or a Certificate of Authorization may state in advertising literature that items, constructions, or activities "are built (produced or performed) or activities conducted in accordance with the requirements of the ASME Boiler and Pressure Vessel Code," or "meet the requirements of the ASME Boiler and Pressure Vessel Code."

The ASME Symbol shall be used only for stamping and nameplates as specifically provided in the Code. However, facsimiles may be used for the purpose of fostering the use of such construction. Such usage may be by an association or a society, or by a holder of a Code Symbol who may also use the facsimile in advertising to show that clearly specified items will carry the symbol. General usage is permitted only when all of a manufacturer's items are constructed under the rules.

STATEMENT OF POLICY ON THE USE OF ASME MARKING TO IDENTIFY MANUFACTURED ITEMS

The ASME Boiler and Pressure Vessel Code provides rules for the construction of boilers, pressure vessels, and nuclear components. This includes requirements for materials, design, fabrication, examination, inspection, and stamping. Items constructed in accordance with all of the applicable rules of the Code are identified with the official Code Symbol Stamp described in the governing Section of the Code.

Markings such as "ASME," "ASME Standard," or any other marking including "ASME" or the various Code Symbols shall not be used on any item which is

not constructed in accordance with all of the applicable requirements of the Code.

Items shall not be described on ASME Data Report Forms nor on similar forms referring to ASME which tend to imply that all Code requirements have been met when, in fact, they have not been. Data Report Forms covering items not fully complying with ASME requirements should not refer to ASME or they should clearly identify all exceptions to the ASME requirements.

PART HG

GENERAL REQUIREMENTS FOR ALL MATERIALS OF CONSTRUCTION

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ARTICLE 1

SCOPE AND SERVICE RESTRICTIONS

HG-100 SCOPE

The requirements of Part HG apply to steam heating boilers, hot water heating boilers, hot water supply boilers, and to appurtenances thereto, and shall be used in conjunction with the specific requirements in Part HF, Boilers of Wrought Materials, and Part HC, Cast Iron Boilers, whichever is applicable. Part HG is not intended to apply to potable water heaters except as provided for in Part HLW.

HG-101 SERVICE RESTRICTIONS

HG-101.1 Service Restrictions. The rules of this Section are restricted to the following services:

(a) steam boilers for operation at pressures not exceeding 15 psi;

(b) hot water heating boilers and hot water supply boilers for operating at pressures not exceeding 160 psi and/or temperatures not exceeding 250°F, at or near the boiler outlet.

HG-101.2 Services in Excess of Those Covered by This Section. For services exceeding the limits specified in HG-101.1, the rules of Section I shall apply.

PART HLW

REQUIREMENTS FOR POTABLE WATER HEATERS

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INTRODUCTION

The following is a brief introduction to Part HLW. It is general in nature, and should not be considered as a substitute for actual review of appropriate articles of the document. However, this will give the user a better understanding of the purpose, requirements, and intent of Part HLW.

HISTORY

Since the major use of water heaters is to supply clean, potable water for various cleaning purposes, after which the water is discarded, and inasmuch as the maximum water temperature is 210°F, the design, development, testing, corrosion protection, controls, installation, and end use are so different from heating boilers, it became necessary to establish separate requirements in this Section for lined water heaters supplying potable hot water for commercial purposes other than for space heating. Part HLW was prepared by a Special Task Group established by the Chairman of the ASME Subcommittee on Heating Boilers in October 1967. The Task Group prepared these rules in the course of 15 meetings held over a period of approximately 3 years and took cognizance of those requirements that are peculiar to lined water heaters. The protective linings utilized not only extend the useful life of water heaters but also provide rust-free potable water. The lining materials included in Part HLW are those which are in general use in the industry and include glass, galvanized zinc, portland cement, copper, fluorocarbon-based polymer linings, and amine or polyamine epoxy linings. Part HLW includes gas, oil, and electrically heated water heaters.

Coverage was later expanded to allow construction of lined vessels for the storage of potable water. Except for marking, construction requirements are the same as for fired vessels.

It was later recognized that some structural materials had sufficient corrosion resistance to be utilized in the construction of potable water vessels. Although unlined, a vessel so constructed would comply with

the intent of Part HLW to supply clean, potable water. The scope was expanded to include water heaters and storage tanks so constructed.

GENERAL

Part HLW applies to water heaters in commercial or industrial sizes providing corrosion resistance for supplying potable hot water for commercial purposes. A water heater is defined as a closed vessel in which water is heated and withdrawn for use external to the system at pressures not exceeding 160 psig and temperatures not exceeding 210°F. Application to residential size water heaters is not intended and is excluded by the provisions of HLW-101.

Differences in applicable criteria for water heaters versus hot water heating boilers are as follows.

(a) In a water heater, the temperature of the water is limited to a maximum of 210°F.

(b) A water heater is intended to directly supply potable water for external use, with 100% makeup.

(c) To supply rust-free potable hot water, a water heater is provided with a corrosion resistant lining or constructed with corrosion resistant materials.

(d) Since a water heater is directly connected to a potable water supply system, certain controls and indicating instruments, such as a water level indicator, low and high water cut-offs, and pressure and altitude gauges, are not necessary on a water heater.

(e) Since the demand for potable hot water can be intermittent and of short duration, considerations are given to minimize the temperature gradation within the water heater to control the temperature of discharge water.

The following is a brief outline of the contents of each Article of Part HLW.

Article 1 — General

The scope of Part HLW is given, and definitions of the various water heaters are stated.

Article 2 — Materials

The material requirements for the linings permitted are specified as well as the lining thickness requirements. The material requirements specified for the lining materials were, in general, taken from existing standards by abstracting those requirements which were considered to be those essential for the applications covered by these rules. Minimum thicknesses for the backing materials for use with each of the water heater linings is specified.

Article 3 — Design

The design criteria for water heaters is given in Article 3. The pressure is specified as a maximum allowable working pressure of 160 psi with a minimum of 100 psi. The maximum water temperature permitted is 210°F.

The maximum allowable working pressure of the water heater shall be established in accordance with the proof test provision of HLW-500. As an alternative, stress values in Table HLW-300 may be used in calculations employing the available formulas when applicable to the geometry of the lined water heater or parts.

Article 4 — Weldments

The provisions for weldment joint design are similar to those given elsewhere in this Section and in Section VIII, Division 1. In addition, some acceptable joint designs are provided which have been commonly used in the construction of water heaters and have provided satisfactory service performance.

Article 5 — Tests

Proof test procedure is delineated for establishing the maximum allowable working pressure of a water heater or parts, and this test is required to be witnessed and accepted by the Authorized Inspector. The Manufacturers' Master Data Proof Test Report for Lined Water Heaters shall be certified by the designated responsible engineering head of the Manufacturer and the forms shall be kept on file by the Manufacturer as a matter of record.

Article 6 — Inspection and Stamping

Inspection and stamping requirements for water heaters are given. An "HLW" Code symbol stamp is provided for water heaters made in accordance with Part HLW of Section IV.

Article 7 — Controls

Each water heater is required to have an operating control and a separate high-limit temperature-actuated control which shuts off the fuel supply in case of operating control failure. Water heaters should be equipped with suitable primary safety controls, safety limit switches, burners, or electric elements as appropriate and as required by a nationally recognized Standard. Examples of these nationally recognized Standards are listed.

Article 8 — Installation

Some acceptable piping installations are shown. Provisions for the installation of safety relief valves and other valves are given.

ARTICLE 1

GENERAL

HLW-100 SCOPE

(a) The rules in Part HLW are applicable to water heaters providing corrosion resistance for supplying potable hot water for commercial purposes (exceeding the limitations of exceptions of HLW-101) other than for space heating.

(b) Linings for lined water heaters are limited to porcelain enameled (glass lined), galvanizing, cement, copper, fluorocarbon polymer linings, and amine or polyamine epoxy linings (see HLW-200).

(1) Glass lined water heaters are defined as those with fired glass internal coatings which are hot water resistant.

(2) Galvanized water heaters are defined as those that are hot zinc dipped after the assembly has been welded.

(3) Cement lined water heaters are those that are lined with a low-soluble, hydraulic, cement-lining material.

(4) Copper-lined water heaters are defined as those that are completely lined with sheet copper.

(5) Fluorocarbon polymer-lined water heaters are defined as those that are lined with a thermosetting fluorocarbon polymer combined with other stabilizing ingredients and applied after all fabrication has been completed.

(6) Amine or polyamine epoxy-lined water heaters are defined as those that are lined with amine or polyamine epoxy of an analysis for use in potable hot water service.

(c) The materials used in the construction of unlined corrosion resistant water heaters are limited to those listed in Table HLW-301.

(d) Tanks built under the rules of Part HLW may be used for storage of potable water. Article 7 need not apply.

(e) Water heaters and tanks built under the rules of Part HLW may be provided with cathodic protection.

(f) Any water heater or storage tank that meets all of the requirements of Part HLW, including those for inspection, may be stamped with the Code HLW symbol even though exempted from such stamping.

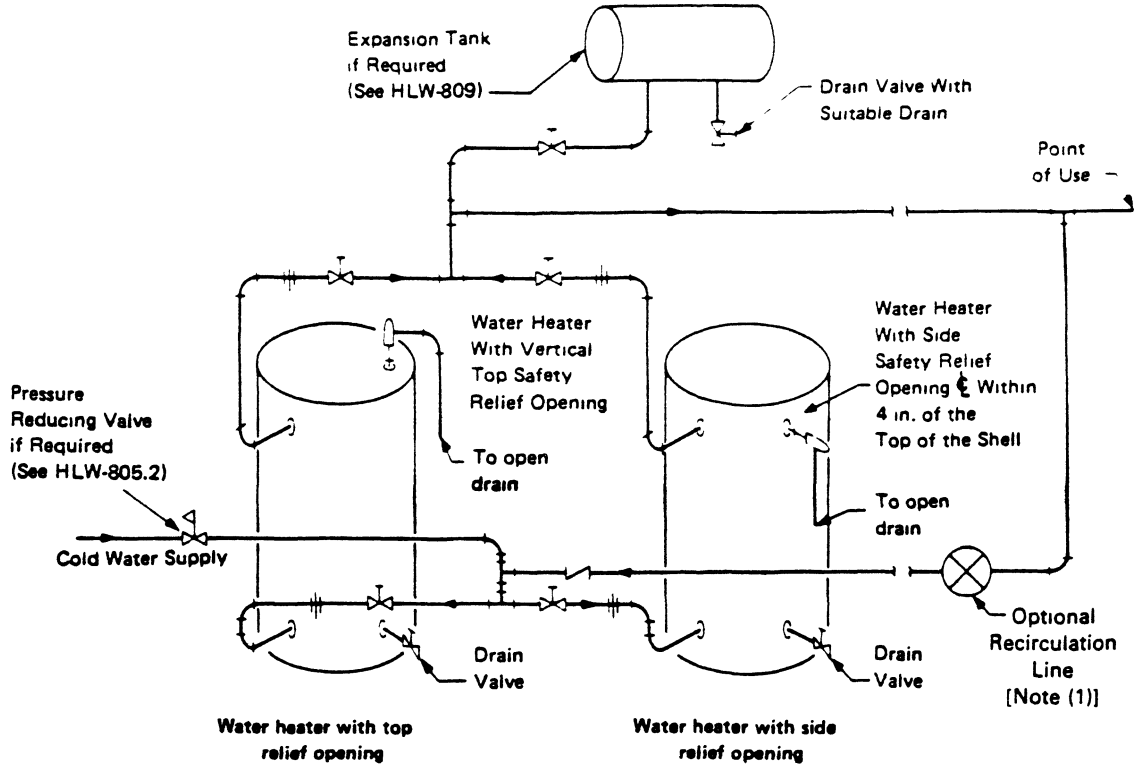
HLW-101 SERVICE RESTRICTION AND EXCEPTION

The rules of Part HLW are restricted to potable water heaters and water storage tanks for operation at pressures not exceeding 160 psi and water temperatures not in excess of 210°F, except that water heaters are exempted when none of the following limitations is exceeded:

(a) heat input of 200,000 Btu/hr;

(b) water temperature of 210°F;

(c) nominal water-containing capacity of 120 gal, except that they shall be equipped with safety devices in accordance with the requirements of HLW-800.



NOTE:
 (1) Recirculation system may be gravity or pump-actuated

FIG. HLW-809.1 A TYPICAL ACCEPTABLE PIPING INSTALLATION FOR STORAGE WATER HEATERS IN BATTERY

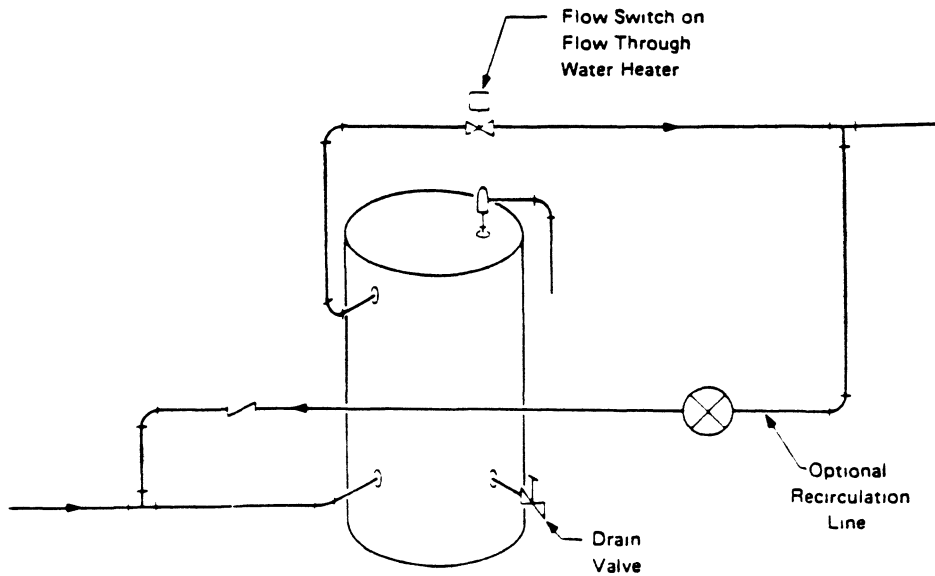


FIG. HLW-809.2 A TYPICAL ACCEPTABLE PIPING INSTALLATION FOR FLOW THROUGH WATER HEATER WITH PROVISIONS FOR PIPING EXPANSION

APPENDIX E

DEFINITIONS

E-100 TERMS RELATING TO DESIGN

Action, Popping, or Pop — The action of a safety or safety relief valve when it opens under steam pressure. The disk of the valve is designed so that the force of the steam lifting the disk is increased when the disk is lifted slightly off its seat. The increase in force accelerates the rising action of the disk to the wide open position at or near the opening pressure.

Blowdown — The difference between the opening and closing pressures of a safety or relief valve.

Boiler, Automatically Fired — A boiler equipped with a means of introducing heat or of causing fuel, whether solid, liquid, gaseous, or electric, to be introduced into the boiler or boiler furnace, the means being so regulated by the rate of flow, the generating pressure, or temperature of the boiler fluid or of a vessel or space being heated as to maintain a determined, desired condition within a designated tolerance.

Boiler, Horizontal-Return Tubular — A firetube boiler consisting of a cylindrical shell, with tubes inside the shell attached to both end closures. The products of combustion pass under the bottom half of the shell and return through the tubes.

Bottom Blowoff Valve — A valve or cock located in the bottom blowoff connection of a boiler which, when opened, permits free passage of scale and sediment during the blowoff operation. If the blowoff outlet connection is so located that it will drain the lowest water space practicable, a separate drain connection is not necessary.

Column, Fluid Relief — That piping, connected to the top of a hot water heating boiler, which is provided for the thermal expansion of the water. It will connect to either an open or a closed expansion tank.

Drain Valve — A valve or cock located in a boiler connection which, when opened, will drain the lowest water space practicable.

Electric Boiler, Submerged Electrode Type — A

submerged electrode type electric boiler incorporates a design wherein two or more metallic electrodes are directly suspended in the boiler water. When a source of electric power is connected to the electrodes, current will flow between the electrodes and through the water, thus raising the temperature of the water to produce steam.

Electric Boiler, Resistance Heating Element Type — Electric boilers of the resistance heating element type are either:

(a) of a design where the electric resistance element is directly attached to the external surface of the pressure vessel; or

(b) an immersed type where the electric resistance element is inserted through an opening in the pressure vessel so that the element is in direct contact with the water.

Feedwater — Water introduced into a boiler during operation. Includes makeup and return condensate or return water.

Flue — A hollow cylinder exceeding 5 in. in outside diameter and used for the conveyance of gases with a temperature 850°F or less.

Furnace — A hollow cylinder exceeding 5 in. in outside diameter in which combustion takes place or used for the conveyance of gases having a temperature exceeding 850°F or less.

Gases, Primary Furnace — Primary furnace gases are those in a zone where the anticipated temperature of the gas exceeds 850°F.

Hot Water Heating Boiler — A boiler in which no steam is generated, from which hot water is circulated for heating purposes and then returned to the boiler, and which operates at a pressure not exceeding 160 psig or a temperature of 250°F at or near the boiler outlet.

Hot Water Supply Boiler — A boiler completely filled with water that furnishes hot water to be used externally to itself at pressures not exceeding 160 psig or at temperatures not exceeding 250°F at or near the boiler outlet.

Joints, Swing — Threaded, flanged, welded, or brazed pipe and fittings so arranged that the piping system which they comprise, when connected to a boiler, can expand and contract without imposing excessive force on it.

Lined Potable Water Heater — A water heater with a corrosion resistant lining, used to supply potable hot water.

Makeup Water — Water introduced into the boiler to replace that lost or removed from the system.

Pressure, Accumulation Test — That steam pressure at which the capacity of a safety, safety relief, or a relief valve is determined. It is $33\frac{1}{3}\%$ over the steam safety valve set pressure and 10% over the safety relief valve set pressure.

Pressure, Design — The pressure used in the design of a boiler for the purpose of determining the minimum permissible thickness or physical characteristics of the different parts of the boiler. When applicable, static head shall be added to the design pressure to determine the thickness of any specific part of the boiler.

Pressure, Maximum Allowable — The maximum gage pressure permissible on a completed boiler. This pressure is based on calculations for every element of the boiler using nominal thickness exclusive of allowances for corrosion and thickness required for loadings other than pressure. It is the basis for the pressure setting of the pressure relieving devices protecting the boiler.

Pressure, Operating — The pressure of a boiler at which it normally operates. It shall not exceed the maximum allowable working pressure and it is usually kept at a suitable level below the setting of the pressure relieving devices to prevent their frequent opening.

Rated, Officially — A safety, safety relief, or relief valve for use on a heating boiler which has been capacity rated in accordance with HG-402.

Stress, Maximum Allowable — The maximum allowable stress is the maximum unit stress permitted in a given material used in boiler constructed under these rules. The maximum allowable tensile stress values permitted for different materials are given in Tables HF-300.1, HF-300.2, and HC-300.

Siphon — A bent pipe or tube, between a steam pressure gage and the steam connection on a boiler, so fabricated that it contains a water seal which prevents steam entering the Bourdon tube of the gage.

Surface, Heating, Square Feet of — The heating surface of a boiler is that area of the boiler surface exposed to the products of combustion. In computing the heating surface for the purpose of determining the safety or relief valve requirements, only the tubes,

fireboxes, shells, tubesheets and the projected area of the headers need be considered, except that for vertical firetube boilers only that portion of the tube surface up to the middle point of the gage glass is to be computed.

Thickness, Required — The required thickness is that computed by the formulas in this Code.

Tube, Fire — Shall mean a hollow cylinder 5 in. (127 mm) or less in outside diameter and used for the conveyance of gases, flame, or hot air.

Tube, Water — Shall mean a hollow cylinder used for the conveyance of liquids.

Unlined Water Heater—A water heater made from materials that are resistant to the corrosion action of potable hot water.

Valve, Pressure-Temperature Relief — An automatic relieving device actuated by the static pressure upstream of the valve (which opens further with increase in the pressure over the opening pressure) or by the temperature of the fluid. It is used primarily for liquid service.

Valve, Safety — An automatic pressure relieving device actuated by the static pressure upstream of the valve and characterized by full-opening pop action. It is used for gas or vapor service.

Valve, Safety, Lift of — The movement of the disk off the seat of a safety, safety relief, or relief valve when the valve is opened. It normally refers to the amount of movement of the disk off the seat when the valve is discharging at rated pressure.

Valve, Safety Relief — An automatic pressure relieving device actuated by the pressure upstream of the valve and characterized by opening pop action with further increase in lift with an increase in pressure over popping pressure.

Water Heater — A closed vessel in which water is heated by the combustion of fuels, electricity, or any other source and withdrawn for use external to the system at pressures not exceeding 160 psig and shall include the apparatus by which heat is generated and all controls and devices necessary to prevent water temperatures from exceeding 210°F.

Wet-Bottom Boiler — The term wet-bottom boiler shall mean any type of boiler which has a stayed or self-supporting, partially or fully water-cooled, shell or furnace bottom.

E-101 TERMS RELATING TO WELDING

Arc Stud Welding — An arc welding process wherein coalescence is produced by heating with an arc drawn between a metal stud, or similar part, until the surfaces to be joined are properly heated, when

ADDENDUM C

1986 Addenda

Date of Issue: December 31, 1986

ASME BOILER AND PRESSURE VESSEL CODE An American National Standard

SECTION IV Heating Boilers

1986 Edition

Addenda to the 1986 Edition of the Code are issued in the form of replacement pages. Revisions, additions, or deletions are incorporated directly into the affected pages. It is advisable, however, that these title sheets and all replaced pages be retained for reference.

SUMMARY OF CHANGES

This is the first Addenda to be published to the 1986 Edition of Section IV.

Replace or insert the pages listed. Changes given below are identified on the pages by a margin note, **A86**, placed next to the affected area. The pages not listed are the reverse sides of the listed pages and contain no changes.

| <i>Page</i> | <i>Location</i> | <i>Change</i> |
|-------------|-----------------|---|
| v, vi | Foreword | (1) Tenth, fourteenth, and fifteenth paragraphs revised (2) New last paragraph added |
| ix-xix | Personnel | Revised in its entirety |
| 2 | Contents | Updated to reflect 1986 Addenda |
| 19 | HG-312.7(f) | HG-312.7(e)(5) corrected by Errata to read HG-312.7(f) |
| 42, 42.1 | HG-402.2(f) | Added |
| 43 | HG-402.5 | Third line corrected by Errata |
| 44 | HG-406 | Deleted |
| 45 | HG-501.1(a) | Revised |
| | HG-501.1(b) | Revised |
| 48 | HG-510 | Revised |
| 57, 58 | HG-603(d) | Revised |
| 69 | Contents | Updated to reflect 1986 Addenda |
| 72-75 | HF-201 | Revised in its entirety |

| Page | Location | Change |
|------------|----------------|---|
| 72-75 | HF-204.2 | Revised |
| 79-80.1 | Table HF-300.1 | (1) Under Forgings, Carbon Steels, SA-182 F316 and F316L added (2) Under Plate, Alloy Steel, SA-240 316 and 316L added (3) Under Tube, Alloy Steel, SA-213 316 and 316L and SA-249 316 and 316L added (4) Note (15) revised |
| 135, 136 | Contents | Updated to reflect 1986 Addenda |
| 141 | HLW-100(a) | Revised |
| | HLW-100(f) | (1) Redesignated as subparagraph (g) (2) New subparagraph (f) added |
| | HLW-100(g) | See item above for HLW-100(f) |
| 143 | HLW-201(c) | Revised |
| 147, 147.1 | Table HLW-301 | (1) Under Plate, Alloy Steel: (a) SA-240 304, 304L, 316, and 316L added (b) Note references for SA-240 XM-8 revised (2) Under Tube, Alloy Steel: (a) SA-213 304, 304L, 316, and 316L and SA-249 304, 304L, 316, and 316L added (b) Note references for SA-268 XM-8 revised (3) Under Bar, Alloy Steel: (a) SA-479 304, 304L, 316, and 316L added (b) Note references for SA-479 XM-8 revised (4) New grouping Pipe, Alloy Steel added with eight grades of SA-312 (5) New grouping Forgings, Alloy Steel added with SA-182 F304, F304L, F316, and F316L (6)(a) Note (1) revised (b) Notes (2) through (4) redesignated as (3) through (5), respectively; new Note (2) added (c) Note (6) added |
| 163 | HLW-504 | Revised |
| 165, 166 | HLW-601 | Title revised |
| | HLW-601.1 | Revised |
| | HLW-602.3 | Added |
| 192 | F-100.1 | Revised |
| 193 | F-202.11 | Added |

FOREWORD

The American Society of Mechanical Engineers set up a committee in 1911 for the purpose of formulating standard rules for the construction of steam boilers and other pressure vessels. This committee is now called the Boiler and Pressure Vessel Committee.

The Committee's function is to establish rules of safety governing the design, fabrication, and inspection during construction of boilers and pressure vessels, and to interpret these rules when questions arise regarding their intent. In formulating the rules, the Committee considers the needs of users, manufacturers, and inspectors of pressure vessels. The objective of the rules is to afford reasonably certain protection of life and property and to provide a margin for deterioration in service so as to give a reasonably long, safe period of usefulness. Advancements in design and material and the evidence of experience have been recognized.

The Boiler and Pressure Vessel Committee deals with the care and inspection of boilers and pressure vessels in service only to the extent of providing suggested rules of good practice as an aid to owners and their inspectors.

The rules established by the Committee are not to be interpreted as approving, recommending, or endorsing any proprietary or specific design or as limiting in any way the manufacturer's freedom to choose any method of design or any form of construction that conforms to the Code rules.

The Boiler and Pressure Vessel Committee meets regularly to consider revisions of the rules, new rules as dictated by technological development, Code Cases, and requests for interpretations. Requests for interpretation must be addressed to the Secretary in writing and must give full particulars in order to receive consideration and a written interpretation (see Mandatory Appendix covering preparation of technical inquiries). Proposed revisions to the Code resulting from inquiries will be presented to the Main Committee for appropriate action. The action of the Main

Committee becomes effective only after confirmation by letter ballot of the Committee and approval by ASME.

Proposed revisions to the Code approved by the Committee are submitted to the American National Standards Institute and published in *Mechanical Engineering* to invite comments from all interested persons. After the allotted time for public review and final approval by ASME, revisions are published annually in Addenda to the Code.

Code Cases may be used in the construction of components to be stamped with the ASME Code symbol beginning with the date of their approval by ASME.

After Code revisions are approved by ASME, they may be used beginning with the date of issuance shown on the Addenda. Revisions become mandatory as minimum requirements six months after such date of issuance, except for boilers or pressure vessels contracted for prior to the end of the six-month period.

Manufacturers and users of components are cautioned against making use of revisions and Cases that are less restrictive than former requirements without having assurance that they have been accepted by the proper authorities in the jurisdiction where the component is to be installed.

Each state and municipality in the United States and each province in the Dominion of Canada that adopts or accepts one or more Sections of the Boiler and Pressure Vessel Code is invited to appoint a representative to act on the Conference Committee to the Boiler and Pressure Vessel Committee. Since the members of the Conference Committee are in active contact with the administration and enforcement of the rules, the requirements for inspection in this Code correspond with those in effect in their respective jurisdictions. The required qualifications for an Authorized Inspector under these rules may be obtained

from the administrative authority of any state, municipality, or province which has adopted these rules.

The Boiler and Pressure Vessel Committee in the formulation of its rules and in the establishment of maximum design and operating pressures considers materials, construction, methods of fabrication, inspection, and safety devices. Permission may be granted to regulatory bodies and organizations publishing safety standards to use a complete Section of the Code by reference. If usage of a Section, such as Section IX, involves exceptions, omissions, or changes in provisions, the intent of the Code might not be attained.

Where a state or other regulatory body, in the printing of any Section of the Boiler and Pressure Vessel Code, makes additions or omissions, it is recommended that such changes be clearly indicated.

The National Board of Boiler and Pressure Vessel Inspectors is composed of chief inspectors of states and municipalities in the United States and of provinces in the Dominion of Canada that have adopted the Boiler and Pressure Vessel Code. This Board, since its organization in 1919, has functioned to uniformly administer and enforce the rules of the Boiler and Pressure Vessel Code. The cooperation of that organization with the Boiler and Pressure Vessel Committee has been extremely helpful.

186 It should be pointed out that the state or municipality where the Boiler and Pressure Vessel Code has been made effective has definite jurisdiction over any particular installation. Inquiries dealing with problems of local character should be directed to the proper authority of such state or municipality. States, provinces, municipalities, or other regulatory bodies may, if there is any question or doubt as to the proper interpretation, refer the question to the Boiler and Pressure Vessel Committee.

186 The Specifications for base materials given in Section II, Parts A and B, are identical with or similar to those of The American Society for Testing and Materials. When reference is made in an ASME Material Specification to an ASTM Specification for which a companion ASME Specification exists, the reference shall be interpreted as applying to the

ASME Material Specification. Specifications for welding materials given in Section II, Part C, are identical with or similar to those of the American Welding Society. Not all materials included in the ASME Material Specifications in Section II have been adopted for Code use. Usage is limited to those materials and grades adopted by at least one of the other Sections of the Code for application under rules of that Section. All materials allowed by these various Sections and used for construction within the scope of their rules shall be furnished in accordance with ASME Material Specifications contained in Section II except where otherwise provided in Code Cases or in the applicable Section of the Code. Materials covered by these Specifications are acceptable for use in items covered by the Code Sections only to the degree indicated in the applicable Section. Materials for Code use should preferably be ordered, produced, and documented on this basis; however, material produced under an ASTM Specification may be used in lieu of the corresponding ASME Specification, provided the requirements of the ASTM Specification are identical (excluding editorial differences) or more stringent than the ASME Specification for the Grade, Class, or Type produced and provided that the material is confirmed as complying with the ASTM Specification. Material produced to an ASTM specification with requirements different from the requirements of the corresponding ASME Specification may also be used in accordance with the above, provided the material manufacturer or vessel manufacturer certifies with evidence acceptable to the Authorized Inspector that the corresponding ASME Specification requirements have been met. Material produced to an ASME or ASTM Material Specification is not limited as to country of origin.

When required by context in this Section, the singular shall be interpreted as the plural, and vice-versa; and the feminine, masculine, or neuter gender shall be treated as such other gender as appropriate.

Publication of the SI (Metric) Edition of the ASME Boiler and Pressure Vessel Code was discontinued with the 1986 Edition. Effective October 1, 1986, the SI Edition was withdrawn as an ASME Boiler and Pressure Vessel Code document.

A86

ARTICLE 1

GENERAL

HLW-100 SCOPE

A86

(a) The rules in Part HLW are applicable to water heaters providing corrosion resistance for supplying potable hot water for commercial purposes at pressures not exceeding 160 psi and temperatures not in excess of 210°F. Part HLW is not intended to apply to hot water heating boilers.

(b) Linings for lined water heaters are limited to porcelain enameled (glass lined), galvanizing, cement, copper, fluorocarbon polymer linings, and amine or polyamine epoxy linings (see HLW-200).

(1) Glass lined water heaters are defined as those with fired glass internal coatings which are hot water resistant.

(2) Galvanized water heaters are defined as those that are hot zinc dipped after the assembly has been welded.

(3) Cement lined water heaters are those that are lined with a low-soluble, hydraulic, cement-lining material.

(4) Copper-lined water heaters are defined as those that are completely lined with sheet copper.

(5) Fluorocarbon polymer-lined water heaters are defined as those that are lined with a thermosetting fluorocarbon polymer combined with other stabilizing ingredients and applied after all fabrication has been completed.

(6) Amine or polyamine epoxy-lined water heaters are defined as those that are lined with amine or polyamine epoxy of an analysis for use in potable hot water service.

(c) The materials used in the construction of unlined corrosion resistant water heaters are limited to those listed in Table HLW-301.

(d) Tanks built under the rules of Part HLW may be used for storage of potable water. Article 7 need not apply.

(e) Water heaters and tanks built under the rules of Part HLW may be provided with cathodic protection.

(f) Water heaters used for deionized water fabricated of stainless steel listed in Table HLW-301 may be built to Part HLW provided:

A86

(1) all welding meets the requirements of Section IX;

(2) the maximum thickness shall be $\frac{1}{2}$ in.

(g) Any water heater or storage tank that meets all of the requirements of Part HLW, including those for inspection, may be stamped with the Code HLW symbol even though exempted from such stamping.

A86

ADDENDUM D

1988 Addenda

Date of Issue: December 31, 1988

ASME BOILER AND PRESSURE VESSEL CODE An American National Standard

SECTION IV Heating Boilers

1986 Edition

Addenda to the 1986 Edition of the Code are issued in the form of replacement pages. Revisions, additions, or deletions are incorporated directly into the affected pages. It is advisable, however, that these title sheets and all replaced pages be retained for reference.

SUMMARY OF CHANGES

This is the third and last Addenda to be published to the 1986 Edition of Section IV. Previous Addenda were published in 1986 and 1987.

Replace or insert the pages listed. Changes given below are identified on the pages by a margin note, **A88**, placed next to the affected area. Previous Addenda changes are indicated by **A86** and **A87**. The pages not listed are the reverse sides of the listed pages and contain no changes.

| <i>Page</i> | <i>Location</i> | <i>Change</i> |
|-------------|-----------------------|--|
| ix-xix | Personnel | Revised in its entirety |
| 4 | Part HG Contents | Updated to reflect A88 |
| 37 | HG-360.2(e) | Added |
| 43 | HG-402.4 | Revised |
| | HG-402.5 | Revised |
| 54 | HG-533.3 | Third line corrected by Errata |
| 65 | Table HG-709.2 | Revised |
| 136 | Part HLW Contents | Updated to reflect A88 |
| 139 | Part HLW Introduction | (1) History deleted (2) General heading deleted and its text revised |
| 146 | Table HLW-300 | SA-106 Grade C added |
| 147, 147.1 | Table HLW-301 | (1) Max. Allowable Design Stress column revised (2) S44400 added as follows: (a) Under Plate, Alloy Steel, to SA-240 |

| <i>Page</i> | <i>Location</i> | <i>Change</i> |
|-------------|-----------------|--|
| 147, 147.1 | Table HLW-301 | (b) Under Tube, Alloy Steel, to SA-268 in two places (c) Under Bar, Alloy Steel, to SA-479 (3) Reference to Note (8) added as follows: (a) Under Tube, Alloy Steel, to SA-249 in four places (b) Under Pipe, Alloy Steel, to all four Wld. Pp. entries of SA-312 (4) Note (4) revised and Notes (7) and (8) added |
| 148 | HLW-303 | New last paragraph added by Errata |
| 157, 157.1 | HLW-431.5(c) | Revised |
| | HLW-431.6 | (1) Redesignated as HLW-431.7 (2) New HLW-431.6 added |
| | HLW-431.7 | Redesignated as HLW-431.8 |
| 162 | HLW-501 | Last paragraph revised |
| 169 | HLW-805 | Title revised |
| | HLW-805.1 | Title added |
| | HLW-805.2 | Revised |
| | HLW-805.3 | HLW-809.3 redesignated as HLW-805.3 |
| | Table HLW-809.1 | Revised |
| | HLW-809.1 | Revised |
| 170 | Fig. HLW-809.1 | (1) Callouts reset for easier use and readability (2) General Note added |
| | Fig. HLW-809.2 | (1) Callouts reset for easier use and readability (2) General Note added |
| 187 | E-100 | Definition of <i>Bottom Blowoff Valve and Gases, Primary Furnace</i> revised |
| 188 | E-100 | Following definitions revised: <i>Pressure, Design</i> <i>Stress, Maximum Allowable</i> <i>Surface, Heating, Square Feet of</i> <i>Thickness, Required</i> <i>Tube, Fire</i> <i>Tube, Water</i> <i>Wet-Bottom Boiler</i> |

NOTE:

Volume 23 of the Interpretations to Section IV of the ASME Boiler and Pressure Vessel Code follows the last page of this Addenda. The Interpretations are not part of the Code or the Addenda and are included for information only.

INTRODUCTION

A88

The following is a brief introduction to Part HLW. It is general in nature, and should not be considered as a substitute for actual review of appropriate articles of the document. However, this will give the user a better understanding of the purpose, requirements, and intent of Part HLW.

Part HLW applies to water heaters in commercial or industrial sizes providing corrosion resistance for supplying potable hot water for commercial purposes at pressures not exceeding 160 psig and temperatures not exceeding 210°F.

Part HLW does not apply to residential size water heaters which are excluded by provisions of HLW-101 and hot water heating boilers.

Differences in applicable criteria for water heaters versus hot water heating boilers are as follows.

(a) In a water heater, the temperature of the water is limited to a maximum of 210°F.

(b) A water heater is provided with a corrosion resistant lining or constructed with corrosion resistant materials.

(c) A water heater is intended to supply potable hot water with 100% makeup from a potable water supply system. Therefore, certain controls and indicating instruments, such as a water level indicator, low and high water cut-offs, and pressure and altitude gages, are not necessary on a water heater. Vessels built under the rules of Part HLW may be used for storage of potable water.

The following is a brief outline of the contents of each Article of Part HLW.

Article 1 — General

The scope of Part HLW is given, and definitions of the various water heaters are stated.

ADDENDUM E

THE STATE OF UTAH
BOILER AND PRESSURE VESSEL
RULES AND REGULATIONS



EFFECTIVE

OCTOBER 1, 1988

REVISED AND APPROVED BY THE BOILER REVIEW BOARD

MAY 31, 1988

ISSUED BY
THE INDUSTRIAL COMMISSION OF UTAH
SAFETY DIVISION

REV. 3

SPECIAL ATTENTION!

**EFFECTIVE 1ST OF JANUARY 1984,
ALL NEW BOILERS INSTALLED IN THIS
STATE SHALL BE INSPECTED BY A
BOILER INSPECTOR FROM THE INDUS-
TRIAL COMMISSION OF UTAH FOR
CODE COMPLIANCE, AND THE AFFIX-
ING OF A STATE BOILER NUMBER.**

CAUTION

**KINDLY OBSERVE THE FOLLOWING BRIEFS AND AVOID UN-
NECESSARY INCONVENIENCE**

DO NOT buy secondhand boilers or pressure vessels for use in this State without notifying this Department and securing permission for operation of same. See Part II, Article 24.

DO NOT operate any boilers or pressure vessels until same has been inspected by a State Boiler Inspector from this Department or a duly authorized insurance company inspector and a certificate of inspection has been received permitting the operation of same.

DO NOT fail to post certificate of inspection in the boiler room or if the boiler is of portable type, on inside of cab or in a metal container or kept in tool box attached. See Part I, Article 16.

DO NOT do, or have done, any WELDING on Pressure Retaining Parts until you have received instructions either from this Department or your insurance carrier. All welding must be performed by welders who have qualified to the ASME Code, Section IX. See Part II, Article 27.

IN CASE OF ACCIDENT to a boiler or pressure vessel, secure permission from either the insurance company if the boiler or pressure vessel is insured or from the State if uninsured, before any changes are made or before any parts are removed. See Part II, Article 18.

BOILER AND PRESSURE VESSEL LAW



NORMAN H. BANGERTER
Governor

THE INDUSTRIAL COMMISSION OF UTAH
160 East 300 South
P.O. BOX 510910
SALT LAKE CITY, UTAH 84151-0910

STEPHEN M. HADLEY
Chairman

JOHN FLOREZ
Commissioner

THOMAS R. CARLSON
Commissioner

BOILER AND PRESSURE VESSEL RULES AND REGULATIONS

Recognition and credit are given to the following members of the boiler and pressure vessel review board who formulated these rules and regulations. Members include representatives from Manufacturers of Pressure Vessels, Users of Low Pressure Boilers, Insurance Companies, Public Interest, and Petro-Chemical Industry, each with technical expertise in the boiler and pressure vessel industry.

1. Mr. Paul Clayton
Rocky Mountain Fabrication
2. Dr. Larry DeVries
University of Utah
3. Mr. Rodney Green
Granite School District
4. Mr. Lloyd Gustaveson
Church of Jesus Christ of Latter-Day Saints
5. Mr. B. A. Hinton
Amoco Oil Company
6. Mr. Paul M. Howe
Factory Mutual Systems
7. Mr. James C. Parsell
Safety Director, State of Utah

BOILER AND PRESSURE VESSEL SAFETY ACT

The rules and regulations contained herein have been promulgated by the Industrial Commission of Utah, Safety Division, under authority of the Utah Code, Volume 4B Chapter 7, Sections 35-7-5 thru 35-7-9. They were adopted after all public comment had been reviewed on February 24, 1978, and become effective May 1, 1978.

Industrial Commission of Utah

Stephen M. Hadley
Chairman

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STATE OF UTAH
BOILER AND PRESSURE VESSEL RULES
AND REGULATIONS

PART I — DEFINITIONS OF TERMS

1. **THE ACT** means the Boiler and Pressure Vessel Safety Act of 1967, which fixes many provisions by legislation and provides for the adoption and enforcement of safety rules and administration of the Act by The Industrial Commission of Utah.

The Act reads as follows: "This Act shall, except as otherwise provided here, (See Part II, Article 16), cover all boilers and pressure vessels used in industrial or manufacturing establishments, business establishments, sawmills, construction jobs and every place where workmen or the public may be exposed to the risks thereof."

2. **ANSI/API 510** means the latest edition of the American National Standards Institute/American Petroleum Institute approved national standard Pressure Vessel Inspection Code for Maintenance, Inspection, Repair, and Alteration.

3. **ASME CODE** means the latest edition of the Boiler and Pressure Vessel Code of the American Society of Mechanical Engineers with such revisions, amendments, and interpretations thereof as are made, approved and adopted by the Society and approved and adopted by The Commission. Copies of the Code may be obtained from said Society at 345 East 47th Street, New York, New York 10017.

4. **APPROVED** means approved by the Commission.

5. **AUTHORIZED INSPECTION AGENCY** means one of the following:

(a) A department or division established by a state, commonwealth or municipality of the United States, or a province of Canada which has adopted one or more sections of the Boiler and Pressure Vessel Code of the ASME and whose inspectors hold valid commissions with the National Board of Boiler and Pressure Vessel Inspectors.

(b) An inspection agency of an insurance company which is authorized (licensed) to write boiler and pressure vessel insurance in those jurisdictions which have examined the agency's inspectors to represent such jurisdictions as is evident by the issuance of a valid Certificate of Competency to the inspector.

(c) An Owner-User Inspection Agency that meets the requirements of Part II, Article 15.

6. **BOILER** means a closed vessel in which water is heated, steam is generated, steam is superheated, or any combination thereof, under pressure or vacuum by the direct application of heat.

The term "boiler" includes fired units for heating or vaporizing liquids other than water where these units are separate from processing systems and complete within themselves.

(a) **POWER BOILER** means a boiler in which steam or other vapor is generated at a pressure of more than 15 psig.

(b) **HIGH-TEMPERATURE WATER BOILER** means a water* boiler intended for operation at pressures in excess of 160 psig and/or temperatures in excess of 250 degrees F.

(c) **PROCESS STEAM GENERATOR** means a vessel or system of vessels comprised of one or more drums and one or more heat exchange surfaces as used in waste heat or heat recovery type steam boilers.

(d) **ELECTRIC BOILER** means a power boiler, heating boiler, high-temperature or low-temperature water* boiler in which the source of heat is electricity.

(e) **MINIATURE BOILER** means a power boiler or high-temperature water boiler which does not exceed the following limits:

- (1) 16 in. inside diameter of shell.
- (2) 20 sq. ft. heating surface (not applicable to electric boilers).
- (3) 5 cu. ft. gross volume exclusive of casing and insulation.
- (4) 100 psig maximum allowable working pressure.

(f) **UNFIRED STEAM BOILER** means a vessel or system of vessels intended for operation at a pressure in excess of 15 psig for the purpose of producing and controlling an output of thermal energy.

(g) **WASTE HEAT BOILER** — (See Unfired Steam Boiler).

(h) **HEAT RECOVERY BOILER** — (See Process Steam Generator).

(i) **STEAM HEATING BOILER** means a steam boiler for operation at pressures not exceeding 15 psig.

* Includes other fluids.

(j) **HOT WATER HEATING BOILER** means a boiler in which no steam is generated, from which hot water is circulated for heating purposes and then returned to the boiler, and which operates at a pressure not exceeding 160 psig and/or at temperatures of 250 degrees F. at or near the boiler outlet.

(k) **HOT WATER SUPPLY BOILER** means a boiler completely filled with water that furnishes hot water to be used externally to itself at pressures not exceeding 160 psig or at temperatures not exceeding 250 degrees F at or near the boiler outlet.

(l) **LINED POTABLE WATER HEATER** means a water heater with a corrosion resistant lining, used to supply potable hot water.

(m) **WATER HEATER** means a closed vessel in which water is heated by the combustion of fuels, electricity or any other sources and withdrawn for use external to the system at pressures not exceeding 160 psig and shall include all controls and devices necessary to prevent water temperatures from exceeding 210 degrees F.

7. **CERTIFICATE OF COMPETENCY** means a certificate issued to a person who has passed the prescribed examination as provided in Part II, Article 8.

8. **CERTIFICATE INSPECTION** means an inspection, the report of which is used by the Safety Director as justification for issuing, withholding or revoking the Inspection Certificate.

This certificate inspection shall be an internal inspection when required; otherwise, it shall be as complete an inspection as possible.

(a) **INTERNAL INSPECTION** means as complete an examination as can reasonably be made of the internal and external surfaces of a boiler or pressure vessel while it is shut down and manhole plates, handhold plates or other inspection opening closures are removed.

(b) **EXTERNAL INSPECTION** means an inspection made when a boiler or pressure vessel is in operation.

9. **CODE** means the applicable section of the ASME Code as defined in Part I, Article 3, and (for unfired pressure vessels which were contracted for prior to the withdrawal of the API-ASME Code in 1956) includes editions of the API-ASME Code for unfired pressure vessels jointly published by the American Petroleum Institute and the American Society of Mechanical Engineers.

10. **COMMISSION, NATIONAL BOARD** means the commission issued by the National Board to a holder of a Certificate of Competency who desires to make shop inspections or field inspections in accordance with the National Board By-Laws and whose employer submits the inspector's application to the National Board for such Commission.

11. **COMMISSION** means the Industrial Commission, State of Utah.

12. **COMMISSIONER** means the Commissioner in charge of the Safety Division.

13. **CONDEMNED BOILER OR PRESSURE VESSEL** means a boiler or pressure vessel that has been inspected and declared unsafe, or disqualified by legal requirements by the Safety Director who has applied a stamping or marking designating its condemnation.

14. **DIVISION** means the Boiler and Pressure Vessel Safety Division of The Industrial Commission of Utah.

15. **EXISTING INSTALLATION** means and includes any boiler or pressure vessel which was in compliance with the applicable Rules and Regulations in effect at the earliest date contracted for, constructed, installed, or placed in operation.

16. **INSPECTION CERTIFICATE** means a certificate issued by the State for the operation of a boiler or pressure vessel.

17. **INSPECTOR** means any State Inspector, Deputy Inspector or Owner/User Agent.

(a) **STATE INSPECTOR** means any Boiler and Pressure Vessel Inspector employed by the State of Utah, including the Safety Director.

(b) **DEPUTY INSPECTOR** means any inspector appointed by the Commission, holding a Utah Certificate of Competency and employed by an insurance company authorized to insure against loss from an explosion of boiler and pressure vessels in the State of Utah.

(c) **OWNER/USER AGENT** means any inspector holding a Utah Certificate of Competency, and who is regularly employed by an owner/user agency as defined in Part II, Article 15.

18. **REPAIR** means work necessary to return a boiler or pressure vessel to a safe and satisfactory operating condition.

(a) **MAJOR REPAIRS** means a repair upon which the strength of a boiler or pressure vessel will depend.

(b) **ALTERATION** means a change in a boiler or pressure

vessel that substantially alters the original design requiring consideration of the effect of the change on the original design. It is not intended that the addition of nozzles smaller than an unreinforced opening size be considered an alteration.

19. **SAFETY AND SAFETY RELIEF VALVE REPAIRS** means all repairs to such valves and includes the replacement or rework of critical parts which may affect the valve's flow passage, capacity, function, or pressure retaining integrity.

20. **NATIONAL BOARD** means the National Board of Boiler and Pressure Vessel Inspectors, 1055 Crupper Avenue, Columbus, Ohio 43229, whose membership is composed of the Safety Directors and Chiefs of government jurisdictions who are charged with the enforcement of the provision of the ASME Code.

21. **NATIONAL BOARD INSPECTION CODE** means the latest edition of the manual supplied by the National Board for Boiler and Pressure Vessel Inspectors.
Copies of this Code may be obtained from the National Board.

22. **NEW BOILER OR PRESSURE VESSEL INSTALLATION** means and includes all boilers or pressure vessels, other than existing installations, constructed, installed, placed in operation, or contracted for after May 1967.

23. **NONSTANDARD BOILER OR PRESSURE VESSEL** means a boiler or pressure vessel that does not bear this state's stamp, Code stamp, or the stamp of any state or political subdivision which has adopted a standard of construction equivalent to that required by the Commission.

24. **OWNER OR USER** means any person, firm or corporation legally responsible for the safe operation of pressure vessels within the state.

25. **PRESSURE VESSEL** means a vessel in which the pressure is obtained from external source, or by the application of heat from an indirect source, or from a direct source, other than those boilers defined in Part I, Article 6.

26. **PSIG** means pounds per square inch gage.

27. **REINSTALLED BOILER OR PRESSURE VESSEL** means a

boiler or pressure vessel removed from its original setting and reinstalled at the same location or at a new location without change of ownership.

28. **SECONDHAND BOILER OR PRESSURE VESSEL** means a boiler or pressure vessel which has changed both location and ownership since the last certificate inspection.

29. **STANDARD BOILER OR PRESSURE VESSEL** means a boiler or pressure vessel which bears the stamp of the State of Utah or of another state which has adopted a standard of construction equivalent to that required by the Commission, the Code stamp, or both the ASME and the National Board stamps.

30. **Nuclear Power Plants**, See ASME, Boiler and Pressure Vessel Code, Section III.

PART II – ADMINISTRATION

1. MINIMUM CONSTRUCTION STANDARDS FOR BOILERS AND PRESSURE VESSELS

(a) All boilers and pressure vessels used in industrial or manufacturing establishments, business establishments, construction job and every place where workmen or the public may be exposed to the risks thereof shall be designed, constructed, inspected, stamped and installed in accordance with the applicable sections of the ASME Boiler and Pressure Vessel Code and the latest Addenda thereto, in effect, and these Rules and Regulations.

(b) Boilers and pressure vessels installed after May 1, 1978 shall be registered with the National Board and shall bear the National Board number. A copy of the manufacturer's data report, signed by the manufacturer's representative and the National Board commissioned inspector, shall be filed by the manufacturer with the National Board prior to installation in the State of Utah.

(c) Steam Pressure Piping-All steam pressure piping external to power boilers from the boiler to the first stop valve of a single boiler, and to the second stop valve in a battery of two or more boilers, installed after May 1, 1978 shall comply to the ASME Code, Section I, and ANSI B 31.1 this piping is also covered by Utah's Boiler Rules and Regulations, and the applicable ASME Data Report Form P4a covering such piping shall be furnished by the owner or installer, to the Industrial Commission of Utah.

(d) State of Utah Special-If a boiler or pressure vessel is of special design or one that cannot bear ASME stamping, details of the proposed construction, including shop drawings, shall be submitted to the Safety Director. Approval as " State of Utah Special" for construction and installation must be obtained from the Commission before construction is started.

2. REQUIREMENTS FOR NEW INSTALLATION

No boiler or pressure vessel shall hereafter be installed in this State unless it has been constructed, inspected, and stamped in conformity with the ASME Code, including the National Board stamp; except:

- (a) Those exempt by the Act.
- (b) Those outlined in Part II, Article 1 (d).
- (c) Those existing boilers and pressure vessels which are to be reinstalled.

All boiler and pressure vessel installations, including reinstalled and secondhand boilers and pressure vessels, shall be installed in accordance with the requirements of the ASME Code and these Rules and Regulations. Boiler installations shall also comply with the ASME Safety Code CSD-1.

The stamping shall not be concealed by lagging or paint and shall be exposed at all times unless a suitable record is kept of the location of the stamping so that it may be readily uncovered at any desired time.

3. SAFETY AND SAFETY RELIEF VALVES, AND REPAIR OF SAFETY AND SAFETY RELIEF VALVES

(a) All safety and safety relief valves that are installed new on boilers and pressure vessels to which the Rules and Regulations apply after May 1, 1978 shall bear the ASME and National Board symbols.

(b) Effective January 1, 1979, all safety and safety relief valves that are installed on boilers and pressure vessels to which these Rules and Regulations apply, which require resetting or repair, the work shall be performed by a firm that holds National Board authorization to use the stamp bearing their repair symbol.

4. FREQUENCY OF INSPECTIONS OF BOILERS AND PRESSURE VESSELS

(a) Power boilers shall receive certificate inspections annually. One inspection must be internal and the other external, while the boiler is in operation.

(b) High temperature and high pressure water boilers shall be inspected externally, under operating conditions, annually. Internal inspections will be at the discretion of the inspector.

The inspection period for power boilers and high temperature and high pressure water boilers may be extended by the Industrial Commission upon written application of the owner/user, with the recommendation of an authorized inspector. Such extensions will be granted in writing by the Industrial Commission. The original and one copy will go to the owner/user, another copy will go to the authorized inspector.

(c) Heating boilers shall receive certificate inspections biennially.

(1) For steel steam boilers this shall include an internal and external inspection. The external inspection shall be performed while the boiler is in service, within the previous 24 month period.

(2) Hot water heating boilers shall be inspected when the boiler is in service. Internal inspections shall be at the discretion of the inspector.

(d) Pressure vessels shall be inspected every sixty (60) months. This inspection shall be an external with an internal at the discretion of the inspector where construction permits.

5. NOTIFICATION OF INSPECTION

Certificate inspections shall be scheduled in accordance with the frequency established in Article 4, above, and at a time mutually agreeable to the inspector and owner or user.

External inspections may be performed by the inspector during reasonable hours and without prior notification.

When as a result of external inspection or determination by other objective means it is the inspector's opinion that continued operation of the boiler or pressure vessel constitutes a menace to public safety, the inspector may request an internal inspection and/or an appropriate pressure test to evaluate conditions. In such instances the owner or user shall prepare the boiler for an internal inspection and/or an appropriate pressure test as the inspector designates.

6. INSPECTION CERTIFICATE AND INSPECTION FEES

If a boiler after inspection, is found to be suitable and to conform to these Rules and Regulations, a Certificate of Inspection valid for 12 months for power boilers and 24 months for low pressure boilers is issued by the inspector.

A legible Certificate of Inspection and Permit to Operate a Boiler shall be displayed in a conspicuous location near the boiler for the entire validation period. (Certificate must be protected under a transparent cover.)

If an owner/user of a boiler required to be inspected refuses to allow an inspection to be made, a certificate will not be issued. If he refuses to pay the fee, the certificate shall not be issued. A valid Certificate may be obtained only when the owner/user complies with the requirements.

The owner or user who causes a boiler or pressure vessel to be operated without a valid inspection certificate shall be subject to the penalty as provided for in Section 35-7-9 of the Act, which reads:

"35-7-9. Violation of Act—Misdemeanor—Penalty.—On and after July 1, 1967, it shall be unlawful for any person, firm, partnership or corporation to operate a boiler or pressure vessel to which this Act applies in violation of

this Act. Such violation shall constitute a misdemeanor on the part of the owner, user or operator thereof, and be punishable for a fine not exceeding \$100 or imprisonment not to exceed ninety days or both, at the discretion of the Court."

7. VALIDITY OF INSPECTION CERTIFICATE

An inspection certificate, issued in accordance with Part II, Article 6 shall be valid until expiration unless a code violation, defect or condition affecting the safety of the boiler is disclosed.

8. EXAMINATION FOR AN INSPECTOR'S CERTIFICATE OF COMPETENCY (STATE OF UTAH)

Examination for an inspector's Certificate of Competency shall be held at the office of the Commission or at any other location to be selected by the Commission, four (4) times each year; namely, the first Wednesday of the months of March, June, September, December.

An applicant for an examination shall have education and experience equal to at least one of the following:

(a) From an accredited school, a degree in engineering plus one year experience in design, construction, operation or inspection of high pressure boilers and pressure vessels;

or

(b) An associate degree in mechanical technology plus two years experience in design, construction, operation or inspection of high pressure boilers and pressure vessels; or

(c) A high school education or the equivalent plus three years experience:

1) in high pressure boiler and pressure vessel construction or repair,

or

2) in charge of high pressure boiler and pressure vessel operation,

or

3) in the inspection of high pressure boilers and pressure vessels.

Applications for examination shall be in writing on a form to be furnished by the Commissioner stating the education of the applicant, a list of his employers, his period of employment and position held with each employer.

Applications containing willful falsifications or untruthful statements shall be rejected.

If the applicant's education and experience are acceptable to the Commission, he shall be given a written examination dealing with the construction, installation, operation, maintenance and repair of boilers and pressure vessels and their appurtenances, and the applicant shall be accepted or rejected on the merits of the examination.

If the applicant is successful in meeting the requirements of the Commission, a Certificate of Competency will be issued by the Commission, when the inspector is employed on a full-time basis by an authorized inspection agency as defined in Part I, Article 5.

Upon the expiration of ninety (90) days, an applicant who fails to pass the examination will be permitted to take another written examination and his acceptance or rejection will be determined by the Commission on the basis of this examination.

9. EXAMINATION FEES

A fee of twenty-five (\$25.00) will be charged for each applicant taking the examination for Certificate of Competency. Checks or money orders for examination fees shall be made payable to the Commission and sent to the Safety Director.

10. CERTIFICATE OF COMPETENCY AND IDENTIFICATION CARD

Upon request, a Certificate of Competency and an Identification Card shall be issued by the Commission to:

(a) An inspector who is employed full-time by a governmental authority having an authorized inspection agency as defined in Part I, Article 5(b).

(b) An inspector who is employed full-time by an insurance company which is authorized to insure against loss from explosions of boilers and pressure vessels in Utah.

(c) Upon application to the Commission, an Owner-User certificate for inspectors of pressure vessels may be issued on an individual basis. Owner-User inspectors shall be an employee of said Owner-User and may only conduct inspections on items within facilities of and owned and operated by his employer.

Inspectors so designated may be issued a Certificate of Competency only after successfully passing a written and oral examination administered by the Commission in accordance with Part II Article 8 above. Such Certificates of Competency shall be overprinted "Owner-User" and shall be subject to renewal annually.

An Owner-User employing inspectors for his own equipment under this Part II of the Rules and Regulations shall have readily available for the inspector's use, latest edition of the National Board Inspection Code.

The Commission reserves the right to conduct its own inspections on Owner-User items at any time deemed necessary by the Commission. Such Commission inspections shall be subject to charges or fees at rates as set by the Commission.

(d) Before a Certificate of Competency and an Identification Card from the State of Utah are issued to a deputy inspector as defined in Part I, Article 17(b), said inspector shall be interviewed by the Safety Director, or designee.

PROVIDED

- (1) The applicant has satisfactorily passed the examination as set forth in Part II, Article 8 and Article 9; or
- (2) The applicant holds a valid Commission or Certificate of Competency from a state that has a standard of examination substantially equal to that of Utah, and a valid Commission and Identification Card issued by the National Board.

The request for the Certificate of Competency and Identification Card shall be completed on forms to be provided by the Safety Director and shall be accompanied by a facsimile of the applicant's National Board Commission and Identification Card, and a fee of \$15.00.

The Certificate of Competency and valid Identification Card shall be returned to the Safety Director when the inspector to whom they were issued is no longer employed by the organization employing him at the time the Certificate was issued.

Each person holding a valid Certificate of Competency and who conducts inspections as provided by the Safety Act shall apply through the organization employing him to the Safety Director on forms provided and obtain Identification Card annually. A fee of \$15.00 will be required for each Identification card.

An inspector's Certificate of Competency may be suspended by the Safety Director after due investigation and recommendation by the Commissioner, for incompetency or untrustworthiness of the holder thereof, or for willful falsification of any matter or statement contained in his application, or in a report of any inspection made by him. Written notice of any such suspension shall be given by the Safety Director, within ten (10) days, to the inspector and his employer. Persons

whose Certificate of Competency has been suspended shall be entitled to an appeal to the Commission and to be present in person or to be represented by counsel at the hearing of the appeal.

11. INSPECTORS TO HAVE NO OTHER INTERESTS

Inspectors shall not engage in the sale of any article or device relating to boilers, pressure vessels, or their appurtenances.

12. INSPECTION REPORTS TO BE SUBMITTED BY DEPUTY INSPECTORS

(a) Deputy Inspectors shall, within one (1) year of the effective date of these Rules and Regulations for power boilers and high-pressure, high-temperature water boilers, two (2) years for low pressure boilers, submit to the Safety Director an inspection report on Form NB-5 of the National Board Inspection Code for boilers subject to inspection in this state. Complete data shall be submitted on Form NB-5 for nonstandard boilers.

(b) Subsequent inspections of both standard and non-standard boilers and pressure vessels shall be reported on Forms NB-6 and NB-7 of the National Board Inspection Code.

(c) Inspections reports, as required in (a) and (b) above, shall be submitted within thirty (30) days from date of inspection.

(d) When hazardous conditions affecting the safety of a boiler or pressure vessel are found to exist at the time of any inspection, the inspector shall report such conditions immediately to the Safety Director on Form NB-6 or NB-7.

(e) Owner-User Inspection Agencies may report subsequent inspections of both standard and non-standard pressure vessels on Form NB-7 or at their option, upon forms approved by the Commission. Such reports should be filed as provided in Part II, Article 15.

13. INSURANCE COMPANIES TO NOTIFY SAFETY DIRECTOR OF NEW, CANCELLED OR SUSPENDED INSURANCE ON BOILERS OR PRESSURE VESSELS.

All insurance companies shall notify the Safety Director in writing, within thirty (30) days, of new, cancelled, expired, suspended or rejected insurance coverage on all boilers or pressure vessels.

14. INSPECTORS TO NOTIFY SAFETY DIRECTOR OF UNSAFE BOILERS AND PRESSURE VESSELS.

If an Inspector, upon first inspection of a new risk, finds that a boiler or pressure vessel, or any appurtenance thereof, is in such condition that his company would refuse insurance, the company shall immediately notify the Safety Director and submit a report on the defects.

If, upon inspection, an Inspector finds a boiler or pressure vessel to be unsafe for further operation, he shall promptly notify the owner or user stating what repairs or other corrective measures are required to bring the object into compliance with these Rules and Regulations. Unless the owner or user agrees to make such repairs or adopt such other corrective measures promptly, the Inspector shall immediately notify the Safety Director. Until such corrections have been made further operation of the boiler or pressure vessel involved shall not be permitted. If an Inspection Certificate for the object is then in force, it shall be suspended by the Safety Director, until such time that a reinspection establishes that the necessary repairs or corrective actions have been taken and that the boiler or pressure vessel is safe to operate.

15. OWNER-USER INSPECTION AGENCY

Any person, firm, partnership or corporation operating pressure vessels in this State may seek approval and registration as an Owner-User Inspection Agency by filing an application with the Safety Director on forms prescribed and available from the Department, and request approval by the Commission.

Such application and registration shall show the name of such agency and its principal address in this State, including branches or other locations within the State, and the name and address of the person or persons having supervision over inspections made by such agency. Changes in such supervisory personnel shall be reported to the Safety Director within thirty days after any such change.

Each Owner-User Inspection Agency as required by the provisions of the Boiler Safety Act and these rules and regulations shall:

(a) Conduct inspections of unfired pressure vessels, not exempt by the Act, utilizing only qualified inspection personnel, as provided in Part II, Article 8.

(b) Retain on file at the location where the equipment is inspected a true record or copy of the report of the latest of each inspection signed by the inspector who made the inspection.

(c) Execute and deliver to the owner or user (management) a true report of each inspection together with appropriate requirements or recommendations that result from such inspections.

(d) Promptly notify the Safety Director of any unfired pressure vessel which does not meet the requirements of safe operating conditions.

(e) Maintain inspection records which will include a list of each unfired pressure vessel covered by the Act, showing an assigned State number and such abbreviated description as may be necessary for identification; the date of last inspection of each unit and approximate date for the next inspection, arrived at by applying the appropriate rules to all data available at the time such inspection record is compiled (re: Frequency and type of inspection, see Part II, Article 4.) Such inspection record shall be readily available for examination by the Safety Director or his authorized representative during business hours. All initial inspections (first installation or first registration) shall be accomplished by a State of Utah Inspector.

(f) File a statement annually, on a date mutually agreed upon with the Safety Director. Such statement shall be signed by the individual having supervision over the inspections made during the period covered. The Statement shall include all vessels covered by the Act, identified by their state numbers, inspected during the year, and a certificate that each such inspection was conducted pursuant to the inspection requirements provided for by the Act. Such annual statement shall be accompanied by a filing fee in accordance with the schedule as follows:

1. For statements covering not more than twenty-five vessels--five (\$5.00) dollars per vessel;
2. For statements covering more than twenty-five but less than one hundred—on hundred (\$100.00) dollars;
3. For statements covering more than one hundred but less than five hundred—two hundred (\$200.00) dollars;
4. For statements covering more than five hundred vessels—four hundred (\$400.00) dollars.

16. EXEMPTIONS

These rules shall not apply to the following boilers and pressure vessels:

(a) Boilers subject to inspection, control or regulation under or pursuant to the terms of any law or regulation of the

U.S. Government or any of its agencies.

(b) **PRESSURE VESSELS** used for the transportation of compressed gases if constructed and operated in compliance with specification and regulations of the United States Department of Transportation.

(c) **PRESSURE VESSELS** containing air located on vehicles operating pursuant to regulations of other jurisdictional authorities.

(d) **PRESSURE VESSELS** having an internal or external operating pressure not exceeding 15 psig with no limit on size.

(e) **PRESSURE VESSELS** having an inside diameter not exceeding 6 in. (152 mm) with no limitation on pressure.

(f) **PRESSURE VESSELS** containing water under pressure, including those containing air, the compression of which serves only as a cushion, when none of the following limitations are exceeded:

- (1) a design pressure of 300 psi;
- (2) a design temperature of 210oF;

(g) **PRESSURES VESSELS** containing water heated by steam or any other indirect means when none of the following limitations is exceeded:

- (1) a heat input of 200,000 btu/hr.
- (2) a water temperature of 210 degrees F;
- (3) a water-containing capacity of 120 gallons.

(h) **COIL TYPE HOT WATER BOILERS** without any steam space and where no steam is generated within the coil but where the water flashes into steam when released through a manually operated nozzle, unless one of the following limitations is exceeded:

- (1) 3/4 in. nominal diameter tubing or pipe size with no drum or headers attached.
- (2) 6 gallons nominal water-containing capacity.
- (3) 350 degrees F water temperature.

(i) **HOT WATER SUPPLY BOILERS, WATER HEATERS, INCLUDING LINED POTABLE WATER HEATER** when none of the following limitations are exceeded:

- (1) a heat input of 200,000 Btu/hr.
- (2) a water temperature of 210 degrees F.
- (3) a water-containing capacity of 120 gallons.

- (j) **PRESSURE VESSELS** which may be classified as:
- (1) Pressure containers which are integral parts of components of rotating or reciprocating mechanical devices such as pumps, compressors, turbines, generators, engines and hydraulic or pneumatic cylinders where the primary design considerations and/or stresses are derived from the functional requirements of the device, or
 - (2) Structures whose primary function is the transport of fluids from one location to another within a system of which it is an integral part, that is, piping systems.

(k) **BOILERS AND PRESSURE VESSELS** located in a private residence or in an apartment house with less than 5 family units.

17. DEFECTIVE CONDITIONS DISCLOSED AT TIME OF EXTERNAL INSPECTION

If, upon an external inspection, there is evidence of a leak or crack, sufficient covering of the boiler or pressure vessel shall be removed to permit the inspector to satisfactorily determine the safety of the boiler or pressure vessel. If the covering cannot be removed at that time, he may order the operation of the boiler or pressure vessel stopped until such time as the covering can be removed and proper examination made.

18. OWNER OR USER TO NOTIFY SAFETY DIRECTOR OF ACCIDENT

When an accident occurs which serves to render a pressure part of a boiler or pressure vessel inoperative, the owner or user shall notify the Safety Director or deputy inspector as soon as possible, and submit a detailed report of the accident. In case of a serious accident, such as in a personal injury or an explosion, notice shall be given immediately by telephone, telegraph or messenger, and neither the boiler or pressure vessel, nor any parts thereof, shall be removed or disturbed before an inspection has been made by the inspector, except for the purpose of conserving human life and limiting consequential damage.

19. RESTAMPING BOILERS AND PRESSURE VESSELS

When the stamping on a boiler or pressure vessel becomes indistinct, the inspector shall instruct the owner or user to have it restamped. Request for permission to restamp the boiler or pressure vessel shall be made to the Safety Director and proof of the original stamping shall accompany the request. The Safety Director may grant such authorization. Restamping authorized by the Safety Director shall be done only in the

presence of an inspector, and shall be identical with the original stamping, except that it will not be required to restamp the ASME Code Symbol. Notice of completion of such restamping shall be filed with the Safety Director by the inspector who witnessed the stamping on the boiler or pressure vessel, together with a facsimile of the stamping applied.

20. PENALTY FOR OPERATION OF UNSAFE BOILERS OR PRESSURE VESSELS

If upon inspection, a boiler or pressure vessel is found to be in such condition that it is unsafe to operate, the inspector shall notify the Safety Director as required in Part II, Article 14 and the Inspection Certificate shall be suspended by the Safety Director. Any person, firm, partnership or corporation causing such objects to continue to be operated shall be subject to the penalty provided by laws.

21. CONDEMNED BOILERS OR PRESSURE VESSELS

Any boiler or pressure vessel having been inspected and declared unsafe by the Safety Director or State Inspector shall be stamped by the inspector with an arrowhead stamp having an overall length of 1/2-inch and width of 3/8-inch on either side of the letter "XXX" and the letter of the State, as shown by the following facsimile, which will designate a condemned boiler or pressure vessel.

X X X UTAH X X X

Any person, firm, partnership, or corporation using or offering for sale condemned boiler or pressure vessel for operation within this State shall be subject to the penalties provided by law.

22. REINSTALLATION OF STANDARD BOILERS OR PRESSURE VESSELS

If a standard boiler or pressure vessel located in this State is to be moved to another state for temporary use or repair, application shall be made by the owner or user to the Safety Director for permission to reinstall the boiler or pressure vessel in the State.

23. REINSTALLATION OF NONSTANDARD BOILERS OR PRESSURE VESSELS

A nonstandard boiler or pressure vessel which is moved outside the boundaries of the State cannot be reinstalled in the State. Shipment of nonstandard boilers and pressure vessels into this State for use is prohibited.

24. INSTALLATION OF USED OR SECONDHAND BOILERS OR PRESSURE VESSELS

Before a used or secondhand boiler or pressure vessel can be shipped for installation in this State, an inspection must be made by an inspector qualified by an examination equal to that required by this State or by an inspector holding a National Board Commission, and data submitted by him shall be filed by the owner or user of the boiler or pressure vessel with the Safety Director for his approval. Such boilers and pressure vessels when installed in the State shall be equipped with fittings and appurtenances that comply with the Rules and Regulations for new installations. Such used equipment, prior to entering the State, shall be subject to requirements of Part II, Article 1(a) and (b).

Before bringing used or secondhand boilers or pressure vessels into this State, a legible copy of the original manufacturer's ASME Data Report must be submitted to, and approved by the Safety Director. A legible copy of the ASME data report shall be also submitted to the authorized Code Inspector prior to his inspection of the boiler or pressure vessel.

25. REINSTALLED BOILERS OR PRESSURE VESSELS

When a stationary boiler or pressure vessel is moved and reinstalled, the fittings and appurtenances shall comply with the Rules and Regulations for new installations.

26. FACTOR OF SAFETY FOR EXISTING INSTALLATIONS

Any inspector may increase the factor of safety on any existing installation if the condition of the boiler or pressure vessel warrants it. If the owner or user does not concur with the inspector's decision, the owner or user may appeal to the Commissioner, who may request a joint inspection by the Safety Director and the Deputy Inspector or Special Inspector. Each inspector shall render his report to the Commissioner and the Commissioner shall render the final decision, based upon the data contained in the inspectors reports.

27. REPAIRS BY WELDING

No repair to a boiler or pressure vessel shall be initiated without the authorization of the Inspector who shall satisfy himself that the welding procedures and welders are qualified and that the repair methods are acceptable. All welded repairs shall be reported to this jurisdiction on a National Board R-1 Form, #NB-66.

28. REPAIRS AND RENEWALS OF BOILERS FITTINGS AND APPURTENANCES

Whenever repairs are made to fittings or appurtenances or it becomes necessary to replace them, such repairs or replacements shall comply with the requirements of the ASME Code.

29. RIVETED PATCHES

In applying riveted patches, the design of the patch and method of installation shall be in accordance with the National Board Inspection Code.

30. REMOVAL OF SAFETY APPURTENANCES

No person shall remove, or do any repair work on any safety appurtenances prescribed by these Rules and Regulations while a boiler or pressure vessel is in operation, except for certain boilers and pressure vessels as defined below.

Boiler safety and safety relief valves requiring resetting or other adjustments, may be performed on the boiler only by those holding "VR" Authorization.

Pressure vessel safety and safety relief valves requiring resetting or other adjustment may be performed on pressure vessels only by those holding "VR" Authorization.

Pressure vessels may be operated in accordance with the ASME Code, Section VIII, Division - 1, only after written application and approval has been obtained by the owner or user from the Industrial Commission of Utah, Safety Division, and the Insurance Company, if any.

Should any of these appurtenances be removed for repair during an outage of a boiler or pressure vessel, they must be reinstalled and in proper working order before the object is again placed in service.

31. INSPECTION FEES

The inspection fees to be charged as required by law for the inspection of a boiler or pressure vessel shall be set by the Division. This inspection fee shall be paid by the owner or user. The current schedule of boiler inspection fees follows:

Certificate of Inspection:

All boilers inspected by Insurance Co. \$ 25.00

Boiler Inspection Fees:

Pressure Vessels \$25.00

Boilers to 500 square feet heating surface \$35.00

Boilers to 2500 square feet heating surface \$85.00

Boilers 2500+ square feet heating surface \$95.00

Special inspections will be made at the rate of \$50.00 per hour plus all expenses.

NOTE: Fee schedule shown above is subject to change by the Division within the limits established by law.

32. APPLICATION OF STATE UNIT NUMBERS

Upon completion of the installation of a new boiler or at the time of the initial certificate inspection of an existing installation each boiler shall be stamped by the state inspector with a unit number of the State consisting of letters and figures to be not less than 5/16-inch in height and arranged as follows:

U 0000 for Boilers

All cast-iron, low pressure heating boilers shall have securely attached to the front of the boiler a non-corrosive metal tag of not less than 1 inch in height, which shall have the serial number of the State stamped thereon.

33. RETURN LOOP CONNECTION

It is recommended that the return water connections to all low-pressure, steam heating boilers supplying a gravity return heating system be so arranged as to form what is known as the "return pipe loop connection", so that the water cannot be forced out of the boiler below the safe water level. This connection is shown in the ASME code Section IV.

34. EXIT FROM BOILER ROOM

All boiler rooms exceeding 500 square feet floor area or containing one or more boilers having a total fuel burning capacity of 1,000,000 BTU per hour or more, or the equivalent of electrical heat input, shall have at least two (2) means of exit. Each exit shall be remotely located from the other. Each elevation in such boiler room shall have two (2) means of exit, each remotely located from the other.

35. SUGGESTIONS FOR OPERATION

It is recommended that the ASME Code, Section VI, Recommended Rules for Care of Heating Boilers, and Section VII, Recommended Rules for Care of Power Boilers be used as a guide for proper and safe operating practices.

36. GAS BURNERS

For installations which are gas-fired, the burners used shall conform to the requirements of the ANSI/ASME CSD-1, **Controls and Safety Devices for Automatically Fired Boilers**, and/or the National Fire Protection Association.

37. BLOWOFF EQUIPMENT

The blowdown from a boiler or boilers that enters a sewer

system or blowdown which is considered a hazard to life and/or property shall pass through some form of blowoff equipment that will reduce pressure and temperature to safe limits. Such equipment shall conform to the provisions set forth in the National Board and Pressure Vessel Inspectors' publication, "Boiler Blowoff Equipment".

PART III — EXISTING INSTALLATIONS

SECTION 1 — POWER AND HIGH PRESSURE, HIGH-TEMPERATURE WATER BOILERS

1. AGE LIMIT OF EXISTING BOILERS

(a) The age limit of any boiler of nonstandard construction, installed prior to May 1967 shall be thirty (30) years, except that, after a thorough internal and external inspection, and a hydrostatic pressure test of 1 1/2 times the allowable working pressure and held for a period of at least thirty (30) minutes, during which time no distress or leakage develops, any boiler having other than a riveted, longitudinal, lap joint may be continued in operation without reduction in working pressure. The age limit of any boiler having riveted, longitudinal, lap joints and operating at a pressure in excess of 50 psi shall be twenty (20) years. This type of boiler, when removed from an existing setting, shall not be reinstalled for a pressure in excess of 15 psi. A reasonable time for replacement, not to exceed one year, may be given at the discretion of the Safety Director.

(b) The shell or drum of a boiler in which a typical "lap seam crack" is discovered along a longitudinal riveted joint shall be permanently discontinued for use under steam pressure. By "lap seam crack" is meant the typical crack frequently found in lap joints extending parallel to the longitudinal joint and located either between or adjacent to rivet holes.

(c) The age limit of boilers of standard construction, installed prior to May 1967 shall be determined from the results of a thorough internal and external inspection by an inspector and the application of an appropriate pressure test. Hydrostatic test pressure shall be a 1 1/2 times the allowable working pressure and maintained for thirty (30) minutes. The boiler may be continued in service at the same working pressure provided there is no evidence of leakage or distress under these test conditions.

2. MAXIMUM ALLOWABLE WORKING PRESSURE FOR STANDARD BOILERS

The maximum allowable working pressure for standard boilers shall be determined in accordance with the applicable provisions of the edition of the ASME Code under which they were constructed and stamped.

3. MAXIMUM ALLOWABLE WORKING PRESSURE FOR NON-STANDARD BOILERS

(a) The maximum allowable working pressure on the shell

of a nonstandard boiler shall be determined by the strength of the weakest section of the structure, computed from the thickness of the plate, the tensile strength of the plate, the efficiency of the longitudinal joint or tube ligaments, the inside diameter of the weakest course and the factor of safety allowed by these rules and regulations.

$$\frac{TS \ t \ E}{RFS} = \text{maximum allowable working pressure, psig}$$

where:

TS = maximum allowable tensile strength of shell plates, psi
t = minimum thickness of shell plate, in weakest course, inches
E = efficiency of longitudinal joint

For tube ligaments and riveted construction, E, shall be determined by the rules given in the ASME Section I, Part PR. For seamless construction, E shall be considered 100 percent.

R = inside radius of the weakest course of the shell, in inches

FS = factor of safety permitted

(b) **TENSILE STRENGTH.** When tensile strength of steel or wrought iron shell plates is not known, it shall be taken as 45,000 psi.

(c) **FACTORS OF SAFETY.** The following factors of safety shall be increased by the inspector if the condition and safety of the boiler demand it:

The lowest factor of safety permissible on existing installations shall be 4.5, except for horizontal-return-tubular boilers having continuous longitudinal lap seams more than 12 feet in length, then the factor of safety shall be 8. When this latter type of boiler is removed from its existing setting, it shall not be installed for pressures in excess of 15 psig.

Reinstalled or secondhand boilers shall have a minimum factor of safety of 6, when the longitudinal seams are of lap-riveted construction, and a minimum factor of safety of 5, when the longitudinal seams are of butt- and double-strap construction.

4. CAST IRON HEADERS AND MUD DRUMS

The maximum allowable working pressure on a water-tube boiler, the tubes of which are secured to cast-iron or malleable-iron headers, or which have cast-iron mud drums, shall not exceed 160 psig.

5. PRESSURE ON CAST-IRON BOILERS

The maximum allowable working pressure for any cast-iron boiler, except hot-water boilers, shall be 15 psig.

6. SAFETY VALVES

(a) The use of weighted-lever safety valves, or safety valves having either the seat or disk of cast iron, shall be prohibited after these regulations become effective. Valves of this type or construction shall be replaced by direct, spring-loaded, pop-type valves that conform to the requirements of the ASME Code, Section I.

(b) Each boiler shall have at least one safety valve, and if it has more than 500 square feet of water-heating surface, or an electric power input of more than 1,100 kw, it shall have two or more safety valves.

(c) The valve or valves shall be connected to the boiler, independent of any other steam connection, and attached as close as possible to the boiler, without unnecessary intervening pipe or fittings. Where alteration is required to conform to this requirement, owners or users shall be allowed reasonable time in which to complete the work.

(d) No valves of any description shall be placed between the safety valve and the boiler nor on the discharge pipe. When a discharge pipe is used, it shall be at least full size of the safety-valve discharge and fitted with an open drain to prevent water lodging in the upper part of the safety valve or discharge pipe. When an elbow is placed on a safety valve discharge pipe, it shall be anchored and supported securely. All safety-valve discharges shall be so located or piped as to be carried clear from walkways or platforms.

(e) The safety-valve capacity of each boiler shall be such that the safety valve or valves will discharge all the steam that can be generated by the boiler without allowing the pressure to rise more than 6 percent above the highest pressure to which any valve is set and in no case to more than 6 percent above the maximum allowable working pressure.

(f) One or more safety valves on every boiler shall be set at or below the maximum allowable working pressure. The remaining valves may be set within a range of 3 percent above the maximum allowable working pressure, but the range of setting of all the safety valves on a boiler shall not exceed 10 percent of the highest pressure to which any valve is set.

(g) When two or more boilers, operating at different

pressures and safety-valve settings, are interconnected, the lower pressure boilers or interconnected piping shall be equipped with safety valves of sufficient capacity to prevent overpressure, considering the maximum generating capacity of all boilers.

(h) In those cases where the boiler is supplied with feedwater directly from water mains without the use of feeding apparatus (not to include return traps), no safety valve shall be set at a pressure higher than 94 percent of the lowest pressure obtained in the supply main feeding the boiler.

(i) The relieving capacity of the safety valves on any boiler shall be checked by one of the three following methods and, if found to be insufficient, additional valves shall be provided:

(1) By making the accumulation test, which consists of shutting off all other steam-discharge outlets from the boiler and forcing the fires to the maximum. The safety-valve capacity shall be sufficient to prevent a rise of pressure in excess of 6 percent of the maximum allowable working pressure. This method should not be used on a boiler with a superheater or reheater.

(2) By measuring the maximum amount of fuel that can be burned and computing the corresponding evaporative capacity (steam-generating capacity) upon the basis of the heating value of this fuel. These computations shall be as outlined in the Appendix of the ASME Code, Section I.

(3) By measuring the maximum amount of feedwater that can be evaporated.

When either of the methods outlined in (2) or (3) is employed, the sum of the safety-valve capacities shall be equal to or greater than the maximum evaporative capacity (maximum steam-generating capacity) of the boiler.

(j) The relieving capacity of safety valves for forced-flow steam generators shall be in accordance with the requirements of the ASME Code, Section I.

7. BOILER FEEDING

Each boiler shall have a feed supply which will permit it to be fed at any time while under pressure.

A boiler having more than 500 square feet of water-heating surface shall have at least two means of feeding, one of which shall be an approved feed pump, injector or inspirator. A source of feed directly from water mains at a pressure 6 percent greater than the set pressure of the safety valve with the highest setting may be considered one of the means. As provided for in the ASME Code, Section I, boilers fired by gaseous, liquid, or

solid fuel in suspension may be equipped with a single means of feeding water provided means are furnished for the immediate shutoff of heat input if the water feed is interrupted.

The feedwater shall be introduced into the boiler in such manner that it will not be discharged close to riveted joints of shell or furnace sheets, or directly against surfaces exposed to products of combustion, or to direct radiation from the fire.

The feed piping to the boiler shall be provided with a check valve near the boiler and a valve cock between the check valve and the boiler. When two or more boilers are fed from a common source, there shall also be a valve on the branch to each boiler between the check and source of supply. Whenever a globe valve is used on feed piping, the inlet shall be under the disk of the valve.

Where deaerating heaters are not employed, it is recommended that the temperature of the feedwater be not less than 120 degrees F. to avoid the possibility of setting up localized stress.

Where deaerating heaters are employed, it is recommended the minimum feedwater temperature be not less than 215 degrees F., so that dissolved gases may be thoroughly released.

8. WATER LEVEL INDICATORS

No outlet connections (except for damper, regulator, feedwater regulator, low-water fuel cutout, drain, steam gages, or such apparatus that does not permit the escape of an appreciable amount of steam or water therefrom) shall be placed on the piping that connects the water column to the boiler. The water column shall be provided with a valved drain of at least 3/4-inch pipe size, the drain to be piped to a safe location.

Each boiler shall have three or more gage cocks located within the visible length of the water glass, except when the boiler has two water glasses located on the same horizontal lines. Boilers not over 36 inches in diameter, in which the heating surfaces does not exceed 100 square feet, need have but two gage cocks.

For all installations where the water gage glass or glasses are more than 30 feet above the boiler operating floor, it is recommended that remote water-level indicating or recording gages be installed at eye height above the operating floor.

9. STEAM GAGES

Each steam boiler shall have a steam gage, with dial range not less than 1 1/2 times the maximum allowable working pressure, connected to the steam space or to the steam connection

to the water column. The steam gage shall be connected to a siphon or equivalent device of sufficient capacity to keep the gage tube filled with water and so arranged that the gage cannot be shut off from the boiler except by a cock placed near the gage and provided with a tee or lever handle arranged to be parallel to the pipe in which it is located when the cock is open.

When a steam gage connection longer than 8 feet becomes necessary, shutoff valve may be used near the boiler provided the valve is of the outside-screw-and-yoke type and is locked open. The line shall be of ample size with provision for free blowing.

Each boiler shall be provided with a connection and suitable valving which connects to the steam space of each boiler for the exclusive purpose of attaching a test gage when the boiler is in service so that accuracy of the boiler steam gage may be ascertained.

10. STOP VALVES

Except for a single-boiler, prime-mover installation, each outlet from a boiler (except safety-valve and water column connections) shall be fitted with a stop valve located as close as practicable to the boiler.

In a single-boiler, prime-mover installation the steam stop valve may be omitted provided the prime-mover throttle valve is equipped with an indicator to show whether the valve is open or closed and is designed to withstand the required hydrostatic pressure test of the boiler.

When a stop valve is so located that water can accumulate, ample drains shall be provided. The drainage shall be piped to a safe location and shall not be discharged on the top of the boiler or its setting.

When two or more boilers provided with manholes are connected to a common header, the connection from each boiler shall be fitted with two stop valves having an ample free-blow drain between them. The discharge of the drain shall be visible to the operator while manipulating the valves and shall be piped clear of the boiler setting. The stop valves shall consist preferably of one automatic nonreturn valve (set next to the boiler) and a second valve of the outside-screw-and-yoke type.

11. BLOWOFF CONNECTION

The construction of the setting around each blowoff pipe shall permit free expansion and contraction. Careful attention shall be given to the problem of sealing these setting openings without restricting the movement of the blowoff piping.

All blowoff piping, when exposed to furnace heat, shall be protected by firebrick or other heat-resisting material, so constructed that the piping may be inspected readily.

Each boiler shall have a blowoff pipe, fitted with a valve or cock, in direct connection with the lowest water space. Cocks shall be of the gland or guard type and suitable for the pressure allowed. The use of globe valves shall not be permitted. When the maximum allowable working pressure exceeds 100 psig, each blowoff pipe shall be provided with two valves or a valve and cock.

Blowoff piping shall comply with the requirements of the ASME Code, Section I, from the boiler to the valve or valves, and shall be run full size without use of reducers or bushings. The piping shall not be galvanized.

All fittings between the boiler and blowoff valve shall be of steel. In case of renewal of blowoff pipe or fittings, they shall be installed in accordance with the rules and regulations for new installations of the ASME Code, Section I, A56-A60.

12. REPAIRS AND RENEWALS OF BOILER FITTINGS AND APPURTENANCES

Whenever repairs are made to fittings or appurtenances or it becomes necessary to replace them, such repairs or replacements shall comply with the latest requirements of the ASME Code, Section I and the National Board Inspection Code.

13. RECOMMENDATIONS FOR OPERATION

It is recommended that ASME Code, Section VII, covering Recommended Rules for the Care of Power Boilers be used as a guide for proper and safe operating practices.

14. CONDITIONS NOT COVERED BY THESE REQUIREMENTS

All cases not specifically covered by these requirements shall be treated as new installations or may be referred to the Safety Director for instruction concerning the requirements.

SECTION 2 — HEATING BOILERS

1. STANDARD BOILERS

The maximum allowable working pressure of standard boilers shall in no case exceed the pressure indicated by the manufacturer's identification stamped or cast on the boiler or on a plate secured to it.

2. NONSTANDARD RIVETED BOILERS

The maximum allowable working pressure on the shell of a nonstandard riveted heating boiler shall be determined in accordance with Part III, Section I, Article 3, covering Existing Installations, Power Boilers, except that in no case shall the maximum allowable working pressure of a steam heating boiler exceed 15 psig, or a hot-water boiler exceed 160 psig or 250 degrees F. temperature.

3. NONSTANDARD WELDED BOILERS

The maximum allowable working pressure of a nonstandard steel or wrought iron heating boiler of welded construction shall not exceed 15 psig for steam. For other than steam service, the maximum allowable working pressure shall be calculated in accordance with ASME Code, Section IV.

4. NONSTANDARD CAST-IRON BOILERS

The maximum allowable working pressure of a nonstandard boiler composed principally of cast iron shall not exceed 15 psig for steam service or 30 psig for hot-water service.

The maximum allowable working pressure of a non-standard boiler having cast iron shell or heads and steel or wrought iron tubes shall not exceed 15 psig for steam service or 30 psig for hot-water service.

5. SAFETY VALVES

(a) Safety valves of the top discharge type shall not be permitted in this state for new installations or replacements.

(b) Each steam boiler shall have one or more officially rated safety valves of the spring pop type adjusted to discharge at a pressure not to exceed 15 psig. Seals shall be attached in a manner to prevent the valve from being taken apart without breaking the seal. The safety valves shall be arranged so that they cannot be reset to relieve at a higher pressure than the maximum allowable working pressure of the boiler. A body drain connection below seat level shall be provided by the manufacturer and this drain shall not be plugged during or after field installation. For valves exceeding 2 inch pipe size, the drain hole or holes shall be tapped not less than 3/8-inch pipe size. For valves less than 2 inches, the drain hole shall not be less than 1/4-inch diameter.

(c) No safety valve for a steam boiler shall be smaller than 3/4-inch unless the boiler and radiating surfaces consist of a self-contained unit. No safety valve shall be larger than 4 1/2 inches. The inlet opening shall have an inside diameter equal

to, or greater than the seat diameter.

(d) The minimum relieving capacity of the valve or valves shall be governed by the capacity marking on the boiler.

(e) The minimum valve capacity in pounds per hour shall be the greater of that determined by dividing the maximum BTU output at the boiler nozzle obtained by the firing of any fuel for which the unit is installed by 1000, or shall be determined on the basis of the pounds of steam generated per hour per square foot of boiler heating surfaces as given in Table HG-400.1. In many cases a greater relieving capacity of valves will have to be provided than the minimum specified by these rules. In every case, the requirements of HG 400.1 shall be met.

TABLE HG 400.1
Minimum Pounds of Steam per Hour
per Square Foot of Heating Surface

| Boiler Heating Surface: | Firetube Boilers | Watertube Boilers |
|------------------------------------|-----------------------------|------------------------------|
| Hand fired | 5 | 6 |
| Stoker fired | 7 | 8 |
| Oil, gas, or pulverized fuel fired | 8 | 10 |
| Waterwall Heating Surface: | | |
| Hand fired | 8 | 8 |
| Stoker fired | 10 | 12 |
| Oil gas, or pulverized fuel fired | 14 | 16 |

NOTES:

1. When a boiler is fired only by a gas giving a heat value not in excess of 200 BTU per cu. ft., the minimum safety valve or safety relief valve relieving capacity may be based on the value given for handfired boilers above.

2. The minimum safety valve or safety relief valve relieving capacity for electric boilers shall be 3 1/2 pounds per hour per kilowatt input.

3. For heating surface determination see ASME Code, Section IV.

(f) The safety valve capacity for each steam boiler shall be such that with the fuel burning equipment installed, and operated at maximum capacity, the pressure cannot rise more than 5 psi above the maximum allowable working pressure.

(g) When operating conditions are changed, or additional boiler surface is installed, the valve capacity shall be increased, if necessary, to meet the new conditions and be in accordance

with (e) and (f). The additional valves required, on account of changed conditions, may be installed on the outlet piping provided there is no intervening valve.

(h) If there is any doubt as to the capacity of the safety valve, an accumulation test shall be run (see ASME Code, Section VI, Care of Heating Boilers).

(i) No valve of any description shall be placed between the safety valve and the boiler, nor on the discharge pipe between the safety valve and the atmosphere. The discharge pipe shall be at least full size and be fitted with an open drain to prevent water lodging in the upper part of the safety valve or in the discharge pipe. When an elbow is placed on the safety discharge pipe, it shall be located close to the safety valve outlet or the discharge pipe shall be securely anchored and supported. All safety valve discharges shall be so located or piped as not to endanger persons working in the area.

6. SAFETY RELIEF VALVE REQUIREMENTS FOR HOT WATER BOILERS

(a) Each hot water heating boiler shall have at least one officially rated (ASME approved and National Board rated) safety relief valve set to relieve at or below the maximum allowable working pressure of the boiler. Each hot water supply boiler shall have at least one officially rated safety relief valve of the automatic reseating type set to relieve at or below maximum allowable working pressure of the boiler. Safety relief valves officially rated as to capacity shall have pop action when tested by steam. When more than one safety relief valve is used on either hot heating or hot water supply boilers, the additional valve or valves shall be officially rated and may be set within a range not to exceed 6 psi above the maximum allowable working pressure of the boiler up to and including 60 psig and 10 percent for those having a maximum allowable working pressure exceeding 60 psig. Safety relief valves shall be spring loaded. Safety relief valves shall be so arranged that they cannot be reset at a higher pressure than the maximum permitted by this paragraph.

(b) No materials liable to fail due to deterioration or vulcanization when subject to saturated steam temperature corresponding to capacity test pressure shall be used for any part.

(c) No safety relief valve shall be smaller than 3/4-inch nor larger than 4 1/2-inch standard pipe size, except that boilers having a heat input not greater than 15,000 BTU per hour may be equipped with a rated safety relief valve of 1/2-inch standard pipe size. The inlet opening shall have an inside diameter ap-

proximately equal to, or greater than, the seat diameter. In no case shall the maximum opening through any part of the valve be less than 1/2-inch diameter or its equivalent area.

(d) The required steam relieving capacity, in pounds per hour, of the pressure relieving device or devices on a boiler shall be the greater of that determined by dividing the maximum output in BTU at the boiler outlet obtained by the firing of any fuel for which the unit is installed by 1000, or on the basis of pounds of steam generated per hour per square foot of boiler heating surface as given in Table HG 400.1. In many cases a greater relieving capacity of valves will have to be provided than the minimum specified by these rules. In every case, the requirements shall be met.

(e) When operating conditions are changed, or additional boiler heating surface is installed, the valve capacity shall be increased, if necessary to meet the new conditions and shall be in accordance with (f). The additional valves required, on account of changed conditions, may be installed on the outlet piping provided there is no intervening valve.

(f) Safety relief valve capacity for each boiler shall be such that, with the fuel burning equipment installed and operated at maximum capacity the pressure cannot rise more than 6 psi, above the maximum allowable working pressure for pressure up to and including 60 psig and 10 percent of maximum allowable working pressures over 60 psig.

(g) If there is any doubt as to the capacity of the safety relief valve, an accumulation test shall be run (see ASME Code, Section VI, Care of Heating Boilers).

(h) No valve of any description shall be placed between the safety relief valve and the boiler, nor on the discharge pipe between the safety relief valve and the atmosphere. The discharge pipe shall be at least full size and fitted with an open drain to prevent water lodging in the upper part of the safety relief valve or in the discharge pipe. When an elbow is placed on the safety relief valve discharge pipe, it shall be located close to the safety relief valve outlet or the discharge pipe shall be securely anchored and supported. All safety relief valve discharges shall be so located or piped as not to endanger persons working in the area.

7. VALVE REPLACEMENT

Safety valves and safety relief valves requiring repairs shall be replaced with a new valve or repaired by the manufacturer or his authorized representative.

8. PRESSURE RELIEVING DEVICES

Boilers and fired storage water heaters exempt in Part I, Article 6 shall be equipped with pressure relieving devices in accordance with the requirements of the ASME Code, Section IV.

9. INSTRUMENTS, FITTINGS AND CONTROL REQUIREMENTS

Instruments, fittings and controls for each boiler installation shall comply with the requirements of the ASME Code, Section IV.

10. LOW WATER FUEL CUTOFF

(a) It is required that each newly automatically fired hot water heating boiler with heat input greater than 400,000 BTU/hr. have an automatic low water fuel cutoff with manual reset which has been designed for hot water service, so located as to automatically cut off the fuel supply when the surface of the water falls to the level established in Paragraph (b); (Also, see the ASME Code, Section IV.)

(b) As there is no normal water line to be maintained in a hot water heating boiler, any location of the low water fuel cutoff above the lowest safe permissible water level established by the boiler manufacturer is satisfactory.

(c) A coil type boiler or water tube boiler with heat input greater than 400,000 BTU/hr. requiring forced circulation, to prevent overheating of the coils or tubes, shall have a flow sensing device installed in the outlet piping, in lieu of the low water fuel cutoff required in Para.(a), to automatically cut off the fuel supply when the circulating flow is interrupted.

11. STEAM GAGES

Each steam boiler shall have a steam gage connected to its steam space, its water column, or its steam connection, by means of a siphon or equivalent device exterior to the boiler. The siphon shall be of sufficient capacity to keep the gage tube filled with water and so arranged that the gage cannot be shut off from the boiler except by a cock with a tee or lever handle placed in the pipe near the gage. The handle of the cock shall be parallel to the pipe in which it is located when the cock is open.

The range of the scale on the dial of a steam boiler steam gage shall be not less than 30 psi. The gage shall be provided with effective stops for the indicating pointer at the zero point and at the maximum pressure point. The travel of the pointer from zero to 30 psi pressure shall be at least 3 inches.

12. PRESSURE OR ALTITUDE GAGES

Each hot-water boiler shall have a pressure or altitude gage connected to it or to its flow connection in such a manner that it cannot be shut off from the boiler except by a cock with tee or lever handle placed on the pipe in which it is located when the cock is open.

The range of the scale on the dial of the pressure or altitude gage shall be graduated approximately to not less than 1 1/2 nor more than three times the pressure at which the safety relief valve is set.

13. THERMOMETERS

Each hot water boiler shall have a thermometer so located and connected that it shall be easily readable when observing the water pressure or altitude gage. The thermometer shall be so located that it will at all times indicate the temperature in degrees Fahrenheit or Centigrade of the water in the boiler at or near the outlet.

14. WATER GAGE GLASSES

Each steam boiler shall have one or more water gage glasses attached to the water column or boiler by means of valved fittings. The lower fitting shall be provided with a drain valve of the straightway type with opening not less than 1/4-inch diameter to facilitate cleaning. Gage glass replacement shall be possible while the boiler is under pressure.

Transparent material, other than glass, may be used for the water gage provided that the material has proved suitable for the pressure, temperature and corrosive conditions encountered in service.

15. STOP VALVES AND CHECK VALVES

If a boiler can be closed off from the heating system by closing a steam stop valve, there shall be a check valve in the condensate return pipe between the boiler and the system.

If any part of a heating system can closed off from the remainder of the system by closing a stop valve, there shall be a check valve in the condensate return pipe from that of the system.

When two or more boilers provided with manholes are connected to a common header, the connection from each boiler shall be fitted with two stop valves having an ample free-blow drain between them. The discharge of the drain shall be visible to the operator while manipulating the valves and shall be piped clear of the boiler setting. The stop valves shall consist

preferably of one automatic nonreturn valve (set next to the boiler) and a second valve of the outside-screw-and-yoke type.

16. FEEDWATER CONNECTIONS

Feedwater, make-up water, or water treatment shall be introduced into a boiler through the return piping system or through an independent feedwater connection which does not discharge against parts of the boiler exposed to direct radiant heat from the fire. Feedwater, make-up or water treatment shall not be introduced through openings or connections provided for inspection or cleaning, safety valve, safety relief valve, surface blowoff, water column, water gage glass, pressure gage or temperature gage.

Feedwater piping shall be provided with a check valve near boiler and a stop valve or cock between the check valve and the boiler or return pipe system.

Where one or more boiler returns are fed back to the boiler by gravity, there shall be a check valve and stop valve in each return line, the stop valve to be placed between the boiler and the check valve, and both shall be located as close to the boiler as is practicable. It is recommended that no stop valves be placed in the supply and return pipe connections of a single boiler installation.

17. RETURN PUMP

Each boiler equipped with a condensate return pump, where practicable, shall be provided with a water level control arranged to automatically maintain the water level in the boiler within the range of the gage glass.

18. REPAIRS AND RENEWALS OF BOILER FITTINGS AND APPURTENANCES

Whenever repairs are made to fittings or appurtenances, or it becomes necessary to replace them, such repairs or replacements shall comply with the ASME Code, Section IV for new construction.

19. CONDITIONS NOT COVERED BY THESE REQUIREMENTS

All cases not specifically covered by these requirements shall be treated as new installations or may be referred to the Safety Director for instructions concerning the requirements.

SECTION 3 — PRESSURE VESSELS

1. MAXIMUM ALLOWABLE WORKING PRESSURE FOR STANDARD PRESSURE VESSELS

The maximum allowable working pressure for standard pressure vessels shall be determined in accordance with the applicable provisions of the edition of the ASME Code under which they were constructed and stamped.

2. MAXIMUM ALLOWABLE WORKING PRESSURE FOR NON-STANDARD PRESSURE VESSELS

(a) FOR INTERNAL PRESSURE. The maximum allowable working pressure on the shell of a non-standard pressure vessel shall be determined by the strength of the weakest course computed from the thickness of the plate, the tensile strength of the plate, the efficiency of the longitudinal joint, the inside diameter of the weakest course and the factor of safety set by the these rules.

$$\frac{TStE}{RFS} = \text{maximum allowable working pressure, psi:}$$

where:

TS = maximum allowable tensile strength of shell plate, psi.

When the tensile strength of the steel plate is not known, it shall be taken as 45,000 psi for temperatures not exceeding 400 degrees F.

t = minimum thickness of shell plate of weakest course, inches.

E = efficiency of longitudinal joint depending upon construction.

Use the following values:

For fusion-welded joints:

| | Percent |
|------------------------|---------|
| Single lap weld | 40 |
| Double lap weld | 60 |
| Single butt weld | 60 |
| Double butt weld | 75 |
| Forge weld | 70 |
| Brazed steel | 80 |

R = inside radius of weakest course of shell, inches, provided the thickness does not exceed 10 percent of the radius.

If the thickness is over 10 percent of the radius, the outer radius shall be used.

FS = factor of safety allowed by these rules.

For riveted joints, calculate riveted efficiency in accordance with the 1971 ASME Code, Section VIII.

(b) FOR EXTERNAL PRESSURE. The maximum allowable working pressure for cylindrical non-standard pressure vessels subjected to external or collapsing pressure shall be determined by the rules in the ASME Code, Section VIII, Div. 1.

(c) FACTORS OF SAFETY. The minimum factor of safety shall in no case be less than four (4) for existing installations. The factor of safety may be increased when deemed necessary by the inspector to insure the operation of the vessel within safe limits. The condition of the vessel and the particular service to which it is subject will be the determining factors.

(d) END CLOSURES. The maximum allowable working pressure permitted for formed heads under pressure shall be determined by using the appropriate formulas from the ASME Code, Section VIII, Div. 1.

3. INSPECTION OF INACCESSIBLE PARTS

Where in the opinion of the inspector, as the result of conditions disclosed at the time of inspection, it is advisable to remove the interior or exterior lining, covering, or brickwork to expose certain parts of the vessel not normally visible, the owner or user shall remove such materials to permit proper inspection and to establish construction details. Metal thickness shall be determined utilizing appropriate equipment including drilling if necessary.

4. PRESSURE RELIEF DEVICES

Pressure relief devices for each pressure vessel installation shall comply with the requirements of the code to which the vessel was constructed.

5. SAFETY APPURTENANCES

Each pressure vessel shall be protected by such safety and relief valves and indicating and controlling devices as will insure its safe operation. These valves and devices shall be so constructed, located, and installed so they cannot readily be rendered inoperative. The relieving capacity of the safety valves shall be in accordance with the applicable codes. Safety valve discharges shall be carried to a safe place.

6. REPAIRS AND RENEWALS OF FITTINGS AND APPURTENANCES

Whenever repairs are made to fittings or appurtenances, or it becomes necessary to replace them, such repairs or replacements shall comply with the ASME Code.

7. AIR COMPRESSOR UNITS MOUNTED ON AIR PRESSURE VESSELS

It is preferred that all electric motor driven air compressors above 7.5 H.P. have the motor and compressor unit separately mounted off the air vessel. The air vessel should not be exposed to any stress, strain or vibration from the air compressing unit.

8. CONDITIONS NOT COVERED BY THESE REQUIREMENTS

All cases not specifically covered by these requirements shall be treated as new installations or may be referred to the Safety Director for instructions concerning the requirements.

PART IV - GENERAL REQUIREMENTS

1. INSPECTION OF BOILERS AND PRESSURE VESSELS

All boilers and pressure vessels, not exempt by the Act, shall be inspected internally and externally, as provided by these Rules and Regulations, by an inspector. The owner or user shall prepare each boiler or pressure vessel for such inspection and for appropriate pressure tests, whenever necessary. Following is a recommended general guide in preparing equipment for an internal inspection:

(a) BOILERS

- (1) Cool the boiler, furnace and setting sufficiently to prevent damage to any part.
- (2) Drain and wash thoroughly internal parts to be inspected.
- (3) Remove manhole and handhold plates, and wash out, drain inspection plugs.
- (4) Remove a sufficient number of grates of internally fired boilers, as requested by the inspector.
- (5) Remove brickwork, refractory and insulation, as required by the inspector, to determine condition of boiler, headers, tubes, furnace, structural supports, and other parts.
- (6) Prevent leakage of water, steam or vapors into boiler interiors that would endanger personnel.
- (7) Before opening the manhole or handhole covers and entering any parts of the steam-generating unit connected to a common header with other boilers, the non return and steam stop valves must be closed, tagged, and preferably padlocked, and drain valves or cocks between the two valves opened. The feed and check valves must be closed and the drain valve between the two valves opened. After draining the boiler, the blowoff valves shall be closed and padlocked. Blowoff lines, where practicable, shall be disconnected between pressure parts and valves. All drains and vent lines shall be opened.
- (8) Prepare the pressure gage for testing.

(b) PRESSURE VESSELS

- (1) Remove manhole and handhold plates, cleaning and inspection plugs.

- (2) Clean internal surfaces and adequately ventilate all interior spaces.
- (3) Isolate the unit to the extent that internal temperature, pressure and environment are not injurious to personnel and are under strict control during complete inspection.
- (4) Remove linings or coverings as required by the inspector, to determine true physical condition of the vessel and its components.
- (5) Make protective and regulating controls readily accessible for inspection.
- (6) Prepare the pressure gages for testing.

2. BOILERS AND PRESSURE VESSELS IMPROPERLY PREPARED FOR INSPECTION

If a boiler or pressure vessel has not been properly prepared for an internal inspection, or if the owner or user fails to comply with the requirements for a hydrostatic test as set forth in these Rules and Regulations, the inspector may decline to make the inspection or test and the inspection certificate shall be withheld until the owner or user complies with the requirements.

3. REMOVAL OF COVERING TO PERMIT INSPECTION

If the boiler or pressure vessel is jacketed so that the seams of shells, drums, or domes cannot be seen, sufficient jacketing, setting wall, or other form of casing or housing shall be removed to permit reasonable inspection of the seams and so that the size of the rivets, pitch of the rivets, and other data necessary to determine the safety of the boiler or pressure vessel may be obtained, provided such information cannot be determined by other means.

4. LAP-SEAM CRACK

The shell of a pressure vessel, in which a lap-seam crack is discovered along a longitudinal riveted joint, shall be immediately discontinued from use. If the equipment is not more than 15 years of age, a complete new course of the original thickness may be installed at the discretion of the inspector and after approval by the Safety Director. Patching is prohibited. (by "lap-seam crack" is meant the typical crack frequently found in lap seams, extending parallel to the longitudinal joint and located between or adjacent to rivet holes.)

5. HYDROSTATIC PRESSURE TESTS

A hydrostatic pressure test, when applied to boiler or pressure vessels, shall not exceed 1 1/2 times the maximum

allowable working pressure. The pressure shall be under proper control so that in no case shall the required test pressure be exceeded by more than 2 percent.

During a hydrostatic test involving pressures in excess of the lowest safety valve setting, the safety valve or valves shall be removed or each valve disk shall be held to its seat by means of a testing clamp and not by screwing down the compression screw upon the spring.

Other safety devices that may be damaged shall be removed prior to applying a hydrostatic test.

NOTE: When a hydrostatic test is to be applied to existing installations, the pressure shall be as follows:

(a) For all cases involving the question of tightness, the pressure shall be equal to the release pressure of the safety valves having the lowest release setting.

(b) For all cases involving the question of safety, the pressure shall be equal to 1 1/2 times the maximum allowable working pressure.

6. AUTOMATIC LOW-WATER FUEL CUTOFF AND/OR WATER-FEEDING DEVICE

Each automatically fired and unattended steam or vapor system boiler shall be equipped with an automatic low-water fuel cutoff so located as to automatically cut off the fuel supply when the surface of the water falls to the lowest safe water line. If a water-feeding device is installed, it shall be so constructed, that the water inlet valves cannot feed water into the boiler through the float chamber and so located as to supply requisite feedwater. The lowest safe water line should not be lower than the lowest visible part of the water glass.

Such fuel or feedwater control device may be attached direct to a boiler or to the tapped openings provided for attaching a water glass direct to a boiler, provided that for low-pressure boilers such connections from the boiler are nonferrous tees or Y's not less than 1/2-inch pipe size between the boiler and the water glass, so that the water glass is attached direct and as close as possible to the boiler; the straightaway tapping of the Y or tee to take the water glass fittings, the side outlet of the Y or tee to take the fuel cutoff or water-feeding device. The ends of all nipples shall be reamed to full-size diameter.

Designs embodying a float and float bowl shall have a vertical straightaway valve drain pipe at the lowest point in the water-equalizing pipe connections by which the bowl and the equalizing pipe can be flushed and the device tested.

A coil type boiler or a water tube boiler with heat input greater than 40,000 BTU/hr. requiring forced circulation, to prevent overheating of the coils or tubes, shall have a sensing device installed in the outlet piping, in lieu of the low water fuel cutoff required in this article, to automatically cut off the fuel supply when the circulating flow is interrupted.

7. PRESSURE-REDUCING VALVES

Where pressure-reducing valves are used, one or more relief or safety valves shall be provided on the low-pressure side of the reducing valve when the piping or equipment on the low-pressure side does not meet the requirements for the full initial pressure.

Proper protection shall be provided to prevent injury or damage caused by the escaping fluid, or vapor from the discharge of relief or safety valves if vented to the atmosphere. The combined discharge capacity of the relief or safety valve shall be such that the pressure rating of the lower pressure piping or equipment shall not be exceeded in case the reducing valve sticks open.

The use of hand-controlled bypasses around reducing valves is permissible: If a bypass is used around the reducing valve, the safety valve or relief valve required on the low pressure side shall be sufficient capacity to relieve all the fluid or vapors that can pass through the bypass without overpressuring the low pressure side.

It is mandatory that a pressure gage be installed on the low-pressure side of a reducing valve.

8. BLOWOFF EQUIPMENT

Blowoff equipment shall conform to the provisions set forth in the National Board of Boiler and Pressure Vessel Inspectors publication, "Boiler Blowoff Equipment".

9. LOCATION OF DISCHARGE PIPING OUTLETS

The discharge of safety valves, blowoff pipes and other outlets shall be located so as to prevent injury to personnel.

10. MAJOR REPAIRS

When repairs are necessary, which in any way affect the working pressure or safety of a boiler or pressure vessel, an inspector shall be called for consultation and advice as to the best method of making such repairs. After such repairs are made, they shall be reviewed by and found acceptable to an inspector.

Repairs to all boilers and pressure vessels shall conform to the applicable provisions of the National Board Inspection Code.

11. SUPPORTS

Each boiler and pressure vessel shall be supported by masonry or structural support of sufficient strength and rigidity to safely support the boiler or pressure vessel and its contents. There shall be no excessive vibration in the boiler, pressure vessel, or their connected piping or fittings.

12. BOILER DOOR LATCHES

A watertube boiler shall have the firing doors of the inward-opening type, unless such doors are provided with substantial and effective latching or fastening devices or otherwise so constructed as to prevent them, when closed, from being blown open by pressure on the furnace side.

These latched or fastenings shall be of the positive self-locking type. Friction contacts, latches, or bolts actuated by springs shall not be used. The foregoing requirements for latches or fastenings shall not apply to coal openings of downdraft or similar furnaces.

All other doors, except explosion doors, not used in the firing of the boiler, may be provided with bolts or fastenings in lieu of self-locking latching devices.

Explosion doors, if used and if located in the setting walls within 7 feet of the firing floor or operating platform, shall be provided with substantial deflectors to divert the blast.

13. CLEARANCE

When boilers are replaced or new boilers are installed in either existing or new buildings, a minimum height of at least 3 feet shall be provided between the top of the boiler proper and the ceiling and at least 3 feet between all sides of the boiler and adjacent walls or other structures. Boilers and pressure vessels having manholes shall have 5 feet clearance from the manhole opening and any wall, ceiling or piping that will prevent a person from entering the boiler or vessel. All boilers and pressure vessels shall be so located that adequate space will be provided for the proper operation of the boilers and pressure vessels and their appurtenances, for the inspection of all surfaces, tubes, waterwalls, economizers, piping, valves, and other equipment, and for their necessary maintenance and repair and replacement of tubes.

14. LADDERS, PLATFORMS AND RUNWAYS

Where valves and other appurtenances require frequent manipulation and are so located that they cannot be reached or operated from the floor, a platform or other safe means of operation shall be provided. If a platform or runway is used it shall be at least 24 inches wide and be provided with standard handrails and toeboards and have at least 7 feet 6 inches head room. All runways shall have at least two (2) means of exit, each to be remotely located from the other, and connected to a permanent stairway or inclined ladder leading to the floor level.

15. AIR AND VENTILATION REQUIREMENTS

Combustion Air Supply and Ventilation of Boiler Room. A permanent source of outside air should be provided for each boiler room to permit satisfactory combustion of the fuel as well as proper ventilation of the boiler room under normal operating conditions.

(a) The total requirements of the burners for all fired pressure vessels, and fired equipment in the boiler room must use the following formula to determine the square foot area of a louvered air inlet, where fired by combustible fuels. The minimum net free louvered area shall in no event be less than one square foot. The table below is based on the following formula and either the table or the formula should be used to determine the net louvered area required, expressed in square feet:

| Input BTU/HOUR | Required Air Cu. Ft./Min. | Min. Net Louvered Area Sq. Ft. |
|-------------------|------------------------------|--------------------------------------|
| 500,000 | 125 | 1.0 |
| 1,000,000 | 250 | 1.0 |
| 2,000,000 | 500 | 1.6 |
| 3,000,000 | 750 | 2.5 |
| 4,000,000 | 1,000 | 3.3 |
| 5,000,000 | 1,250 | 4.1 |
| 6,000,000 | 1,500 | 5.0 |
| 7,000,000 | 1,750 | 5.8 |
| 8,000,000 | 2,000 | 6.6 |
| 9,000,000 | 2,250 | 7.5 |
| 10,000,000 | 2,500 | 8.3 |

BTU/HR - 10,000 x 2.5 = Air, CFM - 300 = Min. Net Area Sq. Ft.

or

BTU/HR - 10,000 x 2.5 = $\frac{\text{Required Air}}{300}$ = Min. Net Area, Sq. Ft.

(b) When mechanical ventilation is used in lieu of (a) above, the supply of combustion and ventilation air to the boiler room and the firing device shall be interlocked with the fan so the firing device will not operate with the fan off. The velocity of the air through the ventilating fan shall not exceed 500 CFM and the total air delivered shall be equal to or greater than shown in (a) above.

16. FIRED JACKETED STEAM KETTLES

Fired jacketed steam kettles are acceptable for installation if constructed and stamped in accordance with the ASME Code, Sections I, IV or VIII, Division 1 and registered with the National Board.

17. SHOP INSPECTION AND INSPECTION OF SECONDHAND OR USED BOILERS OR PRESSURE VESSELS

(a) Shop inspections and inspections of secondhand or used boilers or pressure vessels made by the Safety Director or a Deputy Inspector shall be charged for in accordance with Division requirements.

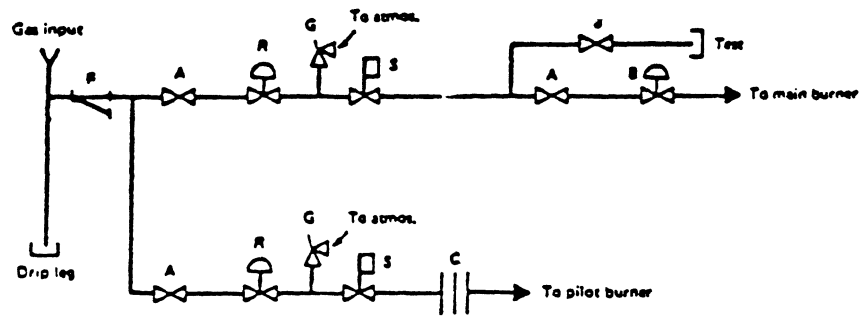
(b) The State of Utah reserves the right to maintain a current file of Quality Assurance manuals and Quality Control manuals used by all manufacturers, assemblers or installers of ASME Code items.

18. CONDITIONS NOT COVER BY THESE RULES AND REGULATIONS

For any condition not covered by these requirements, the applicable provisions of the National Board Inspection Code and/or the ASME Code shall apply.

PART V

ILLUSTRATION A



Above 400,000 Btu/h
 (117,228 W)
 to 2,500,000 Btu/h
 (732,678 W)

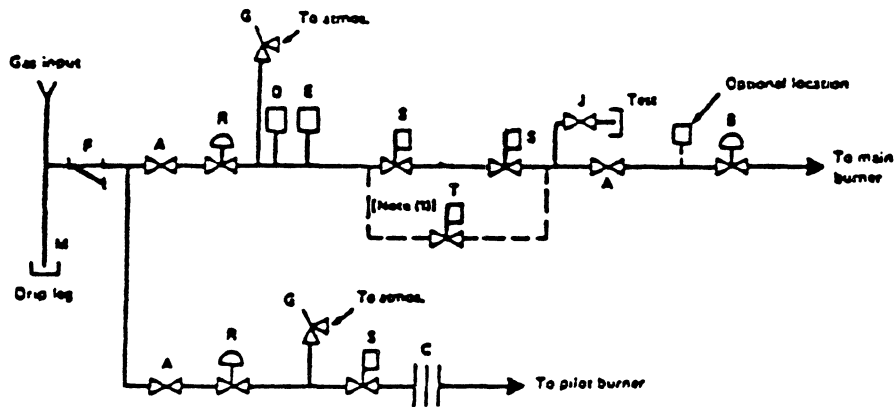
- | | |
|--|------------------------|
| A—Manual Valve | J—Leakage Test Valve |
| B—Control Valve (Modulating) | R—Pressure Regulation |
| C—Orifice | S—Safety Shutoff Valve |
| F—Gas Filter or Strainer (if required) | M—Pipe Cap |
| G—Relief Valve (if required) | |

GENERAL NOTE:

Since boiler design may vary, Standard for Gas Fired Steam and Hot Water Boilers, ANSI Z21.13, does not contain a typical fuel train but through laboratory testing procedures determines that safe lighting of the boiler will be accomplished; this standard illustrates a typical fuel train for boilers. The specific fuel train diagram for boilers complying with ANSI Z21.13 is supplied in the boiler manufacturer's instructions.

TYPICAL GAS FUEL TRAINS

ILLUSTRATION B



Above 2,500,000 Btuh
(732 678 W)
to 5,000,000 Btuh
(1 465 356 W)

- | | |
|--|---|
| A—Manual Valve | J—Leakage Test Valve |
| B—Control Valve (Modulating) | R—Pressure Regulator |
| C—Orifice | S—Safety Shutoff Valve |
| D—High Gas Pressure Switch | T—Safety Shutoff Valve Proof of Closure |
| E—Low Gas Pressure Switch | M—Pipe Cap |
| F—Gas Filter or Strainer - if required | |
| G—Relief Valve - if required | |

GENERAL NOTE:

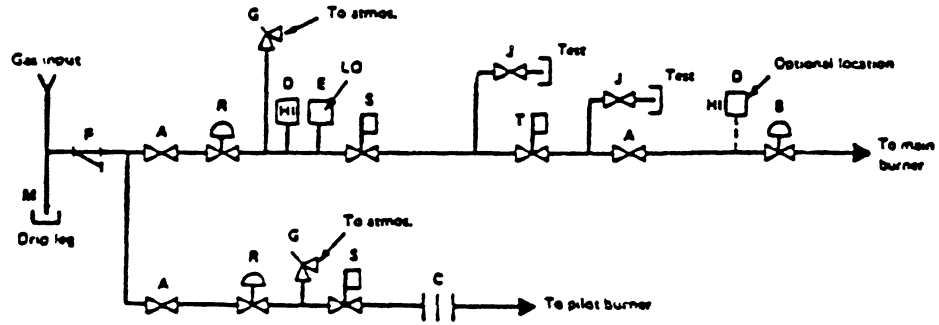
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NOTE:

(1) Alternate Arrangement - T may be used in place of two S type valves.

TYPICAL GAS FUEL TRAINS

ILLUSTRATION C



Above 5,000,000 Btu/h
 (1 465 356 W)
 to 12,500,000 Btu/h
 (3 663 389 W)

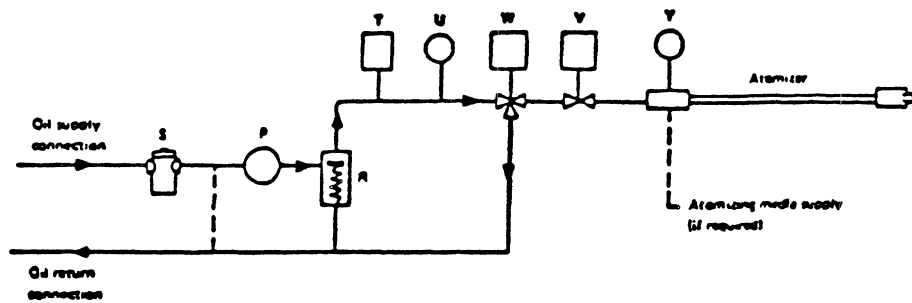
- | | |
|--|--|
| A—Manual Valve | J—Leakage Test Valve |
| B—Control Valve (Modulating) | R—Pressure Regulator |
| C—Orifice | S—Safety Shutoff Valve |
| D—High Gas Pressure Switch | T—Safety Shutoff Valve with Proof of Closure |
| E—Low Gas Pressure Switch | M—Pipe Cap |
| F—Gas Filter or Strainer - if required | |
| G—Relief Valve - if required | |

GENERAL NOTE:

Since boiler design may vary, Standard for Gas Fired Steam and Hot Water Boilers, ANSI Z21.13, does not contain a typical fuel train but through laboratory testing procedures determines that safe lighting of the boiler will be accomplished; this standard illustrates a typical fuel train for boilers. The specific fuel train diagram for boilers complying with ANSI Z21.13 is supplied in the boiler manufacturer's instructions.

TYPICAL GAS FUEL TRAINS

ILLUSTRATION D

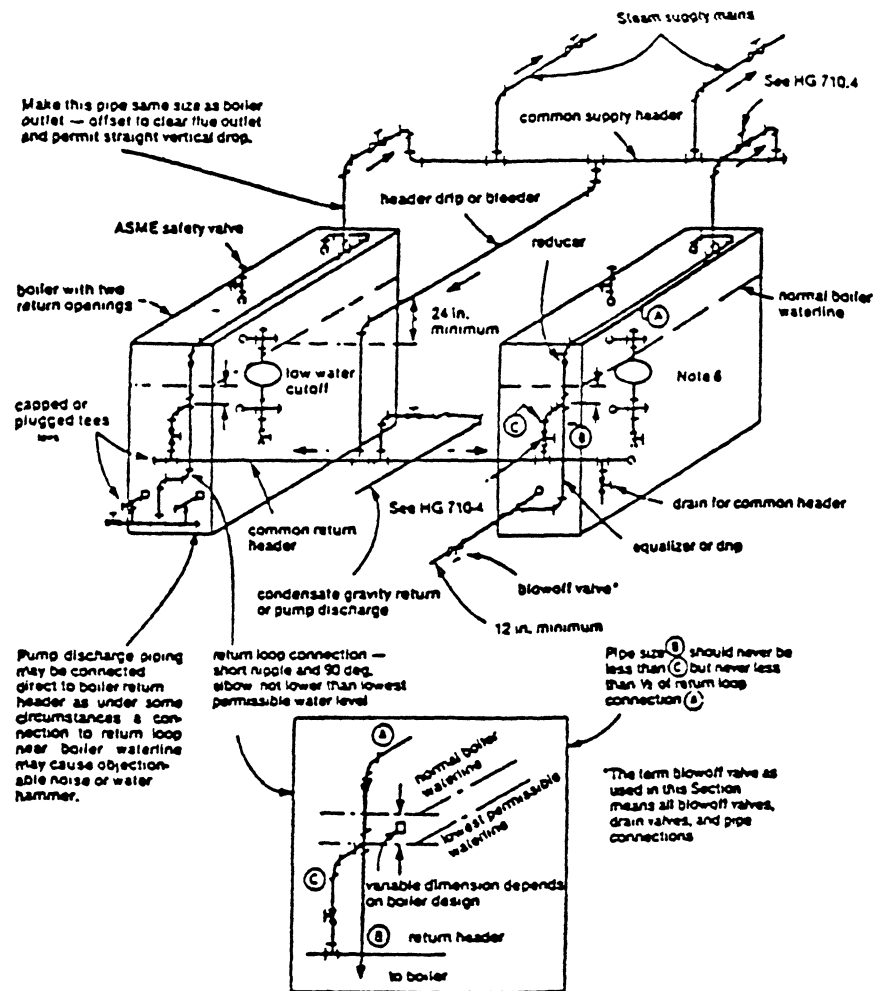


- | | |
|--|---|
| <p>S - Fuel Strainer</p> <p>P - Fuel Pump</p> <p>R - Shutoff Valve and/or Pressure Relief Valve</p> <p>T - Oil Temperature Interlock Switch (where required)</p> <p>U - Oil Pressure Interlock Switch (where required)</p> | <p>V - Safety Shutoff Valve</p> <p>W - Safety Shutoff Valve (may be 3 Way for recirculation, See CF-460)</p> <p>Y - Atomizing Media Supply Pressure Interlock Switch (where required)</p> |
|--|---|

TYPICAL OIL FUEL TRAINS

ILLUSTRATION E

AN ACCEPTABLE PIPING INSTALLATION FOR LOW PRESSURE STEAM BOILERS IN BATTERY

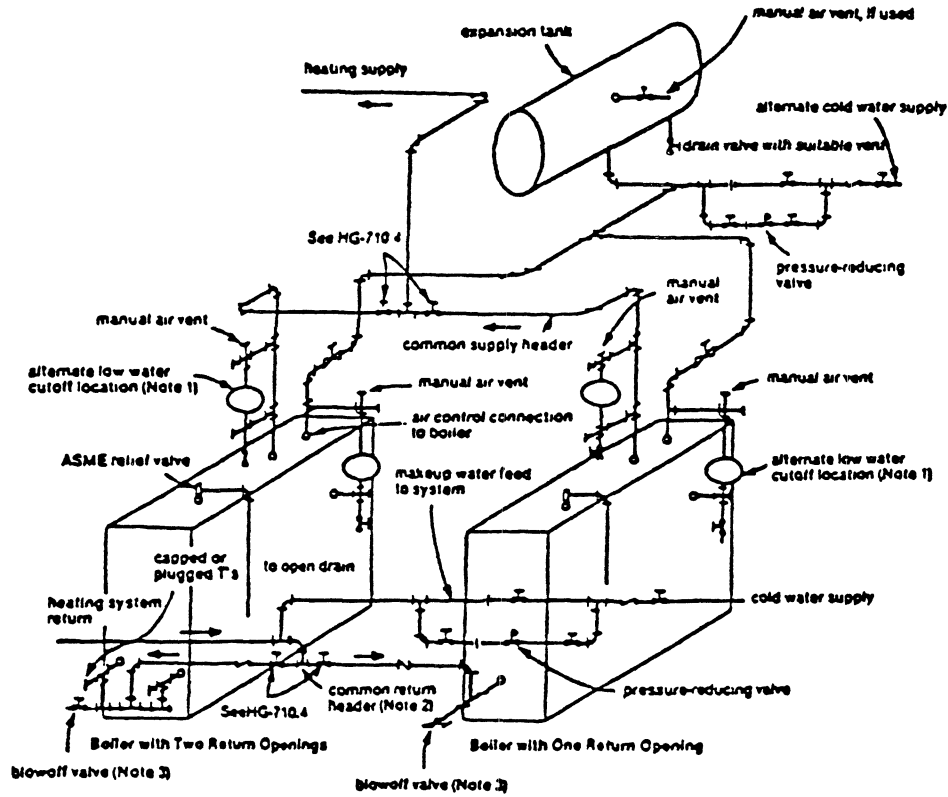


NOTES:

- (1) Return loop connection was designed to eliminate necessity of check valves on gravity return systems, but in some localities a check valve is a legal requirement.
- (2) When pump discharge piping exceeds 25 ft., install swing check valves as shown at pump discharge.
- (3) If pump discharge is looped above normal boiler waterline, install a spring-loaded check valve at return header and at pump discharge.
- (4) Where supply pressures are adequate, feedwater may be introduced directly to a boiler through an independent connection. See HG-702.
- (5) Return connections shown for a multiple boiler installation may not always insure that the system will operate properly. In order to maintain proper water levels in multiple boiler installations, it may be necessary to install supplementary controls or suitable devices.
- (6) Requirements for New Installations (Part II Administration of this manual, Article 30, CSO-1).

ILLUSTRATION F

AN ACCEPTABLE PIPING INSTALLATION FOR HOT WATER BOILERS IN BATTERY



NOTES:

- (1) Recommended control. See HG-814. Acceptable shutoff valves or cocks in the connecting piping may be installed for convenience of control testing and/or service.
- (2) The common return header stop valves may be located on either side of the check valves.
- (3) The term *blowoff valve* as used in this Section means all blowoff valves, drain valves, and pipe connections.

**PART VI - PRESSURE VESSELS
USED BY THE PETROLEUM AND PETRO
CHEMICAL PROCESS INDUSTRIES
ANSI/API 510 JURISDICTION**

Except for boilers, and notwithstanding specific rule coverage in Parts I through V, pressure vessels which fall within the scope and jurisdiction of the ANSI/American Petroleum Institute (API) Code 510 Pressure Vessel Inspection Code are exempt from the preceding sections of the regulation, providing the owner/user complies with the following rules:

- A. The owner-user of pressure vessels shall:
1. Have an Owner-User Inspection Agency certified by the state;
 2. Have qualified inspectors in its employ;
 3. Annually provide a vessel inspection summary to the state;
 4. Maintain complete inspection reports by the Owner-User Inspection Agency which shall be available for inspection by the Safety Director or his deputies at any reasonable time;
 5. Obtain from the Safety Director a valid certificate of operation upon payment of fees prescribed. Such certificate of operation shall be obtained upon application by the owner-user who shall verify that the inspections required by ANSI/API 510 have been performed and that each pressure vessel is in safe operating condition.
- B. An owner-user who falls within the jurisdiction of ANSI/API 510 shall be certified by the commission as an "Owner-User Inspection Agency" by filing a letter of request with the Safety Director provided:
1. That qualified pressure vessel inspector(s) are maintained;
 2. That the requirements of ANSI/API 510 are performed;
 3. That complete records available for inspection by the Safety Director are maintained.
- C. Inspector(s) in the employ of a certified Owner-User Inspection Agency shall be issued certificates of competency as pressure vessel inspector(s) by the Safety Director upon request and payment of fee by the Owner-User Inspection Agency. This request shall certify to the state that the

pressure vessel inspector(s) are qualified in accordance with the provision of ANSI/API 510.

- D. A qualified owner-user shall be allowed to maintain a Safety Relief Valve Repair Organization provided that:
 - 1. The principles of ANSI/API 510 are followed.
 - 2. The Repair Organization maintains the safety relief valves in accordance with the manufacturer's recommendations.
 - 3. At three-year intervals, the Safety Director may select two safety relief valves at random from those that have been repaired by the Repair Organization, and send these valves to an independent testing agency to be tested for set pressure and capacity. The owner-user shall bear the full cost of this testing. Failure of these valves to pass the tests within acceptable limits shall be cause for the Safety Director to require the Repair Organization to furnish additional valves for further testing sufficient to satisfy the Safety Director of the Organization's qualifications. Failure of the additional valves shall cause the Safety Director to require the owner-user to repair safety relief valves according to Part II, Article 3(b), until such time as the owner-user can again demonstrate the competence of the Repair-Organization.
- E. Revocation, for cause, by the Safety Director of the Owner-User Inspection Agency certification revokes all owner-user inspector certificates of competency. The Safety Director may also revoke, for cause, an individual owner-user inspector certificate of competency.
- F. Owner-user inspectors shall not receive any salary or expense from this state, and a certificate of competency shall be valid only as long as such owner-user inspector is employed by the qualified Owner-User Inspection Agency.
- G. The Owner-User Inspection Agency shall apply on or before January 31 of each year for renewal of certificates of competency for each owner-user inspector employed who inspects pressure vessels operated in this state. The fee must accompany application.
- H.
 - 1. Fees for Owner-User Inspection Agency certification as described in Sections B and C shall be paid as follows:
 - a) For certification as an Owner-User Inspection Agency, Two Hundred Fifty (\$250.00) dollars.

- (b) For initial issue of a Certificate of Competency, Twenty-five (\$25.00) dollars.
 - (c) For renewal of a Certificate of Competency, Fifteen (\$15.00) dollars.
- 2. Fees for Annual Vessel Inspection Summary as described in Section A-3 shall be paid as follows:
 - (a) For statements covering not more than twenty-five vessels, **Five (\$5.00) dollars** per vessel.
 - (b) For statements covering more than twenty-five but less than one hundred vessels, **One Hundred (\$100.00) dollars.**
 - (c) For statements covering more than one hundred but less than five hundred vessels, **Two Hundred (\$200.00) dollars.**
 - (d) For statements covering more than five hundred vessels, **Four Hundred (\$400.00) dollars.**

ADDENDUM F

58-56-4. Adoption of building codes — Amendments.

(1) Except as provided in Section 58-56-10 and subject to the provisions of Subsection (3), the following are adopted as the construction standards to which the state and each political subdivision of this state shall adhere in building construction, alteration, remodeling and repair, and in the regulation of building construction, alteration, remodeling and repair:

- (a) the Uniform Building Code as promulgated by the ICBO;
- (b) the National Electrical Code as promulgated by the National Fire Protection Association;
- (c) the Uniform Plumbing Code as adopted by IAPMO; and
- (d) the Uniform Mechanical Code as promulgated by the ICBO and IAPMO.

(2) The division, in collaboration with the commission, shall adopt by rule the specific edition of the NEC, UBC, UMC, and UPC to be used as the standard and may adopt by rule successor editions of any adopted code.

(3) The division, in collaboration with the commission, may adopt amendments to the NEC, UBC, UMC, and UPC to be applicable to the entire state or within a political subdivision only in accordance with Section 58-56-7.

ADDENDUM G

26-15-3. Department to advise Uniform Building Code Commission regarding specific edition of Uniform Plumbing Code.

The department shall advise the Division of Occupational and Professional Licensing and the Uniform Building Code Commission, with respect to the specific edition of the Uniform Plumbing Code to be adopted, and amendments to the Uniform Plumbing Code as provided for under Section 58-56-5. The department may enforce the Uniform Plumbing Code. The provisions of Section 58-56-9 do not apply to health inspectors acting under this section.

ADDENDUM H

UNIFORM PLUMBING CODE

1988
EDITION



AMENDMENTS

R449-100 Utah Plumbing Code

R449-100-1 Reference

The Utah Department of Health hereby incorporates by reference the 1988 edition of the Uniform Plumbing Code as published by the International Association of Plumbing and Mechanical Officials. The Utah Department of Health hereby adopts the following changes to the 1988 edition of the Uniform Plumbing Code.

R449-100-2 Chapter 3

A. Section 318 (a)(6) - Inspections and Testing. Corrections: Notices of correction or violation shall be written by the Administrative Authority and shall be posted at the site of the work or mailed or delivered to the permittee or his authorized representative. Refusal, failure or neglect to comply with any such notice or order within ten (10) days of receipt thereof, shall be considered a violation of this Code, and shall be subject to the penalties set forth.

R449-100-3 Chapter 4

A. Section 406 (m) - An approved type of two-way cleanout fitting, installed inside the building wall near the connection between the building drain and building sewer or installed outside of a building at the lower end of a building drain, and extended to grade, may be substituted for an upper terminal cleanout, if the cleanout is within one hundred (100) feet of the upper terminal and the public or private sewage disposal system.

B. Section 409 (a) - Drainage of Fixtures Located Below the Next Upstream Manhole or Below the Main Sewer Level. Drainage piping that serves fixtures which have flood level rims located below the elevation of the next upstream manhole cover of the public sewer that serves such drainage piping may be protected from backflow of sewage. Fixtures above such elevation shall not discharge through a backwater valve.

R449-100-4 Chapter 6

A. Section 601 (b) - Indirect Waste Conditions. No cold storage room, refrigerator, cooling counter, compartment, receptacle, appurtenance or device which is used, designed or intended to be used for the storage or holding of food or drink, and no dishwashing or culinary sink in any food preparation room which is used for soaking, washing or preparing ready-to-serve food shall have any drain in connection therewith directly connected to any soil, waste or vent pipe. Such equipment or fixtures shall be drained by means of indirect waste pipes, as defined in Chapter 1 of this Code, and all wastes drained by them shall discharge through an airbreak into a floor sink or other approved type receptor which is properly connected to the drainage system.

B. Section 608 (d) - Appliances. Domestic pump-type dishwashers may be directly connected to a trap or into the inlet side (top or head) of an approved food waste disposal unit, provided that the pump discharge line is extended and secured as high as possible under the deck before it is connected to the trap or disposal unit.

RA49-100-5 Chapter 9

A. Section 910 (a) - Plumbing Fixtures Required. Each building intended for human occupancy shall be provided with minimum sanitary facilities as required by the local or state department having jurisdiction. A list of minimum facilities for various occupancies is given in Appendix C of this code. Where not deemed necessary for safety or sanitation in seasonally occupied buildings, the local health officer or his designated representative shall determine fixture requirements on a case-by-case basis.

B. Section 910 (b) - Where four or fewer persons, regardless of sex, are employed, separate toilet facilities for each sex need not be furnished, provided that the toilet room door can be locked from the inside in a manner satisfactory to the building official.

C. Section 910 (c) - A lavatory or similar fixture shall be provided in the same room or an immediately adjoining room wherever a water closet or urinal is installed.

D. Section 910 (d) - All public rest room facilities shall be equipped with at least one floor drain.

E. Section 910 (e) - Hot and cold water shall be supplied to all plumbing fixtures which normally need or require hot and cold water for their proper use and function.

RA49-100-6 Chapter 10

A. Section 1003 - Cross-Connection Control. No person shall install any water operated equipment or mechanism, or use any water treating chemical or substance, if it is found that such equipment, mechanism, chemical or substance may cause pollution of the domestic water supply. Such equipment or mechanism may be permitted only when equipped with an approved backflow prevention device. (See Appendix J for testing and installation requirements.)

B. Section 1004 (g) - Pipe or pipe fittings that contain an excess of 8.0% lead shall be prohibited in piping systems that are used to convey potable water.

C. Section 1007 (e) - Relief valves located inside a building shall be provided with a drain, not smaller than the relief valve outlet, of galvanized steel, hard drawn copper piping and fittings, and shall extend from the valve to an approved fixture or location with the end of the pipe not more than two feet (610 mm) nor less than six inches (152.4 mm) above the ground and pointing downward.

No part of such drain pipe shall be trapped and the terminal end of the drain pipe shall not be threaded.

RA49-100-7 Chapter 11

A. Section 1101 (d) - The public sewer may be considered as being available when such public sewer is within three hundred (300) feet of any property line with any building used for human occupancy.

B. Section 1111 (c) - Abandoned Sewers and Sewage Disposal Facilities. The top cover or arch over the cesspool, septic tank, or seepage pit shall be removed before filling, and the filling shall not extend above the top of the vertical portions of the sidewalls or above the level of any outlet pipe until inspection has been called and the cesspool, septic tank or seepage pit has been inspected. After such inspection, the cesspool, septic tank or seepage pit shall be filled to the level of the top of the ground.

Inspections shall be conducted by the Local Health Officer or a designated representative.

R449-100-8 Chapter 12
Delete Chapter 12

R449-100-9 Chapter 13
Delete Chapter 13

R449-100-10 Appendix C
Delete 11(a)

14. In shopping centers and shopping malls, required facilities may be installed in individual stores or in central toilet areas if the distance to travel from the main entrance of any store does not exceed 500 feet, and not more than one flight of stairs.

R449-100-11 APPENDIX J
Appendix J

Cross Connection Control and Backflow Prevention

The type of backflow prevention device/assembly to be used in each application shall be determined by the Degree of Hazard at the point of use.

| Degree of Hazard | Type of Protection |
|-------------------|--|
| High | Air Gap |
| High | Reduced Pressure Zone (RP) Assembly |
| Medium | Double Check Valve (DC) Assembly |
| Low | Pressure Atmospheric Vacuum Breaker (PAVB) |
| Low | Atmospheric Vacuum Breaker (AVB) |
| Low (Residential) | Hose Bibb Vacuum Breaker |

DEGREE OF HAZARD DETERMINATION

The Degree of Hazards are as follows:

Low Hazard: Asthetic water quality (color, odor, taste, appearance): no harmful effects if consumed.

Medium Hazard: Polluted waters (non-toxic substances): may cause illness and minor distress, no long-term harmful effects if consumed.

High Hazard: Contaminated waters (toxic substances): causing illness or death if consumed.

When the water purveyor is in need of assistance in determining the degree of hazard, the Bureau of Drinking Water/Sanitation shall be contacted for assistance.

Backflow prevention devices/assemblies shall be provided at any installation as required by the local water purveyor or Utah Department of Health. All backflow prevention devices/assemblies shall be installed to be readily accessible for testing, repair and maintenance.

All commercial and high pressure boilers shall have air gap or Reduced Pressure Zone (RP) backflow prevention assembly protection. All boilers that are chemically treated shall have air gap or Reduced Pressure Zone (RP) backflow prevention assembly prevention.

Residential lawn sprinkler systems shall have backflow prevention devices/assemblies installed. Where applicable, an Atmospheric Vacuum Breaker shall be installed if all installation criteria have been met. Otherwise, a Pressure Atmospheric Vacuum Breaker shall be installed in accordance with its installation criteria.

Non-residential sprinkling systems shall be protected by a Pressure Atmospheric Vacuum Breaker where applicable; otherwise, a Double Check Valve assembly will be required.

If any sprinkling system is injected with any chemical or fertilizer, the Reduced Pressure Zone (RP) principle backflow prevention assembly shall be required.

Sprinkler systems that are supplied by pressurized irrigation systems that wish to use the drinking water system during times of the "off" irrigation season must install a swing connection so that only one source of supply may be utilized at a time, and must install a Reduced Pressure Zone Assembly on the drinking water system upstream of any connection.

Fire sprinkling systems containing antifreeze shall be protected by a UL-listed alarm check valve installed in accordance to law. Addition of chemicals other than pure glycerin (C.P. or U.S.P 96.5%) or propylene glycol shall require the installation of a Reduced Pressure Zone (RP) backflow prevention assembly.

INSTALLATION CRITERIA

(Backflow Prevention Devices/Assemblies)

Backflow prevention devices/assemblies shall be installed in water supply lines to provide at least the degree of protection as indicated within this Appendix.

Prior to the installation of any backflow prevention device, the owner of the water system shall be notified that the installation of a backflow prevention device/assembly may create a closed system, thereby creating a thermal expansion hazard.

An inspection of the water system, downstream of the backflow prevention device/assembly, shall be conducted by an authorized representative of the local water purveyor or the administrative authority. If it is determined that there will be a thermal expansion hazard, a thermal expansion control device shall be installed in accordance to the manufacturer's installation instructions in addition to the T&P safety relief valve.

Prior to installation, all backflow prevention devices/assemblies shall appear on the approved listing maintained by the Utah Department of Health, Bureau of Drinking Water/Sanitation.

If any unapproved backflow prevention device/assembly is found within any water system, that device/assembly shall be removed and replaced with a state-approved device/assembly.

Backflow prevention devices/assemblies shall be installed for the determined Degree of Hazard and within the following installation criteria:

1. Air Gap

A. The air gap shall be one inch, or twice the diameter of the incoming pipe (within 10 pipe diameters of the termination of the line), whichever is greater. This measurement will be taken from the end of the water line to the flood rim of the receptacle or vat (the overflow or drainline will not be construed as the flood rim level).

9. Where the air gap is within two pipe diameters (horizontal measurement) of a wall, the air gap shall be increased to three times the incoming pipe diameter. In high hazard installations the air gap shall be inspected on an annual basis by a Certified Backflow Technician.

2. Reduced Pressure Zone (RP) Backflow Prevention Assembly

A. The Reduced Pressure Zone (RP) assembly shall be protected from freezing and vandalism.

B. The bottom of the assembly shall be a minimum of 12 inches above the ground or floor. The assembly owner, when necessary, shall provide devices or structures to facilitate testing, repair, and maintenance and to insure the safety of the Backflow Technician.

C. The body of the assembly shall not be closer than 12 inches to any wall, ceiling, or incumbrance, and shall be readily accessible for testing, repair and maintenance.

D. Reduced Pressure Zone (RP) backflow prevention assemblies shall not be installed in a pit.

E. The relief valve of the assembly shall not be directly connected to any waste disposal line, including sanitary sewer, storm drains, or vents.

F. Reduced Pressure Zone (RP) Backflow Prevention Assemblies shall be maintained as an assembly.

G. The assembly shall be installed in a horizontal position.

3. Double Check Valve (DC) Assembly

A. The bottom of the assembly shall be a minimum of 12 inches above the ground or floor. The assembly owner, when necessary, shall provide devices or structures to facilitate testing, repair and maintenance, and to insure the safety of the Backflow Technician.

B. The body of the Double Check Valve (DC) assembly shall be a minimum of 12 inches from any walls, ceilings, floors, or incumbrances.

C. The assembly shall be readily accessible for testing, repair and maintenance.

D. If installed in a pit, the assembly shall be installed with a minimum of 12-inch clearance between all sides of the vault including the floor, and roof or ceiling.

E. The unit shall be maintained as an assembly.

F. The assembly shall be installed in a horizontal position.

4. Pressure Atmospheric Vacuum Breaker (PAVB) Assembly

A. The Pressure Atmospheric Vacuum Breaker (PAVB) assembly shall not be installed in an area that could be subjected to back pressure or back drainage.

B. The assembly shall be installed a minimum of 12 inches above the highest point of use.

C. The assembly shall be readily accessible for testing, repair and maintenance.

D. The assembly shall not be installed below ground (vault or pit).

E. The PAVB shall be maintained as an assembly.

F. The PAVB shall be installed in a vertical position.

5. Atmospheric Vacuum Breaker (AVB)

A. The Atmospheric Vacuum Breaker (AVB) shall not be installed in an area that could be subjected to back pressure or back drainage.

B. The AVB shall not be installed where it may be subjected to continuous pressure for more than 12 consecutive hours.

- C. The AVB shall be installed a minimum of 6-inches above the highest point of use.
- D. The AVB shall be installed on the discharge side of the last control valve.
- E. The AVB shall be installed in a vertical position.
- 6. Hose Bibb Vacuum Breaker
 - A. The Hose Bibb Vacuum Breaker shall be installed with the anti-removal locking device engaged.

INSPECTION AND TESTING

All high-hazard Air Gaps, Reduced Pressure Zone backflow prevention assemblies, Double Check Valve assemblies, and Pressure Vacuum Breaker assemblies shall be tested, using methods acceptable to the Utah Department of Health, within 10 days of initial installation by a Certified Backflow Technician.

A copy of satisfactory test results shall be submitted to:

- 1) Public Water Purveyor;
- 2) Customer/Consumer;
- 3) Bureau of Drinking Water/Sanitation (Utah Department of Health); and
- 4) the Certified Backflow Technician performing the test.

These satisfactory test results shall be submitted within 30 days after the test is completed.

A copy of unsatisfactory test results shall be submitted to:

- 1) Public Water Purveyor;
- 2) Customer/Consumer;
- 3) Bureau of Drinking Water/Sanitation (Utah Department of Health); and
- 4) the Certified Backflow Technician performing the test.

The unsatisfactory test results shall be submitted within five days after the test is completed.

The most common types of facilities served, and the minimum required protection are listed below.

| Minimum Required Protection | Examples of Facilities Served: |
|--|---|
| Air Gap | <ul style="list-style-type: none"> (1) pipes, pumps, tanks or other devices handling sewage; (2) lawn sprinklers served by non-potable pressure irrigation systems; (3) water closet with flush tank; (4) swimming pools and baptistries; (5) livestock watering troughs or tanks. |
| Reduced Pressure Zone Backflow Prevention Assembly | <ul style="list-style-type: none"> (1) pipes, pumps, tanks or other devices handling toxic chemicals, fertilizers or pesticides; (2) boilers or steam lines; (3) autoclaves w/integral steam generator; |

- (4). wand type car washers and automatic car washers;
- (5) ornamental and lily ponds, aquaria, and ornamental fountain basins;
- (6) snow melting coil systems containing antifreeze;
- (7) solar energy systems containing antifreeze or any liquid heat exchange medium other than potable water.

Double Check Valve Assembly/
Pressure Atmosphere Vacuum
Breaker Assembly

It is necessary to substitute these assemblies for AVBs when service conditions are encountered that negate the effectiveness of AVBs (see installation criteria).

Atmospheric Vacuum Breaker/
Hose Bibb Vacuum Breaker

- (1) laboratory sinks, shampoo sinks and other sinks having faucets with threaded ends or otherwise intended to accommodate hose or tube connections;
- (2) valved outlets or fixtures with attachments used only in connection with foods or other non-toxic substances;
- (3) "hand held" type showers;
- (4) sill cocks and frostproof wall hydrants;
- (5) lawn sprinklers served by potable water systems;
- (6) receptacles containing non-toxic substances;
- (7) water closet or urinal with flushometer valve;
- (8) commercial dishwashing machines;
- (9) detergent dispensing devices;
- (10) autoclaves without steam generator;
- (11) food cabinets and refrigerators;
- (12) steam tables;
- (13) food waste grinders.

RA49-100-12 Installation Standards

Installation Standard For PVC Natural Gas Yard Piping, is 10-84
Delete entire standard.

R449-100-13 Installation Standard For Polyethylene (PE) For Gas Yard
Piping, is 12-83
Delete entire standard.

KEY: plumbing code*
1989

26-15-3

**International Association of
Plumbing and Mechanical Officials**

**UNIFORM
PLUMBING
CODE**

**1988
EDITION**

Adopted at the Fifty-Seventh Annual Conference

SEPTEMBER, 1986

**INTERNATIONAL ASSOCIATION OF PLUMBING
AND MECHANICAL OFFICIALS**

(A Non-Profit Organization)

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of
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Eighteenth Edition
First Printing, January 1988
Second Printing, October 1988
Third Printing, August 1989
Fourth Printing, March 1990

Library of Congress Catalog Card Number 78-073977

Note:

When adopting the Uniform Plumbing Code in whole, in part, or by reference, please notify IAPMO Hqs. at 20001 Walnut Drive South, Walnut, California 91789-2825.

This information will enable us to keep records on how many jurisdictions are using the UPC.

Thank You.

FOREWORD

The advantages of a uniform plumbing code, acceptable in the various jurisdictions, have long been recognized. Increasing confusion resulting from widely divergent practices, dictated by a multitude of conflicting codes, induced the Western Plumbing Officials Association (now International Association of Plumbing and Mechanical Officials) to form a committee dedicated to the creation of a basic plumbing document.

After many months of concerted endeavor, this committee, composed of Plumbing Inspectors, Master and Journeyman Plumbers, Sanitary and Mechanical Engineers, assisted by the Public Utility Companies and the Western Plumbing Industry, successfully compiled the first edition of the "Uniform Plumbing Code" which was officially adopted by the International Association of Plumbing and Mechanical Officials in October, 1945. Amendments adopted by the membership and published in revised form every third year have kept this basic standard abreast of technological developments, and the widespread acceptance and use of the document is indicative of its merit.

In presenting the 1988 edition, the International Association of Plumbing and Mechanical Officials recognizes that the ultimate has not yet been attained. They respectfully urge the users of this Code to present whatever amendments their experience may dictate to the Association's Code Changes Committee, so that, by formal adoption of such, uniformity may be maintained and all will benefit in health, standardization, and safety.

This document was designed to provide a good plumbing system with minimum regulations. The users of the Uniform Plumbing Code are urged to strive for not just a minimum plumbing system, but to keep the consumer in mind and go a step beyond and exceed the minimum.

The consumer is entitled to a sanitary plumbing system. With the exception of "high use and wear" portions of the system, the main plumbing system should have the same life as other components of the building.

The Uniform Plumbing Code is dedicated to all those who have unselfishly devoted their time, effort, and money to create and maintain this, the finest plumbing code in existence.

Vertical marginal lines denote changes from the 1985 edition except where the change was minor. Arrows denote a deletion.

The Uniform Plumbing Code, a publication of IAPMO, is endorsed by ICBO as a companion document to ICBO's Model Codes. The use of the ICBO logo is intended to reflect such support.

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IAPMO Installation Standards are included as a separate section following the UPC Index.

**PART I
ADMINISTRATION**

Title

10.1 This ordinance shall be known as the "Uniform Plumbing Code" and will be referred to as "this Code" herein.

Purpose

10.2 This Code is an ordinance providing minimum requirements and standards for the protection of the public health, safety, and welfare.

Scope

10.3 The provisions of this Code shall apply to the erection, installation, alteration, addition, repair, relocation, replacement, maintenance, or use of any plumbing system, except as otherwise provided for in this Code.

Existing Installations

10.4 (a) Any plumbing system lawfully installed prior to the effective date of this Code may have its existing use, maintenance, or repair continued if the use, maintenance, or repair is in accordance with the original design and location and no hazard to the public health, safety, or welfare has been created by such system.

(b) The owner or his designated agent shall be responsible for the maintenance of the plumbing system in a safe and sanitary condition.

Authority to Abate

10.5 (a) Any portion of a plumbing system found by the Administrative Authority to be insanitary, as defined herein, is hereby declared to be a nuisance.

(b) Where a nuisance exists or a plumbing system is maintained in violation of this Code or any notice issued pursuant to this section, the Administrative Authority shall require the nuisance or violation to be abated and, where necessary, shall seek such abatement in the manner provided by law.

Administrative Authority

20.1 The Administrative Authority shall be the Authority duly appointed to enforce this Code.

Duties and Powers of the Administrative Authority

20.2 (a) The Administrative Authority may appoint such assistants, deputies, inspectors, or other employees as are authorized to carry out the functions of the department and this Code.

Right of Entry

(b) Whenever necessary to make an inspection to enforce any of the provisions of this Code, or whenever the Administrative

Authority or his authorized representative has reasonable cause to believe that there exists in any building or upon any premises any condition which makes such building or premises unsafe as defined in this Code, the Administrative Authority or his authorized representative may enter such building or premises at all reasonable times to inspect the same or to perform any duty imposed upon the Administrative Authority by this Code, provided that if such building or premises be occupied, he shall first present proper credentials and demand entry; and if such building or premises be unoccupied, he shall first make a reasonable effort to locate the owner or other persons having charge or control of the building or premises and demand entry. If such entry is refused, the Administrative Authority or his authorized representative shall have recourse to every remedy provided by law to secure entry.

"Authorized Representative" shall include the persons named in Section 20.2 (a) of this Code.

(c) No owner or occupant or any other person having charge, care, or control of any building or premises shall fail or neglect after proper demand is made as herein provided, to properly permit entry therein by the Administrative Authority or his authorized representative for the purpose of inspection and examination pursuant to this Code. Any person violating this subsection shall be guilty of a misdemeanor.

Violation and Penalties

20.3 Any person, firm, or corporation violating any provision of this Code shall be deemed guilty of a misdemeanor and, upon conviction thereof, shall be punishable by a fine not to exceed \$ _____ or by imprisonment in the _____ Jail for not to exceed _____ months, or both fine and imprisonment. Each separate day or any portion thereof, during which any violation of this Code occurs or continues, shall be deemed to constitute a separate offense and, upon conviction thereof, shall be punishable as herein provided. The issuance or granting of a permit or approval of plans and specifications shall not be deemed or construed to be a permit for, or an approval of, any violation of any of the provisions of this Code. No permit presuming to give authority to violate or cancel the provisions of this Code shall be valid, except insofar as the work or use which it authorized is lawful.

The issuance or granting of a permit or approval of plans shall not prevent the Administrative Authority from thereafter requiring the correction of errors in said plans and specifications or from preventing construction operations being carried on thereunder when in violation of this Code or of any other ordinance or from revoking any certificate of approval when issued in error.

NOTE

Abbreviations used in Table A refer to standards or specifications issued by the organizations identified below:

| | |
|--------------------|---|
| AHAM | Association of Home Appliance Manufacturers, 20 North Wacker Drive, Chicago, Illinois 60606 (312) 984-5800. |
| ANSI | American National Standards Institute, 1430 Broadway, New York, New York 10018 (212) 354-3300. |
| ASME | American Society of Mechanical Engineers, United Engineering Center, 345 E. 47 Street, New York, New York 10017 (212) 705-7722. |
| ASSE | American Society of Sanitary Engineering, P.O. Box 40362, Bay Village, Ohio 44140 (216) 835-3040. |
| ASTM | American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103. Publish Standards and Tentative Standards (215) 299-5400. |
| AWWA | American Water Works Association, 6666 West Quincy Avenue, Denver, Colorado 80235 (303) 794-7711. |
| CISPI | Cast Iron Soil Pipe Institute, 1499 Chain Bridge Road, McLean, Virginia 22101 (703) 827-9177. |
| CS & PS | Commercial Standards and Product Standards, representing voluntary standards of trade, prepared under the procedures of the National Bureau of Standards and published by the United States Department of Commerce. Obtainable from the Superintendent of Documents, United States Government Printing Office, Washington, D.C. 20402 (202) 783-3238. |
| FS | Federal Specifications, published by the Federal Specifications Board. Obtainable from the Superintendent of Documents, United States Government Printing Office, Washington, D.C. 20402 (202) 783-3238. |
| IAPMO (UPC) | International Association of Plumbing and Mechanical Officials, 20001 Walnut Drive South, Walnut, California, 91789-2825 Publish Installation (IAPMO-IS) and Product (IAPMO-PS) Standards (714) 595-8449. |
| PDI | Plumbing and Drainage Institute, 5342 Boulevard Place, Indianapolis, Indiana 46208 (317) 251-5298. |
| UL | Underwriters' Laboratories, Incorporated, 333 Pfingsten Road, Northbrook, Illinois 60062 (312) 272-8800. |
| WQA | Water Quality Association, 4151 Naperville Rd., Lisle, Illinois, 60532 (312) 369-1600. |

All standards and specifications for materials are subject to change. Designations, carrying indication of the year of issue, may thus become obsolete.

TABLE A - PLUMBING MATERIAL STANDARDS

| MATERIALS AND PRODUCTS | ANSI | ASTM | FS | IAPMO | OTHER STANDARDS | FOOTNOTE REMARKS |
|--|---------------------|---------------------|----|---------------------|-----------------|------------------|
| FERROUS PIPE AND FITTINGS: | | | | | | |
| Cast Iron Screwed Fittings (125 & 250lb) (56.8 & 113.6 Kg) | B16.4-1963 | A 126-66 A 74-82 | | | | Note 4 |
| Cast Iron Soil Pipe and Fittings | | | | | | |
| Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems | | | | | CISPI 301-85 | Note 4 |
| Cast Iron Threaded Drainage Fittings | B16.12-1971 | | | | | Note 4 |
| Gray Iron and Ductile Iron Pressure Pipe | | A 377-66 | | | | |
| Hubless Cast Iron Sanitary Systems (Installation) | | | | IS 6-82 | | |
| Malleable Iron Threaded Fittings (150 & 300 lb) (68.1 & 136.2 Kg). Neoprene Rubber Gaskets for Hub and Spigot Cast Iron Soil Pipe and Fittings | B16.3-1977 | | | | CISPI HSN-85 | |
| Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless | | A 53-83 | | | | |
| Pipe, Steel, Black and Hot-Dipped, Zinc-Coated (Galvanized) welded and Seamless, For Ordinary Uses | | A 120-82 | | | | |
| Pipe Threads (Except Dryseal) | B2.1-1968 | | | | | |
| Roof Drains | A112.21.2M- 1983 | | | | | |
| Special Cast Iron Fittings | | | | PS 5-84 PS 16-77 | | |
| Subdrains For Built-up Shower Pans | | | | | | |
| Threaded Cast Iron Pipe For Drainage, Vent and Waste Services.. | A40.5-1943 | | | | | |
| Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples | | A 733-78 | | | | |
| NONFERROUS PIPE AND FITTINGS: | | | | | | |
| Brass-, Copper-, and Chromium-Plated Pipe Nipples | | B 667-81 | | | | |
| Bronze Flanges and Flanged Fittings (150 & 300 lb) | B16.24-1979 | | | | | |
| Cast Brass and Tubing P-Traps | | | | PS 2-83 | | |
| Cast Copper Alloy Fittings and Flared Copper Tubes | B16.26-1975 | | | | | |
| Cast Bronze Threaded Fittings (Class 120 & 250) | B16.15-1976 | | | | | |
| Cast Bronze Solder-Joint Drainage Fittings-DWV | B16.23-1976 | | | | | Note 4 |
| Cast Copper Alloy Solder-Joint Pressure Fittings | B16.18-1976 | | | | | |

TABLE A - PLUMBING MATERIAL STANDARDS

| MATERIALS AND PRODUCTS | ANSI | ASTM | FS | IAPMO | OTHER STANDARDS | FOOTNOTE REMARKS |
|--|-------------|--------------|----|----------|-----------------|------------------|
| Copper and Copper Alloy Welded Water Tube (Installation) | | | | IS 21-80 | | |
| Copper Drainage Tube (DWV) | | B 308-81 | | | | |
| Copper Plumbing Tube and Fittings (Installation) | | | | IS 3-87 | | |
| Diversion Tees and Twin Waste Elbow | | | | PS 9-84 | | |
| Drains for Prefabricated and Precast Showers | | | | PS 4-83 | | |
| Flexible Copper Water Connectors | | | | PS 14-81 | | |
| General Requirements for Wrought Seamless Copper and Copper-Alloy Tube | | B 251-81 | | | | |
| Seamless Brass Tube | | B 135-82 | | | | |
| Seamless Copper Pipe, Standard Sizes | | B 42-83 | | | | |
| Seamless Copper Tube | | B 75-81a | | | | |
| Seamless Copper Water Tube | | B 88-83 | | | | |
| Seamless Copper-Alloy Water Tube | | B 585-80 | | | | |
| Seamless Red Brass Pipe, Standard Sizes | | B 43-80 | | | | |
| Seamless and Welded Copper Distribution Tube (Type D) | | B 641-78 | | | | |
| Threadless Copper Pipe | | B 302-81 | | | | |
| Tubing Trap Wall Adapters | | | | PS 7-84 | | |
| Welded Brass Tube | | B 587-80 | | | | |
| Welded Copper-Alloy Water Tube | | B 566-80 | | | | |
| Welded Copper-Alloy UNS No. C21000 Water Tube | | B 642-78 | | | | |
| Welded Copper Tube | | B 447-80 | | | | |
| Wrought Copper and Bronze Solder-Joint Pressure Fittings | B16.22-1980 | | | | | |
| Wrought Copper and Wrought Copper Alloy Solder-Joint Drainage Fittings | B16.29-1980 | | | | | Note 4 |
| NON-METALLIC PIPE: | | | | | | |
| Acrylonitrile-Butadiene-Styrene (ABS) Building Drain, Waste and Vent Pipe and Fittings (Installation) | | | | IS 5-87 | | |
| Acrylonitrile-Butadiene-Styrene (ABS) Plastic Drain, Waste and Vent Pipe and Fittings | | D 2661-85(a) | | | | Note 4 |
| Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste and Vent Pipe With a Cellular Core | | F 628-85 | | | | |

TABLE A - PLUMBING MATERIAL STANDARDS

| MATERIALS AND PRODUCTS | ANSI | ASTM | FS | IAPMO | OTHER STANDARDS | FOOTNOTE REMARKS |
|--|------|------------|----|---------------------|-----------------|------------------|
| Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings | | D 2751-83a | | | | |
| Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings (Installation) | | | | IS 11-87 | | |
| Asbestos Cement Nonpressure Sewer Pipe | | C 428-74 | | | AWWA C400-72 | Notes 1 & 3 |
| Asbestos Cement Pressure Pipe | | C 298-73 | | | | |
| Asbestos Cement Pressure Pipe For Water and other Liquids | | | | | | |
| Asbestos Cement Pressure Pipe For Water Service and Yard Piping (Installation) | | | | IS 15-82 | | |
| Borosilicate Glass Pipe and Fittings for Drain, Waste and Vent (DWV) Applications | | C 1053-85 | | | | |
| Bell End Poly (Vinyl Chloride) (PVC) Pipe | | D 2672-85 | | | | |
| Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80 | | F 441-84 | | | | |
| Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Hot and Cold-Water Distribution Systems | | D 2846-82 | | | | |
| Chlorinated Poly (Vinyl Chloride) (CPVC) Solvent Cemented Hot and Cold Water Distribution Systems (Installation) | | | | IS 20-85 | | |
| Concrete Drain Tile | | C 412-80 | | | | Note 3 |
| Concrete Sewer, Storm Drain and Culvert Pipe | | C 14-80 | | | | |
| Drain, Waste and Vent (DWV) Plastic Fittings Patterns | | D 3311-82 | | | | Note 4 |
| Extra Strength Vitrified Clay Pipe in Building Drains (Installation) | | | | IS 18-85 | | |
| Fittings for Joining Polyethylene Pipe for Water Service and Yard Piping | | | | PS 25-84 IS 1-85 | | |
| Non Metallic Building Sewers (Installation) | | | | | | |
| Plastic Insert Fittings For Polybutylene (PB) Tubing | | F 845-84 | | | | |
| Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe | | D 2609-74 | | | | Note 6 |
| Polybutylene (PB) Cold Water Building Supply and Yard Piping and Tubing (Installation) | | | | IS 17-82 | | |
| Polybutylene Hot and Cold Water Distribution Tubing Systems Using Insert Fittings (Installation) | | | | IS 22-84 | | |
| Polybutylene Hot and Cold Water Distribution Tubing Systems Using Compression Joints (Installation) | | | | IS 25-85 | | |

TABLE A - PLUMBING MATERIAL STANDARDS

| MATERIALS AND PRODUCTS | ANSI | ASTM | FS | IAPMO | OTHER STANDARDS | FOOTNOTE REMARKS |
|--|------|---|----|---------------------|-----------------|------------------|
| Polybutylene Hot and Cold Water Distribution Pipe, Tubing and Fitting Systems Using Heat Fusion (Installation) | | | | IS 23-84 | | |
| Polybutylene Hot and Cold Water Distribution Pipe, Tubing and Fitting Systems Using Pressure-Lock Fittings (Installation) | | | | IS 24-85 | | |
| Polybutylene (PB) Plastic Hot-Water Distribution Systems | | D 3309-85(b) | | | | |
| Polybutylene (PB) Plastic Pipe (SIDR-PR) Based On Controlled Inside Diameter | | D 2662-83 D 2666-83 | | | | |
| Polybutylene (PB) Plastic Tubing | | | | | | |
| Polyethylene (PE) Cold Water Building Supply and Yard Piping (Installation) | | | | IS 7-83 IS 12-85 | | |
| Polyethylene (PE) For Gas Yard Piping (Installation) | | | | | | |
| Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter | | D 2239-85 | | | | |
| Poly (Vinyl Chloride) (PVC) Building Drain, Waste and Vent Pipe and Fittings (Installation) | | | | IS 9-87 | | |
| Poly (Vinyl Chloride) (PVC) Code Water Building Supply and Yard Piping (Installation) | | | | IS 8-84 IS 10-84 | | |
| Poly (Vinyl Chloride) (PVC) Natural Gas Yard Piping (Installation). Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste and Vent Pipe and Fittings | | D 2665-85 D 2241-84 D1785-83*1 D 2466-78 | | | | Note A |
| Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR) | | | | | | |
| Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120 Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings (Schedule 40) | | | | | | |
| Primers For Use In Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings | | F 656-80 | | | | |
| Rubber Rings For Asbestos-Cement Pipe | | D 1869-79 | | | | |
| Safe Handling Of Solvent Cements and Primers Used For Joining Thermoplastic Pipe and Fittings | | F 402-80 | | | | |
| Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40 | | F 438-82*1 | | | | |

TABLE A - PLUMBING MATERIAL STANDARDS

| MATERIALS AND PRODUCTS | ANSI | ASTM | FS | IAPMO | OTHER STANDARDS | FOOTNOTE REMARKS |
|---|------------------------------|------------------------|------------|----------|-----------------|------------------|
| Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80 | | F 439-82 ⁰¹ | | | | |
| Socket-Type Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings Schedule 80 | | D 2467-76a | | | | |
| Solvent Cement For Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings | | D 2235-81 | | | | |
| Solvent Cements For Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings | | F 483-85 | | | | |
| Solvent Cements For Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings | | D 2564-84 | | | | |
| Thermoplastic Accessible and Replaceable Plastic Tube and Tubular Fittings | | F 409-81 ⁰¹ | | | | Note 4 |
| Thermoplastic Gas Pressure Pipe, Tubing and Fittings | | D 2513-82 | | | | |
| Type PS-48 Poly (Vinyl Chloride) (PVC) Plastic Gravity Flow Sewer Pipe and Fittings | | F 789-85 | | | | |
| Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings | | D 3034-85(a) | | | | |
| Type PSP Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings | | D 3033-85 | | | | |
| Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings Schedule 80 | | D 2464-78 | | | | |
| Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated | | C 700-78 | | | | |
| PLUMBING FIXTURES: | | | | | | |
| Enameled Cast Iron Plumbing Fixtures | A112.10.1M-1979 | | WWP-541-71 | | | |
| Jetted Whirlpool Bathtubs | | | | PS 32-84 | | |
| Plastic Bathtub Units | Z124.1-1980 | | WWP-541-71 | | | |
| Plastic Lavatories | Z124.3-1980 | | WWP-541-71 | | | |
| Plastic Shower Receptors and Shower Stalls | Z124.2-1980 | | WWP-541-71 | | | |
| Plastic Water Closet Bowls and Tanks | Z124.4-1980 | | WWP-541-71 | | | |
| Plumbing Fixtures For Land Use | | | WWP-541-71 | | | |
| Porcelain Enameled Formed Steel Plumbing Fixtures | ANSI/ASME A112.19.4M-1984 | | WWP-541-71 | | | |
| Stainless Steel Plumbing Fixtures (Designed For Residential Use).. | A112.19.3-1978 | | WWP-541-71 | | | Note 5 |
| Testing and Rating Procedure For Grease Interceptors | | | | PS 13-79 | | |

TABLE A - PLUMBING MATERIAL STANDARDS

| MATERIALS AND PRODUCTS | ANSI | ASTM | FS | IAPMO | OTHER STANDARDS | FOOTNOTE REMARKS |
|---|---------------------|------|------------|----------|-----------------|------------------|
| Tile Lined Roman Bath Tube (Installation) | | | | IS 2-82 | | |
| Tile Lined Shower Receptors (and Replacements) (Installation) | | | | IS 4-82 | | |
| Trim For Water Closet Bowls Tanks and Urinals | A112 19 5-1979 | | WWP 541 71 | | | |
| Vitreous China Plumbing Fixtures | A112 19 2M-1982 | | WWP 541 71 | | | |
| VALVES. | | | | | | |
| Backflow Prevention Devices | | | | PS 31 77 | | |
| Backwater Valves | | | | PS 8-77 | | |
| Bronze Gate Valves | | | WWV 54D 73 | | UL 352-1982 | |
| Cast Iron Gate Valves | | | WWV 58b-71 | | | |
| Constant Level Oil Valves | Z21 70-81 | | | | | |
| Earthquake Actuated Automatic Gas Shutoff Systems | A112 18 1M 1979 | | | | | |
| Finished and Rough Brass Plumbing Fixture Fittings | | | | PS 10-84 | | |
| Globe Type Loglighter Valves Angle or Straight Pattern | ANSI/ASSE 1011 1978 | | | | ASSE 1011 1978 | |
| Hose Connection Vacuum Breakers | ANSI/ASSE 1016-1979 | | | | ASSE 1016-1979 | |
| Individual Shower Control Valves Anti Scald Type | ANSI/ASSE 1035-84 | | | | | |
| Laboratory Faucet Vacuum Breakers | Z21 15 74 | | | | | |
| Manually Operated Gas Valves | ANSI/ASSE 1001 1970 | | | | ASSE 1001 1970 | |
| Pipe Applied Atmospheric Type Vacuum Breakers | | | | | | |
| Pressure Reducing and Regulating Valves for Installation on Domestic Water Supply Lines | | | | PS 15-77 | | |
| Pressure Regulating Valves For LP Gas | | | | | UL 144-1978 | |
| Relief Valves and Automatic Gas Shutoff Devices For Hot Water Supply Systems and Addendum | Z21 22 1971 | | | | UL 132 1973 | |
| Thermostatic Mixing Valves Self Actuated For Primary Domestic Use | ANSI/ASSE 1017 1988 | | | | ASSE 1017 79 | |
| Trap Seal Primer Valves (Drainage Type) | ANSI/ASSE 1044 86 | | | | | |

TABLE A - PLUMBING MATERIAL STANDARDS

| MATERIALS AND PRODUCTS | ANSI | ASTM | FS | IAPMO | OTHER STANDARDS | FOOTNOTE REMARKS |
|--|--------------------------|------|----|-------|-----------------|------------------|
| Trap Seal Primer Valves (Water Supply Fed) | ANSVASSE 1018-86 | | | | | |
| Valves For Anhydrous and LP-Gas (Other Than Safety Relief) | | | | | UL 125-1980 | |
| Wall Hydrants, Frostproof Automatic Draining Anti-Backflow Types | ANSVASSE 1019-78 | | | | | |
| Water Closet Flush Tank Ballcocks | ANSVASSE 1002-1986 | | | | ASSE 1002-1986 | |
| Water Pressure Reducing Valves | ANSVASSE 1003-83 | | | | | |
| APPLIANCES AND EQUIPMENT: | | | | | | |
| Automatic Storage Type Water Heaters With Inputs Less Than 50 000 Btu Per Hour (Approved Requirements For, Vol. 1) | Z21 10 1-1971 | | | | | |
| Chimneys - Factory Built Residential Type and Building Heating Appliances | | | | | UL 103-1983 | |
| Circulating Tank - Instantaneous and Large Automatic Storage Type Water Heaters (Approval Requirements for Vol. III) | Z21 10 3-1971 | | | | | |
| Commercial Electric Dishwashers | | | | | UL 921-1978 | |
| Draft Equipment | | | | | UL 378-1983 | |
| Draft Hoods (Listing Requirements For) | Z21 12-1971 | | | | | |
| Drinking Water Coolers | | | | | UL 399-1978 | |
| Electric Booster and Commercial Storage Tank Water Heater | | | | | UL 1453-1982 | |
| Gas Fired Steam and Hot Water Boilers and Addenda | Z21 13-1974 | | | | | |
| Gas Vents | | | | | UL 441-1979 | |
| Heating Water Supply and Power Boilers-Electric | | | | | UL 834-1980 | |
| Home Laundry Equipment (Plumbing Requirements For) | ANSUAHAM HLW 2PR-1980 | | | | | |
| Household Commercial and Portable Exchange Water Softners | | | | | WQA S-100-81 | |
| Household & Commercial Water Filters | | | | | WQA S 200-73 | |
| Household Dishwashers | | | | | UL 749-1978 | |
| Household Dishwashers (Drain Hose) | | | | | AHAM DW 1-75 | |

TABLE A - PLUMBING MATERIAL STANDARDS

| MATERIALS AND PRODUCTS | ANSI | ASTM | FS | IAPMO | OTHER STANDARDS | FOOTNOTE REMARKS |
|---|---------------------------|--|----|----------|--|------------------|
| Household Dishwasher (Plumbing Requirements For) | ANSI/AHAM DW-2PR-1982 | | | | UL 174-1983 | |
| Household Electric Storage Tank Water Heaters | | | | | | |
| Household Food Waste Disposer Units (Plumbing Requirements For) | ANSI/AHAM FWD-2PR-1980 | | | | | |
| Ice Makers | | | | | UL 583-1975 | |
| Metal Connectors For Gas Appliances and Addenda | Z21.24-1973 | | | | UL 778-1980 UL 726-1975 UL 732-1974 UL 589-1980 | |
| Motor Operated Water Pumps | | | | | WQA S-300 84 UL 343-1982 UL 443-1979 UL 80-1980 | |
| Oil-Fired Boiler Assemblies | | | | | | |
| Oil-Fired Water Heaters | | | | | | |
| Pigtails and Flexible Hose Connectors For LP-Gas | | | | | | |
| Point-of-Use Low Pressure Reverse Osmosis Drinking Water Systems | | | | | | |
| Pumps For Oil-Burning Appliances | | | | | | |
| Steel Auxiliary Tanks For Oil-Burner Fuel | | | | | | |
| Steel Inside Tanks For Oil-Burner Fuel | | | | | | |
| MISCELLANEOUS: | | | | | | |
| Boiler and Pressure Vessel Code | | | | | ASME | |
| Chlorinated Polyethylene (CPE) Sheeting For Containment Membrane | | D 4068-81 C 425-82 B 584-83 B 152-71a | | | | Note 2 |
| Compression Joints For Vitrified Clay Pipe and Fittings | | | | | | |
| Copper Alloy Sand Coatings For General Applications | | | | | | |
| Copper Sheet Strip, Plate and Rolled Bar | | | | | | |
| Dishwasher Drain Airgaps (Airbreaks) | | | | PS 23-81 | | |
| Joints For Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets | | C 443-79 | | | | |
| General Requirements For Steel Sheet, Zinc Coated (Galvanized) By The Hot-Dip Process | | A 525-70 | | | | |
| Liquefied Petroleum Gases, Storage and Handling | | | | | NFPA 58-1974 | |
| Low Pressure Air Test For Building Sewers (Installation) | | | | IS 16-84 | | |
| Pipe Hangers and Supports-Materials, Design and Manufacture | ANSI/MSS SP-58-1979 | | | | | |
| Plant Applied Protective Pipe Coatings | | | | PS 22-84 | | |

TABLE A - PLUMBING MATERIAL STANDARDS

| MATERIALS AND PRODUCTS | ANSI | ASTM | FS | IAPMO | OTHER STANDARDS | FOOTNOTE REMARKS |
|--|------|-----------------------|---------------|---------------------|-----------------|------------------|
| Prefabricated Concrete Septic Tanks | | | | PS 1-87 IS 13-84 | | |
| Protectively Coated Pipe (Installation) | | | | | | |
| Rubber Gaskets For Cast Soil Pipe and Fittings | | C 564-82 D 1869-79 | | | | |
| Rubber Rings For Asbestos-Cement Pipe | | | | | | |
| Solder, Tin Alloy, Lead-Tin Alloy, & Lead Alloy (and Flux, Type AC Only) | | B 32-70 | QQ-S-571e(72) | | | |

1 Limited to domestic sewage
 2 Alloy C85200 for cleanout plugs
 3 Type II only

4 Although this Standard is referenced in Table A, some of the pipe, tube or fittings shown in the Standard are not acceptable for use under the Uniform Plumbing Code.

5 PDI Standard G101 by reference

6 Limited to nylon material only

*1 A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

CHAPTER 13

WATER HEATERS AND VENTS

Section 1301- General

The regulations of this chapter shall govern the construction, location, and installation of all fuel burning and other water heaters heating potable water, together with all chimneys, vents, and their connectors. All design, construction, and workmanship shall be in conformity with accepted engineering practices and shall be of such character as to secure the results sought to be obtained by this Code. No water heater shall be hereinafter installed which does not comply in all respects with the type and model of each size thereof approved by the Administrative Authority. (For the convenience of users of this Code, a list of generally accepted gas equipment standards is included at the end of Chapter 2 of this Code in Table A).

Section 1302- Definitions

(a) **Chimney-** A vertical shaft enclosing one or more flues for conveying flue gases to the outside atmosphere.

(b) **Chimney Connector-** The pipe which connects a fuelburning appliance to a chimney.

(c) **Combustible Material-** Walls, floors, ceilings, shelves, or other parts of a building constructed of wood, wood lath and plaster, composition or paper.

(d) **Dielectric Insulator-** A device used as a non-conductor.

(e) **Direct Vent Appliances-** Appliances constructed and installed so that all air for combustion is derived directly from the outside atmosphere and all flue gases are discharged to the outside atmosphere.

(f) **Vent-** Listed factory-made vent pipe and vent fittings for conveying products of combustion to the outside atmosphere.

(g) **Vent Connector-** That portion of a venting system which connects an appliance to a vent.

(h) **Venting System-** The vent or chimney, its connectors assembled to form a continuous open passageway from an appliance to the outside atmosphere for the purpose of removing products of combustion. This definition shall also include the venting assembly which is an integral part of the appliance.

(i) **Venting Systems- Types**

(1) Chimneys or vents of masonry, reinforced concrete or metal; and factory-built chimneys approved or listed for products of

combustion at temperatures in excess of five hundred fifty degrees (550° F) (287.8° C)

(2) **Type B-** Factory-made gas vents listed by a nationally recognized testing agency for venting listed or approved appliances equipped to burn only gas.

(3) **Type L-** A venting system consisting of listed vent piping and fittings for use with oil-burning appliances listed for use with Type L or with listed gas appliances.

(j) **Water Heater-** An appliance designed primarily to supply hot water and is equipped with automatic controls limiting water temperature to a maximum of two hundred ten degrees (210° F) (98.9 deg. C).

Section 1303- Permit

It shall be unlawful for any person to install, remove, or replace, or cause to be installed, removed, or replaced any water heater without first obtaining a permit from the Administrative Authority to do so.

Section 1304- Inspection

(a) **Inspection of chimneys or vents:** This inspection shall be made after all chimneys, vents, or parts thereof, authorized by the permit, have been installed and before any such vent or part thereof has been covered or concealed.

(b) **Final water heater inspection:** This inspection shall be made after all work authorized by the permit has been installed. The Administrative Authority will make such inspection as he deems necessary to assure himself that the work has been installed in accordance with the intent of this Code. No equipment or part thereof shall be covered or concealed until the same has been inspected and approved by the Administrative Authority.

Section 1305- Gas-Fired Water Heater Approval Requirements

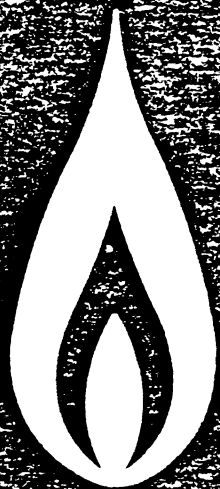
(a) Gas fired water heaters and gas fired hot water boilers shall conform to approved recognized applicable standards or to other standards acceptable to the Administrative Authority. Each such water heater or boiler shall bear the label of an approved testing agency, certifying and attesting that such equipment has been tested and inspected and meets the requirements of applicable standards.

(b) Except when reconditioned by the manufacturer or his approved agent in accordance with its original approval requirements and reinstalled at its original location, each reconditioned water heater or hot water boiler shall be tested for safety and conformity to approved standards, and shall bear the label of an approved testing agency certifying and attesting that such equipment has been tested

ADDENDUM I

**AMERICAN
NATIONAL
STANDARD**

1-16
Z21.10
1990



GAS WATER HEATERS

**Volume I
Storage Water Heaters
With Input Ratings of
75,000 Btu Per Hour or Less**

Secretariat



**American Gas Association
1515 Wilson Boulevard
Arlington, VA. 22209**

Twenty-Fourth Edition - 1990
(Volume I - Storage Water Heaters
With Input Ratings of 75,000 Btu Per Hour or Less)

Approved
April 30, 1990
AMERICAN NATIONAL
STANDARDS INSTITUTE, INC.

For standards covering other types of water heaters see:

Volume III - Storage, With Input Ratings Above
75,000 Btu Per Hour, Circulating and
Instantaneous Water Heaters

Printed in U.S.A.

by

American Gas Association Laboratories
8501 East Pleasant Valley Road
Cleveland, Ohio 44131

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PREFACE

This publication represents a standard for safe operation, substantial and durable construction, and acceptable performance of storage gas water heaters with input ratings of 75,000 Btu per hour (21 980 W) or less. It is the result of years of experience in the manufacture, testing, installation, maintenance, inspection and research on water heaters designed for the utilization of gas. There are risks of injury to persons inherent in some appliances that, if completely eliminated, would defeat the utility of the appliance. The provisions in this standard are intended to reduce such risks while retaining the normal function of the appliance.

Nothing in this standard is to be considered in any way as indicating a measure of quality beyond compliance with the provisions it contains. It is designed to allow compliance of storage gas water heaters, the construction and performance of which may exceed the various provisions specified herein. In its preparation, full recognition has been given to possibilities of improvement through ingenuity of design. As progress takes place, revisions may become necessary. When they are believed desirable, recommendations should be forwarded to the Chairman of Accredited Standards Committee Z21, 8501 East Pleasant Valley Road, Cleveland, Ohio 44131.

Safe and satisfactory operation of a storage gas water heater depends to a great extent upon its proper installation and it should be installed in accordance with the National Fuel Gas Code, Z223.1; manufacturer's installation instructions; and local municipal codes.

CAUTION NOTICE: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute, Inc., require that action be taken to reaffirm, revise or withdraw this standard no later than five (5) years from the date of approval. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute, Inc., 1430 Broadway, New York, N.Y. 10018, (212) 354-3300.

EFFECTIVE DATE: An organization using this standard for product evaluation as a part of its certification program will normally establish the date by which all products certified by that organization should comply with this standard.

1.30.6 The manufacturer's instructions for a water heater suitable for water (potable) heating and space heating shall also include the following;

- a. A statement to the effect that piping and components connected to the water heater for the space heating application shall be suitable for use with potable water.**
- b. A statement to the effect that toxic chemicals, such as used for boiler treatment, shall not be introduced into the potable water used for space heating.**
- c. A statement to the effect that a water heater which will be used to supply potable water shall not be connected to any heating system or component(s) previously used with a nonpotable water heating appliance.**
- d. Instructions that when the system requires water for space heating a temperatures higher than required for other uses, a means such as a mixing valve shall be installed to temper the water for those uses in order to reduce scald hazard potential. These instructions shall include a piping diagram(s) for a typical installation.**

1.31.3 Each water heater shall bear a marking on the rating plate, or on a separate label of Class IIIA marking material, the applicable statement as follows:

- a. **“Suitable for water (potable) heating only,”
or**
- b. **“Suitable for water (potable) heating and
space heating.”**

ADDENDUM J

**AMERICAN
NATIONAL
STANDARD**

ANSI
Z21.10.3
1990



GAS WATER HEATERS

**Volume III
Storage, With Input Ratings Above
75,000 Btu Per Hour, Circulating and
Instantaneous Water Heaters**

Secretariat:



**American Gas Association
1515 Wilson Boulevard
Arlington, VA 22209**

Tenth Edition - 1990

**(Volume III - Storage, Input Ratings Above 75,000 Btu Per Hour,
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**Approved
April 30, 1990
AMERICAN NATIONAL
STANDARDS INSTITUTE, INC.**

For standards covering other types of water heaters see:

**Volume I - Storage Water Heaters With Input Ratings
of 75,000 Btu Per Hour or Less**

Printed in U.S.A.

by

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8501 East Pleasant Valley Road
Cleveland, Ohio 44131**

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PREFACE

This publication represents a standard for safe operation, substantial and durable construction, and acceptable performance of circulating tank, instantaneous and large automatic storage gas water heaters. It is the result of years of experience in the manufacture, testing, installation, maintenance, inspection and research on water heaters designed for the utilization of gas. There are risks of injury to persons inherent in some appliances that, if completely eliminated, would defeat the utility of the appliance. The provisions in this standard are intended to reduce such risks while retaining the normal function of the appliance.

Nothing in this standard is to be considered in any way as indicating a measure of quality beyond compliance with the provisions it contains. It is designed to allow compliance of storage, with input ratings above 75,000 Btu per hour, circulating and instantaneous water heaters, the construction and performance of which may exceed the various provisions specified herein. In its preparation, full recognition has been given to possibilities of improvement through ingenuity of design. As progress takes place, revisions may become necessary. When they are believed desirable, recommendations should be forwarded to the Chairman of Accredited Standards Committee Z21, 8501 East Pleasant Valley Road, Cleveland, Ohio 44131.

Safe and satisfactory operation of a storage water heater, with input ratings above 75,000 Btu per hour, a circulating water heater or an instantaneous water heater depends to a great extent upon its proper installation, and it should be installed, as applicable, in accordance with the National Fuel Gas Code, ANSI Z223.1; manufacturers' installation instructions; and local municipal codes.

CAUTION NOTICE: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute, Inc., require that action be taken to reaffirm, revise, or withdraw this standard no later than five (5) years from the date of approval. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute, Inc., 1430 Broadway, New York, N. Y. 10018, (212) 354-3300.

EFFECTIVE DATE: An organization using this standard for product evaluation as a part of its certification program will normally establish the date by which all products certified by that organization should comply with this standard.

Addenda to

AMERICAN NATIONAL STANDARD FOR
GAS WATER HEATERS

Volume III
Storage With Input Ratings Above 75,000 Btu Per Hour,
Circulating and Instantaneous Water Heaters

PART I

CONSTRUCTION

1.1 SCOPE

1.1.1 This standard applies to newly produced, large automatic storage water heaters having input ratings above 75,000 Btu per hour (21 980 W), instantaneous water heaters and circulating water heaters (see Part IV, Definitions), hereinafter referred to as water heaters or appliances, constructed entirely of new, unused parts and materials:

- a. For use with natural gas;
- b. For use with manufactured gas;
- c. For use with mixed gas;
- d. For use with liquefied petroleum gases; and
- e. For use with LP gas-air mixtures.

This standard also applies to instantaneous water heaters:

- f. For recreational vehicle installation for use with liquefied petroleum gases only (see 1.2.23);
- g. For manufactured home (mobile home) installation convertible for use with natural gas and liquefied petroleum gases when provision is made for the simple conversion from one gas to the other (see 1.2.24); and
- h. For recreational vehicle installation convertible for use with natural gas and liquefied petroleum gases when provision is made for the simple conversion from one gas to the other (see 1.2.25).

Automatic storage water heaters having input ratings of 75,000 Btu per hour (21 980 W) or less are covered in Volume I.

1.30 INSTRUCTIONS

1.30.5 The manufacturer's instructions for a water heater suitable for water (potable) heating and space heating shall also include the following:

- a. A statement to the effect that piping and components connected to the water heater for the space heating application shall be suitable for use with potable water.
- b. A statement to the effect that toxic chemicals, such as used for boiler treatment, shall not be introduced into the potable water used for space heating.
- c. A statement to the effect that a water heater which will be used to supply potable water shall not be connected to any heating system or component(s) previously used with a nonpotable water heating appliance.
- d. Instructions that when the system requires water for space heating at temperatures higher than required for other uses, a means such as a mixing valve shall be installed to temper the water for those uses in order to reduce scald hazard potential. These instructions shall include a piping diagram(s) for a typical installation.

(Former 1.30.5 and 1.30.6 become 1.30.6 and 1.30.7, respectively.)

1.31 MARKING

1.31.3 Each water heater shall bear a marking on the rating plate, or on a separate label of Class IIIA marking material, the appropriate statement as follows:

- a. "Suitable for water (potable) heating only,"
or
- b. "Suitable for water (potable) heating and space heating."

(Former 1.31.3 through 1.31.23 become 1.31.4 through 1.31.24, respectively.)

1.31.25 A water heater suitable for water (potable) heating and space heating shall bear Class IIIA markings indicating:

- a. The water heater shall not be connected to any heating system or component(s) previously used with a nonpotable water heating appliance.
- b. Toxic chemicals, such as used for boiler treatment, shall not be introduced into the potable water heater used for space heating.

(Former 1.31.24 through 1.31.36 become 1.31.26 through 1.31.38, respectively.)

PART II

PERFORMANCE

2.1 GENERAL

2.1.1 This standard applies to water heaters:

- a. For use with natural gas;
- b. For use with manufactured gas;
- c. For use with mixed gas;
- d. For use with liquefied petroleum gases;
- e. For use with LP gas-air mixtures;
- f. For recreational vehicle installation for use with liquefied petroleum gases only (see 2.1.17);
- g. For manufactured home (mobile home) installation convertible for use with natural gas and liquefied petroleum gases (see 2.1.16); and
- h. For recreational vehicle installation convertible for use with natural gas and liquefied petroleum gases (see 2.1.17).

2.4 COMBUSTION

2.4.1 A water heater shall not produce flue gases which contain carbon monoxide in excess of 0.04

percent, on an air free basis, in a sample of the flue gases when adjusted to have a manifold pressure 12.5 percent above that obtained during burner adjustment, (see 2.1.13) and tested in an atmosphere having a normal oxygen supply, and not in excess of 0.02 percent operating at reduced inlet test pressure.

Method of Test

Installation shall be as specified in 2.1.9 for all water heaters except those for outdoor installation, which shall be tested in an open room.

For a water heater equipped with a draft hood, this test shall also be conducted in an open room without any vent connection to the draft hood.

A storage water heater shall be filled and supplied with water at 70 ± 2 F (21 ± 1 °C). Instantaneous and circulating water heaters shall be filled and supplied with water at a temperature of either 70 ± 2 F (21 ± 1 °C) or as specified by the manufacturer in accordance with 2.1.8. When necessary for continuous burner operation, a water flow rate shall be established to maintain an outlet water temperature of 130 ± 5 F (54.5 ± 3 °C) or, for instantaneous and circulating water heaters, as specified by the manufacturer (see 2.1.8).

At the end of 15 minutes of operation at normal inlet test pressure, two samples of the flue gases shall be secured at a point immediately preceding their discharge from the flue outlet of the appliance. The two samples shall be taken