

by the manufacturer shall be in place during all performance tests, unless otherwise specified.

(Present 2.1.7 through 2.1.19 become 2.1.8 through 2.1.20 respectively, unchanged.)

RATIONALE: See "Rationale" following 1.2.24.

2.21 FLUE GAS TEMPERATURE

2.21.1 The average temperature of the flue gases shall not exceed 480 F (266.5 °C) above room temperature. This provision does not apply to water heaters for outdoor installation incorporating integral venting systems.

Method of Test

This test shall be conducted at normal inlet test pressure. The flow of water through the appliance shall be regulated to deliver outlet water at the maximum setting of the thermostat. A sample of the flue gases shall be secured ahead of the draft hood at the appliance flue outlet and analyzed for carbon dioxide.

a. Water heaters operating with natural draft.

[STAFF NOTE: The following three paragraphs identified by an asterisk represent editorial revisions to 2.21.1 which were recommended to the Z21 Committee at the subcommittee's November 1991 meeting to provide consistency with other Z21 gas appliance standards:

- * The draft hood relief opening shall then be blocked. A 2-foot (610 mm) long vertical vent pipe shall be attached vertically to the outlet of a vertically discharging draft hood. If the draft hood discharges horizontally, an elbow and a 2-foot (610 mm) section of vertical vent pipe shall be used. The draft hood, elbow, if used, and the vent pipe shall be insulated to prevent heat loss with a layer of 1 inch (25.4 mm) of glass fiber insulation. A grid of 10 thermocouples in parallel shall be installed in the vent pipe in a plane 18 inches (457 mm) from the inlet. Thermocouples shall be bead type iron-constantan, No. 24 AWC (0.20 mm²), and shall be positioned in the grid so each thermocouple is in an equal area of the vent pipe. The length of all thermocouple leads shall be equal before paralleling. The outlet of the vent pipe shall be equipped with an adjustable restrictor. A horizontal plane of measurement shall be established within the insulated vent pipe, 1 foot below the vent pipe outlet, by establishing two lines, intersecting at 90 degrees, and oriented so they will divide the internal cross section into four equal areas.
- * The vent pipe outlet shall be gradually restricted until the carbon dioxide concentration in a sample of the flue gases secured in the plane of

measurement noted above is the same as determined under the conditions specified above. ~~The average temperature of the flue gases shall be determined and shall not exceed 480 F (266.5 °C) above room temperature in first paragraph under Method of Test.~~

- * The flue gas temperature shall then be determined using a bead type, iron-constantan thermocouple not larger than No. 24 AWG (0.20 mm²). One temperature reading shall be taken at the intersection of the two lines in the plane of measurement, and eight readings taken in two sets of four along each line at points respectively 1/3 and 2/3 of the distance from the intersection of the lines to the periphery of the test vent. The flue gas temperature shall be the average of the individual readings. At the discretion of the test agency, these readings may be obtained using bead-type, iron constantan thermocouples not larger than No. 24 AWG (0.02 mm²) secured in the positions described above by a frame inserted in the vent and presenting no appreciable restriction to the passage of the flue gases.

STAFF NOTE: *The June 1991 proposals held in abeyance continue as follows:*

b. Water heaters having forced or induced draft venting systems.

Dilution air openings shall then be blocked. A 2-foot (610 mm) long vent pipe shall be attached to the flue outlet. The vent pipe shall be insulated to prevent heat loss with 1 inch (25.4 mm) of glass fiber insulation. A grid of 10 thermocouples in parallel shall be installed in the vent pipe in a plane 18 inches (457 mm) from the flue outlet. Thermocouples shall be head-type iron-constantan, No. 24 AWG (0.20 mm²), and shall be positioned in the grid so each thermocouple is in an equal area of the vent pipe. The length of all thermocouple leads shall be equal before paralleling. Additional vent pipe shall be added to the equivalent maximum length specified by the manufacturer. The outlet of this vent pipe shall be equipped with an adjustable restrictor.

The vent pipe outlet shall be restricted until the carbon dioxide concentration in a sample of the flue gases is the same as determined under conditions specified above. The average temperature of the flue gases shall be determined and shall not exceed 480 F (266.5 °C) above room temperature.

RATIONALE: *Coverage is being added to specifically address water heaters equipped with forced or induced draft venting systems, and to clarify the draft tests applicable to each type of system.*

2.25 DRAFT HOODS

Draft hoods provided on water heaters shall comply with the following

provisions when the appliance is installed as specified in 2.1.9. These provisions do not apply to a water heater equipped with a power burner or a forced or induced draft venting system which complies with 2.28.

For an appliance not of the direct vent type for manufactured home (mobile home) installation, the venting system as supplied or specified in the manufacturer's instructions shall be used and shall be terminated at the top of the enclosure. The vent cap, if provided, shall be removed for these tests.

When use with one gas is desired, these tests shall be conducted with the appropriate gas as specified in 2.2.

When use with more than one gas is desired and the appliance input ratings are not identical for the different gases, these tests shall be conducted at the specified input ratings for the individual gases. The number of tests conducted shall be at the discretion of the testing agency.

When use with more than one gas is desired and the appliance input rating is identical for the various gases, these tests shall be conducted in accordance with the following:

- a. If the gases selected include liquefied petroleum gases or LP gas-air mixtures, use test Gas E or H.
- b. If the gases selected are natural and mixed, or natural, manufactured and mixed, use test Gas A.
- c. If the gases selected are mixed and manufactured, use test Gas C.

RATIONALE: See "Rationale" following 2.21.1.

2.25.2 Total downdraft pressures ranging from zero to 0.05 inch water column (13 Pa) imposed at the outlet of the draft hood shall not extinguish the main burner flames nor cause them to flash back, lift, float, burn outside the water heater, nor produce a concentration of carbon monoxide in an air-free sample of the flue gases in excess of 0.04 percent when the appliance is tested in an atmosphere having a normal oxygen supply. This test does not apply to direct vent water heaters.

(Present Method of Test, unchanged.)

RATIONALE: See "Rationale" following 2.21.1.

2.28 DRAFT TESTS FOR WATER HEATERS EQUIPPED WITH POWER BURNERS OR FORCED OR INDUCED DRAFT

The construction of a water heater equipped with a power burner or operating under forced or induced draft shall be such that its performance is not impaired by chimney drafts or chimney stoppage. This provision shall be

deemed met when the appliance complies with the conditions specified below. An appliance for outdoor installation with the venting system provided as a part of the appliance need not comply with the provisions of this section.

When use with one gas is desired, these tests shall be conducted with the appropriate gas as specified in 2.2.

When use with more than one gas is desired and the appliance input ratings are not identical for the different gases, these tests shall be conducted at the specified input ratings for the individual gases. The number of tests conducted shall be at the discretion of the testing agency.

When use with more than one gas is desired and the appliance input rating is identical for the various gases, these tests shall be conducted in accordance with the following:

- a. If the gases selected include liquefied petroleum gases or LP gas-air mixtures, use test Gas E or H.
- b. If the gases selected are natural and mixed, or natural, manufactured and mixed, use test Gas A.
- c. If the gases selected are mixed and manufactured, use test Gas C.

RATIONALE: *The title of this section is revised to include coverage for forced and induced draft systems. (Also see "Rationale" following 2.21.1.)*

~~2.28.1 With the flue outlet or outlet of the draft diverting device, if one is provided, vent termination blocked to any degree up to and including complete closure, the concentration of carbon monoxide in an air-free sample of the flue gases shall not exceed 0.04 percent when the water heater is tested in an atmosphere having a normal oxygen supply. Should outage occur, raw gas shall not be forced into the combustion chamber on reopening the flue outlet.~~

Method of Test

The appliance shall be installed with a venting system in accordance with the manufacturer's installation instructions and operated at normal inlet test pressure for at least 15 minutes. When the appliance incorporates a control to automatically shut off the main gas supply under blocked flue conditions, the area of the flue outlet vent termination shall be gradually decreased to the lowest point at which the control will remain in its open position. A sample of the flue gases shall then be secured and analyzed as specified by 2.4.1-2.

When a draft diverting device is supplied, its outlet shall be completely closed off and a sample of the flue gases secured and analyzed as specified by 2.4.1-2.

In case of outage, the blocked condition shall be maintained for 3 minutes to allow for operation of safety devices, and then removed and observation made.

RATIONALE: See "Rationale" following 2.21.1.

2.28.2 Total downdraft pressures ranging from zero to 0.05 inch water column (13 Pa) imposed at the flue outlet or outlet of the draft diverting device, if one is provided, shall not extinguish the main burner flames nor cause them to flash back, lift, float, burn outside the water heater, nor produce a concentration of carbon monoxide in an air-free sample of the flue gases in excess of 0.04 percent when the appliance is tested in an atmosphere having a normal oxygen supply.

Method of Test

For a water heater equipped with a power burner, a straight section of vent pipe of suitable diameter and of a length at least equal to 10 pipe diameters shall be attached directly to the flue outlet or the outlet of the draft diverting device and connected to the outlet of a blower.

The total draft pressure shall be measured with a pitot tube and a differential gage which may be read directly to 0.005 inch water column (1.24 Pa) pressure. The pitot tube shall be inserted in the straight section of vent pipe at a point midway between its ends, so (1) the head of the tube is coincident with the axis of the vent pipe, and (2) the impact opening of the pitot tube faces the flow stream.

For a water heater equipped with a forced or induced draft venting system, a straight section of vent pipe of suitable diameter and of the minimum length specified by the manufacturer shall be attached directly to the outlet of the draft inducer and connected to the outlet of a blower.

The total downdraft pressure shall be adjusted at 0.05 inch water column (13 Pa). The appliance shall then be allowed to operate for at least 15 minutes. A sample of the flue gases shall be secured and analyzed as specified by 2.4.1. The total downdraft pressure shall then be varied from zero to 0.05 inch water column (13 Pa) and the effect noted.

RATIONALE: See "Rationale" following 2.21.1.

2.28.4 A chimney action, consisting of a static updraft and velocity updraft numerically totaling between 0.06 and 0.07 inch water column (15 and 17 Pa) pressure, applied to the flue outlet or to the outlet of the draft diverting device, if one is provided, shall not cause a fractional increase in the volume of flue gases greater than twice the numerical sum of the pressure head and 5 times the velocity head expressed in inches water column pressure. Furthermore, the concentration of carbon monoxide in an air-free sample of the flue products shall not exceed 0.04 percent under these conditions when the water heater is tested in an atmosphere having a normal oxygen supply.

Method of Test

For a water heater equipped with a power burner, A a straight length of vent pipe of suitable diameter and of a length at least equal to 10 pipe diameters shall be attached directly to the flue outlet or the outlet of the draft diverting device and connected to the inlet of a blower.

For a water heater equipped with a forced or induced draft venting system, a straight section of vent pipe of suitable diameter and of the minimum length specified by the manufacturer shall be attached directly to the outlet of the draft inducer and connected to the outlet of a blower.

The pressure and velocity heads shall be measured with a pitot tube and a differential gage which may be read directly to 0.005 inch water column (1.24 Pa) pressure. The pitot tube shall be inserted in the straight section of vent pipe at a point midway between its ends, so (1) the head of the tube is coincident with the axis of the vent pipe, and (2) the impact opening of the pitot tube faces the flow stream.

An updraft shall be imposed at the flue outlet, or at the outlet of the draft diverting device, such that the numerical sum of the pressure head and velocity head shall be between 0.06 and 0.07 inch water column (15 and 17 Pa).

The appliance shall then be operated at normal inlet test pressure for at least 15 minutes.

Under this condition a sample of the flue gases shall be taken at the flue outlet and ahead of the draft diverting device, if one is provided, and analyzed for carbon dioxide and carbon monoxide. The ratio of carbon dioxide concentration for normal operation, as in the combustion test, to that under updraft, as above shall not be more than $1 + 2(h_p + 5h_v)$ where " h_p " is the pressure head and " h_v " is the velocity head, nor shall the concentration of carbon monoxide exceed the value specified above.

RATIONALE: See "Rationale" following 2.21.1.

2.29 WIND TEST

The provisions of 2.29.1 and 2.29.2 are applicable to (a) water heaters for outdoor installation, (b) water heaters for installation in manufactured homes (mobile homes), and (c) direct vent water heaters, and (d) water heaters which operate under forced or induced draft.

The appliance shall be installed as specified in 2.1.9.

These tests shall be conducted with test Gas A when the gases for which the appliance is for use include natural gas. Otherwise, the test gas shall be selected by the testing agency. Tests shall be conducted at normal inlet test pressure, unless otherwise specified herein.

At the discretion of the testing agency, the wind tests may be repeated with the wind directed from other directions.

RATIONALE: See "Rationale" following 2.21.1.

2.29.1 The pilot(s) shall be capable of being ignited in accordance with the manufacturer's instructions and shall not become extinguished when the water heater is placed in operation in a normal manner while exposed to a wind of 10 miles per hour (4.47 m/s).

Method of Test

A 10-mile-per-hour (4.47 m/s) wind [0.04 inch water column (10 Pa) static pressure], measured in a vertical plane 18 inches (457 mm) from the windward surface of the appliance, shall be directed over the following:

- a. The outer surface of an outdoor type appliance and the outlet of the draft hood or integral venting system;
- b. The combustion and ventilation openings of the test enclosure and the venting system for an appliance for installation in a manufactured home (mobile home) other than of the direct vent type; and
- c. The area of the air intake and vent terminal of a direct vent appliance; and
- d. The area of the vent termination of a forced or induced draft appliance.

With the access door open or the access panel removed for lighting as specified by the manufacturer, the pilot shall be ignited in accordance with the manufacturer's lighting instructions outlined on the instruction plate (see 1.32.4). After the pilot is ignited, the access door shall be closed or the access panel replaced and the main burner(s) placed in operation.

The pilot shall be capable of being ignited and shall not become extinguished when the main burner(s) is operated.

RATIONALE: See "Rationale" following 2.21.1.

2.29.2 The gas to the main burner(s) shall ignite from the pilot without excessive delay and the pilot(s) and main burner(s) shall not become extinguished when the water heater installation is exposed to a wind of 40 miles per hour (17.88 m/s).

Method of Test

For this test all doors and access panels shall be in the closed position.

A 40-mile-per-hour (17.88 m/s) wind [0.66 inch water column (164 Pa) static pressure], measured in accordance with the test method specified in 2.29.1, shall be directed at the surfaces specified therein. If the water heater is designed to prevent the main burner from operating under this wind condition, the wind shall be reduced to the highest value that will allow the main burner to operate. While operating under the above wind conditions, the pilot(s) when operating alone, and the pilot(s) and main burner(s) when operating simultaneously, shall not become extinguished during a 5-minute period.

The main burner valve shall then be shut off. After a period of at least 30 seconds the main burner valve shall be turned on and the main burner gas shall ignite from the pilot without excessive delay.

RATIONALE: See "Rationale" following 2.21.1.

2.29.3 Water heaters of the direct vent, induced or forced draft types shall not produce a concentration of carbon monoxide in excess of 0.04 percent in an air-free sample of the flue gases when exposed to winds from zero to 40 miles per hour (17.88 m/s).

This provision does not apply to a direct vent or induced draft appliance in which:

- a. The combustion system is water-backed;
- b. The entire appliance is enclosed in its own housing designed so there are no air openings to the interior of the structure, and with all piping entering the combustion system gasketed; and
- c. All access to the combustion system of the appliance is from the exterior of the structure.

Method of Test

Burner and primary air adjustments shall be made in accordance with the provisions of 2.3.3. Any adjustments resulting in the deposit of carbon shall not be acceptable.

The appliance shall be operated until an equilibrium condition, ascertained by a constant flue gas temperature, is attained. Sufficient flue gas samples shall be secured and analyzed to determine that the carbon monoxide concentration is not in excess of the allowable limit when winds from zero to 40 miles per hour (17.88 m/s) [zero to 0.66 inch water column (164 Pa) static pressure], measured in accordance with the test method specified in 2.29.1, are directed at the surfaces specified therein.

RATIONALE: See "Rationale" following 2.21.1.

**2.38 WATER HEATERS VENTED HORIZONTALLY
THROUGH AN OUTSIDE WALL (ADDED)**

A water heater for indoor installation designed to vent the flue gases horizontally through an outside wall shall comply with 2.38.1 through 2.38.4 with both the maximum and minimum vent lengths specified by the manufacturer (see 1.2.24 and 2.1.7).

RATIONALE: See "Rationale" following 1.2.24.

2.38.1 A manually ignited pilot(s) shall be capable of being ignited when the vent terminal is exposed to a wind having a nominal velocity of 10 miles per hour (4.47 m/s).

Method of Test

This test shall be conducted at normal inlet test pressure.

The water heater shall be installed as specified in 2.1.9. Deflector walls shall be installed in order that the wind from the wind apparatus will not affect that section of the water heater normally located indoors.

A wind having a nominal velocity of 10 miles per hour (4.47 m/s) [0.04 inch water column (10 Pa) static pressure measured on a flat surface perpendicular to the wind source] shall be produced by a blower and directed against the vent terminal. The blower shall be located so the wind is directed perpendicularly to the surface of the wall structure to which the terminal is attached.

At the discretion of the testing agency, additional tests may be conducted with a wind of the same velocity directed from other directions.

With the water heater subjected to the above wind conditions, the pilot(s) shall be capable of being ignited.

RATIONALE: See "Rationale" following 1.2.24.

2.38.2 The main burner(s) shall not become extinguished and shall ignite from the automatic ignition device(s) without excessive delay, and intermittent and interrupted ignition systems shall ignite, when the vent terminal is exposed to a wind having a nominal velocity of 40 miles per hour (17.88 m/s).

Method of Test

This test shall be conducted at normal inlet test pressure.

The test method specified in 2.38.1 shall be applied, except that the wind produced by the blower shall have a nominal velocity of 40 miles per hour (17.88 m/s) [0.66 inch water column (164 Pa) static pressure measured on a flat surface perpendicular to the wind source].

The pilot(s), if provided, shall be ignited before the water heater is subjected to the wind. While operating under the above wind conditions, the pilot(s) when operating alone, and the pilot(s) and main burner(s) when operating simultaneously, shall not become extinguished during a 10-minute period.

The main burner valve shall then be shut off. After a period of at least 30 seconds, the main burner valve shall be turned on. An intermittent or interrupted ignition system (if provided) shall ignite, and the main burner gas shall ignite from the automatic ignition device(s) without excessive delay. The water heater shall also comply with this test when the burner(s) is turned on and off by the automatic controls.

At the discretion of the testing agency, additional tests may be conducted with a wind of the same velocity directed from other directions.

RATIONALE: See "Rationale" following 1.2.24.

2.38.3 A water heater shall not produce a concentration of carbon monoxide in excess of 0.04 percent in an air-free sample of the flue gases when its vent terminal is exposed to winds having nominal velocities from zero to 40 miles per hour (17.88 m/s).

Method of Test

This test shall be conducted at normal inlet test pressure.

Burner and primary air adjustments shall be made in accordance with 2.3.3.

The water heater shall be operated until a constant flue gas temperature has been attained. The test method specified in 2.38.1 shall be applied, except that the wind produced by the blower shall be varied to have nominal velocities from zero to 40 miles per hour (17.88 m/s) [0.66 inch water column (164 Pa) static pressure measured on a flat surface perpendicular to the wind source]. During the application of this range of wind velocities, sufficient flue gas samples shall be secured and analyzed to determine that the carbon monoxide concentration does not exceed 0.04 percent in an air-free sample of the flue gases.

At the discretion of the testing agency, additional tests may be conducted with winds of the same velocities directed from other directions.

RATIONALE: See "Rationale" following 1.2.24.

2.38.4 The operating characteristics of a water heater shall not be affected by the wind conditions specified in 2.38.3.

This provision shall be deemed met when the variation in the carbon dioxide concentration in the flue gases is not in excess of the limit specified in the following Method of Test.

Method of Test

Burner and primary air adjustments shall be made in accordance with 2.3.3.

The water heater shall be operated under a still air condition at normal inlet test pressure until a constant flue gas temperature is attained. A flue gas sample shall then be secured and analyzed for carbon dioxide.

The wind conditions specified in 2.38.3 shall then be imposed on the vent terminal and sufficient flue gas samples secured and analyzed under the various wind conditions to determine the carbon dioxide concentration.

The carbon dioxide concentration with the water heater subjected to any of the wind velocities specified in 2.38.3 shall not be less than 50 percent of the carbon dioxide concentration produced by the water heater when operated at normal inlet test pressure under a still air condition.

At the discretion of the testing agency, additional tests may be conducted with winds of the same velocities directed from other directions.

RATIONALE: See "Rationale" following 1.2.24.

2.38.5 The vent terminal(s) shall be sufficiently rigid in construction and supported so it will withstand a load of 150 pounds (68.0 kg) without extensive damage or alteration of its position with respect to the water heater. Following application of this load, the water heater shall comply with the combustion test specified in 2.4.1 at normal inlet test pressure.

Method of Test

A vertical suspension load of 150 pounds (68.0 kg) shall be evenly distributed without impact over the vent terminal.

The load shall then be removed and shall not have caused substantial distortion of any part of the vent terminal or alteration of its position relative to the water heater so the water heater would not operate satisfactorily.

The water heater shall then be operated at normal inlet test pressure until equilibrium conditions are attained. A sample of the flue gases shall then be secured and analyzed as specified in 2.4.1, and the concentration of carbon monoxide, based on an air-free sample of the flue gases, shall not exceed 0.04 percent.

A horizontal vent terminal shall be sufficiently rigid in construction so as not to become damaged to the extent that it would be unsafe for use when subjected to impact as specified in the following Method of Test. Following impact of the vent terminal, the water heater shall comply with the combustion test specified in 2.4.1 at normal inlet test pressure.

Method of Test

The impact shall be produced by a pendulum consisting of a cloth bag, filled with sand, weighing 25 pounds (11.3 kg) suspended from a steel cable or rope. The bag shall be formed from a flat section of burlap, canvas or other suitable material. A suitable plastic liner may be used to prevent sand loss. All sides and corners of the cloth shall be drawn up as tightly as possible around the sand and the excess material tied as close as possible at the top of the bag. The bag shall have an at-rest position not more than 1 inch (25.4 mm) from the edge of the bag to the nearest edge of the vent terminal. The point of impact shall be opposite the center of gravity of the bag. The distance of swing [angle 45 degrees (0.79 rad)] shall be measured as the angle between the pendulum arm with the bag at its at-rest position and pendulum arm at its elevated position. The length of the pendulum, measured from the point of rotation to the center of gravity of the bag (see Figure 8), shall be 7 feet (2.13 m).

One impact shall be made at each of the following points, as shown in Figure 8:

- a. The center of the vertical front surface of the vent terminal.
- b. The leading edge on the left side of the vent terminal, pendulum rotated left at an angle 45 degrees (0.79 rad) from the point described in "a."
- c. The leading edge on the right side of the vent terminal, pendulum rotated right at an angle 45 degrees (0.79 rad) from the point described in "a."

Following each impact, the water heater shall be operated at normal inlet test pressure until equilibrium conditions are attained. A sample of the flue gases shall then be secured and analyzed as specified in 2.4.1, and in each case the concentration of carbon monoxide, based on an air-free sample of the flue gases, shall not exceed 0.04 percent.

At the option of the manufacturer the vent terminal may be replaced following each impact and combustion test.

(Present 2.37 becomes 2.39, unchanged.)

RATIONALE: See "Rationale" following 1.2.24.

**REPORT FROM WORKING GROUP ADDRESSING POOL HEATER
(Z21.56) COVERAGE ON WATER TEMPERATURE CONTROLS**

to prevent i.e. spa's overheating

Action Requested

Review and act on recommendations from the working group addressing coverage on water temperature controls for the ANSI Z21.56 pool heater standard.

History

At its November 13-14, 1991 meeting, the Z21 water heater subcommittee reviewed an August 23, 1991 letter from Mr. Alan R. Anderson, Honeywell, Inc. Mr. Anderson's letter requested the subcommittee to determine if the requirements of 2.12, *Temperature Control*, in the pool heater standard (Z21.56) are adequate to assure shutdown when the return water coming from a spa and/or pool exceeds 108° F with a failed operating control. In conjunction with this request, Mr. Anderson recommended that the subcommittee define the terms "Operating Control," "Thermostat," and "Limit."

After discussion, the subcommittee established a working group to address the subject of Mr. Anderson's August 23 letter. Messrs. Hamos (Teledyne Laars) and Cavestany (Raypak) volunteered to participate on the working group, in addition to Mr. Anderson, who was to chair the group.

At its September 21-22, 1993 meeting, the joint subcommittee was informed by Mr. Anderson that the working group had met on three occasions since the subcommittee's last meeting. However, he noted that a report was not yet available, pending further consideration by the working group. Therefore, the subcommittee recommended that the working group continue its task and forward its report for consideration at its next meeting. It was also agreed that the working group's report should be distributed for information to all manufacturers whose equipment is "listed" as complying with ANSI Z21.56.

Background

It is anticipated that a report from the working group will be made available at this meeting.

will try to get by with an

(9-1)

(b) CLEARED:

No NFRs Identified

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ITEM 10.
Z21/CGA Joint Water Heater
Subcommittee Meeting,
September 23-24, 1993

**REVIEW CONFLICTS BETWEEN WATER HEATERS CERTIFIED TO
CGA CAN1-4.1 AND THE SUPPLY WATER TEMPERATURE LIMIT
REQUIREMENTS OF THE 1990 CANADIAN BUILDING CODE (NBC)**

Action Requested

1. Review the attached correspondence related to conflicts between water heaters certified to CGA CAN1-4.1, *Gas-Fired Automatic Storage Type Water Heaters With Inputs Less Than 75 000 BTUH*, and the supply water temperature limit requirements of the 1990 Canadian Building Code (NBC); and
2. Take action(s) as deemed necessary.

Background

Attached is a March 12, 1993 letter to staff from Mr. Raymond Thurton, Canadian Gas Association (CGA) Standards Staff. Attached to Mr. Thurton's letter is correspondence related to a November 16, 1992 letter from Mr. J. H. Elsdon, President, Plumbing Inspectors Association (PIA) of British Columbia, to the CGA. Mr. Elsdon's November 16 letter provides the following excerpt from the 1992 British Columbia Building Code (BCBC):

"9.31.6.1 Where hot water is required by Article 9.31.4.3, equipment shall be installed which is capable of heating to at least 45°C [113 F] but not above 60°C [140 F] an adequate supply of service hot water for every dwelling unit."

Mr. Elsdon indicates in his letter that this requirement can also be found in the 1990 NBC. He further states that the PIA's interpretation of the above is that hot water tanks must have limit stops on the thermostats.

The attached correspondence following Mr. Elsdon's letter involves the CGA's response on this subject.

(b) CLEARED: 3/13/95
✓ No Info Identified

Additional Information

Z21.10.1a-1991 contains revised and added coverage addressing scald hazard potential. Under this addenda, 1.31.17 was revised to specify that "each water heater equipped with an adjustable thermostat shall bear a label of Class IIIA marking material as shown in Exhibit E, and located adjacent to the adjustment means so as to be visible with the control cover, if provided, in place." Exhibit E illustrates the "scald hazard" label. Part of the label's informational text warns that water temperature over 125°F can cause severe burns instantly or death from scalds. Another section of the label indicates that temperature limiting valves are available, referring the reader to the appliance manual.

In addition, in Z21.10.1a-1991, the 1.31.16 marking provision was revised to specify that "each adjustable thermostat shall have a detent or legible marking on Class IIIA material consistent with a water temperature of approximately 120 F (49°C)," instead of 130 F which appeared in Z21.10.1-1990. The subcommittee agreed that proposing a 120 F temperature as the preferred starting point for setting the temperature control is consistent with both the information provided on the proposed label and with water heater thermostat setting regulations specified by some states.

Finally, the following was added to 1.30.1-e, under 1.30, Instructions, which also appears in Z21.10.1a-1991:

"e. Thermostat information to the effect that:

("1" through "4" not reproduced.)

- "5. Valves for reducing point of discharge temperature by mixing cold and hot water in branch water lines are available. A qualified plumber should be consulted."

Subsequently, the above was further modified and now appears in Z21.10.1b-1992 as follows:

- "5. Valves for reducing point of use temperature by mixing cold and hot water are available. Consult a licensed plumber or the local plumbing authority."

The subcommittee's rationale for the above was to provide the consumer with information that there are devices on the market for tempering hot water after it has left the water heater.

Canadian Gas
Association



Association
Canadienne du Gaz

12 March 1993

Mr. D.C. Bixby
Standards Engineer
American Gas Association Laboratories
8501 E. Pleasant Valley Road
CLEVELAND, OH 44131

Dear David;

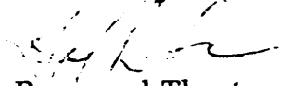
Re: Material for the Next Meeting of the Joint CGA/AGA Water Heater Subcommittee

Attached is correspondence between CGA and J.H. Elsdon of the Plumbing Association on supply water temperature limit in the standard that is in conflict with the British Columbia Building Code (BCBC), Clause 9.31.6.1, and incidentally with the Canadian Building Code (NBC) as well.

I have discussed this with the Joint Subcommittee (JSC) Chairman, Mr. Hosler. He recommended that this be brought forward at the next JSC meeting.

Thank you.

Yours truly;


Raymond Thurton, P.Eng.
Sr. Standards Engineer

Enclosures

9303WTP.LTR



2167 Oak Bay Avenue
Victoria, B. C. V8R 1G2
Telephone: (604) 598-3311
Fax: (604) 598-9108

November 16, 1992

PLUMBING INSPECTORS ASSOCIATION OF BRITISH COLUMBIA

C. G. A.
55 Scarsdale Road
Don Mills, Ontario
M3B 2R3

Dear Sirs:

The 1992 BCBC contains the following sentence:

"9.31.6.1 Where hot water is required by Article 9.31.4.3., equipment shall be installed which is capable of heating to at least 45°C but not above 60°C an adequate supply of service hot water for every dwelling unit."

This requirement can also be found in the 1990 N.B.C.

It is our interpretation that hot water tanks must have limit stops on the thermostats. I have reviewed this requirement with one of Canada's largest suppliers and they were not aware of this new requirement.

I request your consideration to determine if the Standards under your control will necessitate compliance with this new requirement.

A new Code is effective December 1, 1992; accordingly an early response would be appreciated.

Yours truly,

J. H. ELSDON
President



30 November, 1992

Mr. John H. Eldson, President
Plumbing Inspectors Association
of British Columbia
2167 Oak Bay Avenue
Victoria, British Columbia
V8R 1G2

Dear Mr. Elsdon:

Re: 1992 BCBC Clause 9.31.6.1, Your Correspondence of 16 November, 1992


At this time, the CGA certified gas water heaters do not comply with Clause 9.31.6.1 of the 1990 National Building Code of Canada (NBC); they comply with the appliance standard CGA CAN1-4.1.

This matter was discussed by the CGA standard committee, which is now a joint ANSI/CGA committee on water heaters, and administered by the American Gas Association. The CGA committee, at its April 1990 meeting, did not make changes to the standard to accommodate the NBC requirement. The members did not agree with the NBC, and suggested that provinces adopt the 1985 NBC equivalent requirement, which was acceptable to the committee.

I have recently spoken to the Joint ANSI/CGA Water Heater Subcommittee Chairman on this issue, and he agrees with the decision and approach taken by the former CGA Water Heater Committee. His response was that water heaters installed in any jurisdiction, and requiring modification beyond what the appliance standard covers, shall be equipped with a point-of-use anti-scald device, for example, a mixing valve. He also suggested that no thermostat exists today that would accomplish what the 1990 NBC requires.

Finally, he recommended that this matter be introduced to the joint CGA/ANSI Water Heater Subcommittee when they next meet. So at this time, I do not know if the standard will necessitate compliance with the 1990 NBC. The Joint ANSI/CGA Subcommittee will make that decision.

Yours truly,


Raymond Thurton, P.Eng.
Senior Standards Engineer

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Canadian Gas
Association



Association
Canadienne du Gaz

February 7, 1991

Ivey
Mr. I. R. Killacky, P. Eng.
B. C. Ministry of Municipal Affairs
Safety Engineering Services Division
601 West Broadway
Vancouver, B. C.
V5Z 4G9

P. Thurston
Senior Project Engineer
Canadian Gas Association
Standards Department
2200 West Broadway
Vancouver, B. C.
V6K 2R1

Dear Sir:

Subject: 1990 EDITION OF THE BRITISH COLUMBIA BUILDING CODE.

On behalf of the CGA 4.1-4.6 Standards Committee, we are writing to request that you give consideration to the following amendment to clause 9.31.6.1 of the National Building Code of Canada 1990.

The CGA 4.1 - 4.6 Standards Committee is responsible for the development of the CAN1-4.1-M85 Gas Fired Automatic Storage Type Water Heaters with Inputs Less than 75,000 Btuh and CAN1-4.3-M85 Circulating Tank, Instantaneous and Large Automatic Storage Type Gas Water Heaters. At its last meeting the committee addressed the new National Building Code (NBC) requirement 9.31.6.1 and expressed concern.

The reason for this letter is to convey the committee's concern to you in the hope that you would carefully consider the ramifications of endorsing this clause. An alternate wording with rationale is also suggested.

The above clause is worded in such a way that would make enforcement difficult and places design restrictions on the manufacturers. The intent of the clause is to eliminate scalding. The water heater industry is well aware of this potential hazard and has taken steps to address this issue.

There are, however, other considerations that must also be taken into account. The water heater is not dedicated to provide hot water for a single purpose, its usage influences the design and operation of other equipment. For dish washing (both manually and by machine) animal fat will not melt below 120°F (49°C) and a temperature of 140°F (60°C) is required for sanitary reasons. In laundry applications clean clothes are the objective, but sanitation is also a factor. We contacted manufacturers of laundry and dish washing products who indicated a preference for higher temperature water, unfortunately, they could not provide documentation in the way of a report or printed recommendation because, for marketing reasons, it was not in their best interest.

Mr. I. R. Killacky
February 7, 1991
Page 2

A serious health concern issue is the formation of bacteria and the spread of germs and disease. It has been shown that Legionnaires Disease (*Legionella Pneumophila*) flourish at temperatures below 115°F (46°C). It is recommended that 140°F (60°C) will limit this growth. Further, if the system is contaminated, flushing the system with 160°F (71°C) water will kill the bacteria. The intended clause will effectively eliminate this option. In a multi-family dwelling where a common laundry facility is provided, the spread of germs and disease from one family to the other becomes uncontrollable.

Along with other concerns minimum efficiency level requirements are being considered; this as a result of public awareness of energy conservation. Therefore, with a maximum temperature of 140°F (60°C) water heater tank sizes will have to be increased to accommodate the additional storage requirement and the stand-by losses will increase which affects energy conservation, i.e. reduced efficiency.

One last point, which seems to have been overlooked, is the consuming public. The Consumers Association of Canada has indicated that "the consumer should have the choice of what temperature their hot water will be". It must be acknowledged that today's consumers make their purchasing decision from a position of more knowledge and, with further education in safety and operation, potential hazards will be further reduced.

With the above factors, the potential for scalding, bacterial growth such as Legionnaires disease and the preference of the public to control their own environment, the following replacement clause to the NBC clause 9.31.6.1 has been proposed:

New Proposed Clause 9.31.6.1. Where a hot water supply is required by Article 9.31.4.3., equipment shall be installed to provide to every dwelling unit an adequate supply of service hot water with a temperature range from 45°C to 60°C.

RATIONALE: The proposed wording in the 1990 National Building Code is bordering on design restrictions of the water heater. The above proposed clause keeps the intent to avoid potential scalding and is not design restrictive.

The above proposed clause is from the 1985 National Building Code clause 9.32.6.1, with the temperature values changed to reflect those in the 1990 National Building Code.

Mr. I. R. Killacky
February 7, 1991
Page 3

We hope the foregoing has indicated our concerns regarding the proposed clause 9.31.6.1. It is our recommendation that controlling the water temperature should be at the point of use rather than using the appliance to control the temperature. Attached are article's to support our concerns.

The majority of the above text has been duplicated from letters sent to your counterpart in Ontario, Alberta, Saskatchewan and Manitoba. The Ontario Buildings Branch and Alberta Buildings Branch review of the NBC was under way but not completed by the time we could take action. Ontario and Alberta were unaware of the above considerations and their potential effect prior to the submission put forward by the CGA 4.1-4.6 committee. As a result, the revision proposed has been accepted by both Provinces.

The CGA Water Heater Committee recognizes the need for safety in their appliances during normal operation but maintains that this can be accomplished in several ways. The NBC should not address appliance design but building safety design.

We trust you will give due consideration to the forgoing proposal. If you require more information please contact me.

Yours very truly,
CANADIAN GAS ASSOCIATION

Mario Giannoccaro,
Standards Administrator

c.c	M. G. Cherry	- Gas Safety Branch
	C. Wood	- B.C. Gas
	M. Jenson	- Chairman 4.1-4.6
	P. Dumouchel	- Union Gas
	R. Thurton	- CGA

Enclosures

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ITEM 11.
Z21/CGA Joint Water Heater
Subcommittee Meeting,
September 23-24, 1993

**REVIEW CANADIAN REGULATORY COMMENTS REGARDING
WATER HEATERS USED FOR "COMBINATION" POTABLE
WATER/SPACE HEATING APPLICATIONS**

Action Requested

1. Review the attached correspondence between the Canadian Gas Association (CGA) and Alberta Labour regarding the 1.28.6 marking requirement amendment to CAN/CGA-4.1-M85, *Gas-Fired Automatic Storage Type Water Heaters With Inputs Less Than 75 000 BTUH*;
2. Review an attached March 22, 1993 CGA Interoffice Memorandum containing an excerpt from the June 1992 meeting of the Interprovincial Gas Advisory Council (IGAC); and
3. Consider whether to revise the 1.28.6 marking requirement based on the above correspondence.

Background

Attached is a March 12, 1993 letter to staff from Mr. Raymond Thurton, CGA Standards Staff. Mr. Thurton's letter requests the joint subcommittee to consider clarifying the marking requirement in Clause 1.28.6 of the amendment to CAN/CGA-4.1-M85.

Clause 1.28.6 is excerpted under Mr. Thurton's attached November 17, 1992 response letter to Mr. K. Fenning, Alberta Labour, Work & Safety Standards Division, Plumbing & Gas Safety Standards. Mr. Thurton's November 17 response indicates the CGA staff's and the CGA water heater committee chairman's opinion that the 1.28.6 marking provision means that the water heater can be used in any combination of its certified application; i.e., space heating, water (potable) heating, or both. Alberta Labour's interpretation is that a "combination" water heating/space heating unit can only be used in this dual application, and not solely for water (potable) heating or solely for space heating applications.

Additional Background

Also attached is a March 22, 1993 CGA Interoffice Memorandum from Mr. Thurton to Mr. Ken Bales, Manager, CGA Standards. Mr. Thurton's memo contains excerpts from

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the June 15-16, 1992 IGAC meeting regarding the application of water heaters to provide heated water for space heating purposes.

Z21.10.1 Provisions on Water (Potable)
Heating and Space Heating Applications

The following are pertinent excerpts from Z21.10.1-1990:

"1.30 INSTRUCTIONS

"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 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 applicable statement as follows:

- "a. 'Suitable for water (potable) heating only,' or
- "b. 'Suitable for water (potable) heating and space heating.'"

"1.31.24 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."**

The above provisions are similar to those found in the November 1992 amendment to CAN/CGA-4.1-M85 and CAN/CGA-4.3-M85, which covers water heaters covered by Z21.10.3.

Additional Information

At its December 6-7, 1988 meeting, the Z21 water heater subcommittee was requested to add coverage for space heating applications to the Volume III water heater standard, Z21.10.3. The subcommittee agreed to adopt coverage for water heaters for space heating applications to the Z21.10.3 standard, based on coverage currently in the Z21.10.1 standard, which was approved by ANSI on April 5, 1988. However, one subcommittee member had disapproved of this action, commenting that these are typically boiler applications and the coverage in Z21.10.1 is not as applicable to Z21.10.3. The proposed revisions to Z21.10.3, similar to those in Z21.10.1, were approved by ANSI on October 4, 1990.

Canadian Gas
Association



Association
Canadienne du Gaz

12 March 1993

Mr. D.C. Bixby
Standards Engineer
American Gas Association Laboratories
8501 E. Pleasant Valley Road
CLEVELAND, OH 44131

Dear David;

Re: Material for the Next Meeting of the Joint CGA/AGA Water Heater Subcommittee

Attached is correspondence between CGA and Alberta Labour (Provincial Authority Having Jurisdiction). This correspondence requests the Joint Subcommittee to review the marking requirement in Clause 1.28.6 of the amendment to CAN/CGA-4.1-M85. The intent of the review is to determine if the requirement can be clarified. It was suggested by the initial correspondence from Alberta Labour that this marking means that the unit can only be used in a dual combination application, not a single application.

The Joint Subcommittee should consider whether there is a need to change this requirement, and if so to what wording and the rationale for the change. The consensus of the original CGA 4.1 Committee members is that these units can be used in any combination of its certified application; i.e. space heating, water heating, or both.

Thank you.

Yours truly;

Raymond Thurton, P.Eng.
Sr. Standards Engineer

Enclosures

9303WTHI.LTR

Head Office: 55 Scarsdale Road, Don Mills, Ontario M3B 2R3
Tel. (416) 447-6465 • Fax (416) 447-7067



17 November, 1992

Mr. K. Fenning
Alberta Labour
Work & Safety Standards Division
Plumbing & Gas Safety Standards
10808 - 99 Avenue
Edmonton, Alberta
T5K 0G5

Dear Ken:

Thank you for your letter of 6 November, 1992, concerning certification of water heaters for water heating/space heating.

Neither CGA staff nor the CGA Standards Committee Chairman can provide you with an official interpretation of the standard, regarding your request. However, we have discussed this matter with the Chairman of the CGA Standards Committee on Water Heaters, and it is our opinion that the standard would permit a water heater for use in combination potable water/space heating applications, as either a conventional water heater (potable) or space heater, or it may be used in a combination of applications. There is no restriction to use as a potable water heater only, space heater only, or combination. It is our recollection that the reason for the label: "Suitable for water (potable) heating and space heating", is to provide information to users that here is a water heater, and it can be used for any combination of the above applications.

The Chairman of the CGA Gas Fired Water Heater Committee, has indicated that the labelling requirement will be discussed at the next meeting of the Joint Water Heater Subcommittee to determine if an alternative label wording will clarify the intent.

An amendment to the standard is published with the related requirements, and we have attached a copy for your information.

If you wish, you may complete the attached form: "Request for Interpretation of CGA Standards", and we will have it reviewed by the Standards Committee.

Yours very truly,
CANADIAN GAS ASSOCIATION

Ken G. Bales
Manager Standards

cc: Mr. R. Thurton
Mr. M. Jenson

Encs.
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size shall be indicated on the spud or hood. Also see Clause 1.9.3 MAIN BURNER ORIFICE AND ORIFICE FITTINGS.

- f. Normal gas input rating(s) in Btuh.
- g. Symbol of the organization making the tests for compliance with this Standard.
- h. Manifold Pressure (... -inch w.c.) (kPa)
- i. Maximum inlet gas pressure (... -inch w.c.) (kPa)
- j. Minimum inlet gas pressure (... -inch w.c.) (kPa)

1.28.2 Water heaters shall bear a Class IIIA marking material located so as to be easily read when the appliance is in a normally installed position, on which shall appear the following:

- a. Normal recovery capacity as defined in Part 3.
- b. Storage vessel capacity in U.S. or Imp. gallons.
- c. Hydrostatic test and working pressure. The hydrostatic working pressure shall not be more than 50% of the indicated hydrostatic test pressure.
- d. Water heaters designed for installation in mobile housing or recreational vehicles shall incorporate on the name/rating plate or adjacent thereto, a Class IIIA marking, as follows:

"FOR INSTALLATION IN MOBILE HOUSING OR RECREATIONAL VEHICLES."

- e. Where an appliance requires combustion air openings or accessibility clearances in excess of the requirements in the CAN1-B149 INSTALLATION CODES, the manufacturer shall mark these requirements.

1.28.3 Table-top type water heaters having externally attached draft hoods shall bear a marking on the rating plate or on a separate plate of Class IIIA marking material attached adjacent to the rating plate stating: "To be installed with draft hood relief opening not less than 6 inches from adjacent wall." This statement shall also appear on a label of Class IV marking material attached to the appliance.

1.28.4 Water heater installation location limitations shall be clearly marked on the rating plate, or on a separate label of Class IIIA marking material that can be easily read when the appliance is in a normally installed position, in substance as follows:

- a. "For use only in noncombustible locations."

- b. For use only in locations having noncombustible walls."

- c. "For use only on noncombustible floors."

1.28.5 Water heaters which require clearances from any type of construction shall bear a marking on Class III marking material indicating the minimum distance required. Appliances with draft hoods or venting systems extending beyond the side(s) or rear of the unit: "Minimum clearance from draft hood (or vent) to combustible construction, _____ inches."

1.28.6 Water heaters for use in combination potable water/space heating applications shall bear a marking on the rating plate, or on a separate label of Class IIIA marking material, with the statement in both the English and French languages as follows:

"Suitable for water (potable) heating and space heating".

"Peut-être utiliser pour chauffe-eau (au potable) et chauffage".

1.29 INSTRUCTION PLATE

Clearly defined, legible, and complete instructions which can be easily understood in both the English and French languages, for lighting and shutting down the appliance shall be provided Class IIIA marking material on or adjacent to the controlling device, or in an equally conspicuous position on the top front of the appliance casing where they can be easily read while lighting or shutting down the appliance. Lighting instructions shall specify a 5 min complete shut-off period before relighting the appliance.

On water heaters for installation in mobile housing and recreational vehicles convertible for use with natural gas or propane, the instruction plate shall also include instructions for converting the water heater from the use of one gas to another.

The letters used for the instructions shall be 10 point Vogue bold face upper case type or equivalent and the spacing shall be 2 point leaded.

The information on the instruction plate may be combined with the information on the rating plate as specified in 1.28.1 NAME/RATING PLATE.

1.30 OTHER MARKINGS

1.30.1 The appliance shall bear a Class IV marking on which appears the trade name designated by the manufacturer and recorded with the organization making the tests for compliance with these standards.

1.30.2 Table-top water heaters for "flush-to-wall"

**Canadian Gas Association
MEMORANDUM**

22 March, 1993

To: Ray Thurton
From: Ken Bales
Subject: GRI Report - Water Heaters Used for Space Heating

At its 15-16 June, 1992 meeting the IGAC reviewed the application of water heaters to provide heated water for space heating purposes. The following is an excerpt from the Minutes of that meeting:

Minute

No. 419 Certification of Water Heaters for Heating/Space Heating

A member questioned whether water heaters could be used solely for space heating application. R. Thurton suggested that the changes proposed to standard (CAN1-4.1 & 4.3-M85) would permit appliances to be used solely for space heating application. Another member mentioned that boilers are governed by specific criteria of the ASME Code (eg requires low water cut-off controls) which these water heaters, which would be used in the same application, would not have to satisfy. Another concern was in reference to bacterial growth. K. Campbell informed Council that there had been extensive research conducted in this regard (eg. GRI) which concluded that there should not be a concern of health. Also, there are no appropriate boilers available to cover this application, whereas water heaters, where used, have performed well. The IGAC noticed an inconsistency in the terminology used within the proposed coverage for the water heater standard; ie. terms such as "combination". Council requested that the Standards Committee/Subcommittee responsible clarify the scope statement. The Secretary was requested to obtain and circulate to the members a copy of the GRI report on this subject.

ITEM 12.
Z21/CGA Joint Water Heater
Subcommittee Meeting,
September 23-24, 1993

**CONSIDER IGAC REQUEST TO DEVELOP COVERAGE
ADDRESSING FLUEWAY BLOCKAGE OF APPLIANCES
USING "FINNED-TUBE" TYPE HEAT EXCHANGERS**

Action Requested

Consider a recommendation from the Interprovincial Gas Advisory Council (IGAC) to develop standards coverage to require a minimum temperature rise across the heat exchanger of finned-tube type pool heaters in order to avoid condensate that can lead to blockage.

Background

Attached are excerpts from the minutes of the June 18-20, 1991 and May 31-June 1, 1993 meetings of the IGAC.

Additional Background

The IGAC's recommendation also extends to gas-fired boilers which use finned-tube type heat exchangers. The Z21/CGA joint boiler subcommittee has not yet considered the IGAC's request.

Additional Information
Related to Z21 Standards

At its June 19, 1990 meeting, the Z21 water heater subcommittee recommended to the Z21 Committee proposed coverage addressing "heat roll-out" safety shutoff means for the Volume I water heater standard. The coverage now appears in ANSI Z21.10.1b-1992 and requires water heaters (other than direct vent) to be designed or incorporate a means to shut off main burner gas to the heater in the event the flow of combustion products through the flueway(s) is reduced. A performance test was also added to prove that such designs or means complied with the above.

The above coverage was based on temperature ("heat") criteria, as opposed to the "flame-roll out" criteria in the ANSI Z21 furnace and boiler standards. This was to address the potential for the flueway of a residential water heater to be restricted to a point which may cause excessive heat to issue from the appliance's combustion air

openings, thereby damaging appliance wiring and controls. The subcommittee's temperature criteria was based on similar criteria in the Australian gas water heater standard.

In addition, at its June 1990 meeting, the subcommittee established a working group to consider drafting similar coverage applicable to the Z21.56 pool heater standard. At its November 13-14, 1991 meeting, subcommittee adopted for distribution for review and comment the working group's suggested revisions to Z21.56, based on the temperature criteria in Z21.10.1

At its September 21-22, 1992 meeting, the joint subcommittee reviewed the Z21.56 proposed coverage, in light of comments received. At that time, a member inquired as to why the proposed pool heater coverage was based on "flame roll-out" criteria and not the temperature criteria of Z21.10.1. It was reported that after the subcommittee's November 1991 meeting, it had been determined that the "flame roll-out" criteria in the Z21.13 boiler standard was more applicable to pool heater designs than the "heat roll-out" test in Z21.10.1, which is applicable to low-input storage water heaters. Therefore, the proposed coverage for the Z21.56 pool heater standard was based on the coverage in the Z21.13 boiler standard. The subcommittee chairman, in addition to those subcommittee members representing pool heater manufacturing interests, had all concurred after the November meeting that this change in criteria was appropriate.

Based on the above, the subcommittee referred the issues of water heater "heat roll-out" versus pool heater "flame roll-out" test criteria to the Technical Committee of GAMA's Water Heater Division for consideration. The subcommittee then recommended the proposed Z21.56 revisions to the Z21 Committee, unchanged.

b) Finned Tube Type Swimming Pool Heaters The events leading to the deaths of two Calgary residents were outlined. The cause of the deaths was carbon monoxide poisoning from a finned tube type swimming pool which was installed indoors. Eighty percent of the flue gas area around the finned tubes had been blocked. In discussing this issue, members expressed the opinion that the water temperature rise across the heat exchanger was critical. If the temperature rise is too low, condensation can result and contribute to the blockage of the flue gas passageways. It was moved and duly seconded that Council recommend to the Standards Committees responsible for the swimming pool heater and the boiler standards, that standards coverage be added to require a minimum temperature rise across the heat exchanger of finned tube type appliances in order to avoid condensate that can lead to blockage problems.

- carried -