Chapter 3: General Regulations

General Comments

A fundamental principle of the code is its dependence on the listing and labeling method of approval for appliances and equipment. Section 301.3 prohibits the installation of unlisted appliances except where approved in accordance with Section 105.

Purpose

Chapter 3 contains requirements for the safe and proper installation of gas-fired equipment and appliances to help assure protection of life and property

SECTION 301 (IFGC) GENERAL

301.1 Scope. This chapter shall govern the approval and installation of all *equipment* and appliances that comprise parts of the installations regulated by this code in accordance with Section 101.2.

❖ This section states that this chapter governs the approval and installation of all gas-fired equipment and appliances that are regulated by the code. Section 101.2 establishes the scope of application of the code (see commentary, Section 101.2).

301.1.1 Other fuels. The requirements for combustion and dilution air for gas-fired appliances shall be governed by Section 304. The requirements for combustion and dilution air for appliances operating with fuels other than fuel gas shall be regulated by the *International Mechanical Code*.

❖ This code and the *International Mechanical Code*® (IMC®) each have a combustion air chapter that is specific to the fuels addressed in the respective code.

301.2 Energy utilization. Heating, ventilating and air-conditioning systems of all structures shall be designed and installed for efficient utilization of energy in accordance with the *International Energy Conservation Code*.

❖ This section states that all appliances and equipment must be designed and installed to use depletable energy sources efficiently. The *International Energy Conservation Code*® (IECC®) is the applicable document for regulating the efficiency and performance of appliances and heating, ventilating, air conditioning (HVAC) systems. Special applications such as process heating or cooling should be designed for the maximum energy efficiency attainable.

301.3 Listed and labeled. Appliances regulated by this code shall be *listed* and *labeled* for the application in which they are used unless otherwise *approved* in accordance with Section 105. The approval of unlisted appliances in accordance with Section 105 shall be based upon *approved* engineering evaluation.

❖ Gas-fired appliances must be listed and labeled by an approved agency to show that they comply with the applicable national standards. The code requires listing and labeling for appliances, such as boilers, furnaces, space heaters, direct-fired heaters, cooking appliances, clothes dryers, rooftop HVAC units, etc. The code also requires listing for system components as specifically stated in the text addressing those components. The label is the primary, if not the only, assurance to the installer, the inspector and the end user that a representative sample of an appliance model has been tested and evaluated by an approved agency and has been determined to perform safely and efficiently when installed and operated in accordance with its listing.

Appliances must be listed and labeled for the application in which they are used, otherwise the installation would be a misapplication of the appliance. For example, if an appliance is listed for indoor use only and is installed outdoors, this installation is a misapplication of the appliance and serious malfunctions and/or conditions could result. An appliance might be marketed and installed for a particular purpose for which it was not tested and listed and this is what this section intends to prohibit. Verifying that an appliance has a testing agency label is only part of the code official's responsibility. He or she must also verify that the listing from the testing agency includes the application at hand. The bottom line is, the use of an appliance must match the use for which the appliance was tested.

The presence of a label is part of the information that the code official considers when approving appliances. The only exception to the labeling requirement occurs when the code official approves a specific appliance in accordance with the authority granted in Section 105.2.

Approval of unlabeled appliances must be based on documentation that demonstrates compliance with applicable standards or, where no product standards exist, that the appliance is appropriate for the intended use and will provide the same level of performance as would be provided by listed and labeled appliances. A fundamental principle of the code is the reliance on the listing and labeling process to ensure

appliance performance; approvals granted in accordance with Section 105.2 must be well justified with supporting documentation. To the code official, the installer and the end-user, very little is known about the performance of an appliance that is not tested and built to an appliance standard.

301.4 Labeling. Labeling shall be in accordance with the procedures set forth in Sections 301.4.1 through 301.4.2.3.

❖ This section establishes the requirements for testing and labeling appliances by an approved agency. Included within this section are the requirements for testing the product and for approval of the testing agency, the testing equipment and the personnel who conduct the test. Also included is the information that must appear on a label.

301.4.1 Testing. An *approved* agency shall test a representative sample of the appliances being *labeled* to the relevant standard or standards. The *approved* agency shall maintain a record of all of the tests performed. The record shall provide sufficient detail to verify compliance with the test standard.

❖ When an approved agency labels an appliance, the agency is ensuring that a representative sample of the appliance has been tested in accordance with an appropriate standard and has been determined to perform acceptably when installed and operated in accordance with the appliance's listing.

The basis for a label is the requirement for testing a representative, perhaps identical, sample of the appliance to indicate conformance to a required standard. This is an important premise in the code because a code official will consider the presence of a label in the approval of an appliance. For this reason, the appliance must meet the requirements of the standard. Because the appliance tested is installed and operated in accordance with the manufacturer's instructions, these instructions must provide for proper installation and operation. This is important because the code requires that the labeled appliance be installed in accordance with the manufacturer's instructions, and operating instructions must be either attached to or shipped with each appliance.

There are numerous standards, not all of which are specifically referenced in the code, applicable to various appliances and equipment. For this reason, the approved agency determines the applicable standards to be used for testing and then, in turn, as the basis for labeling. Each standard contains safety requirements for a given appliance or piece of equipment and specifies tests that must be performed. The labeling agency is required to maintain sufficient documentation to demonstrate compliance with the test standard. The code official may require that copies of the test reports be submitted to determine the validity of the label.

Examples of standards that are used as a basis for testing and labeling include:

- ANSI Z21.47 Gas-fired Central Furnaces;
- ANSI Z83.8 Gas Unit Heaters; and
- UL 795 Commercial—Industrial Gas Heating Equipment.

301.4.2 Inspection and identification. The *approved* agency shall periodically perform an inspection, which shall be in-plant if necessary, of the appliances to be *labeled*. The inspection shall verify that the *labeled* appliances are representative of the appliances tested.

❖ The approved agency whose identification insignia appears on the label must perform periodic in-plant inspections. The primary objective of these inspections is to determine that the manufactured product is equivalent to the sample that was tested. Because the label is good only for the products that were tested, the in-plant inspections are intended to discover any design changes or production quality control problems. If any discrepancies are found, that the labeling agency would discontinue labeling of that particular product, and the manufacturer would be required to resolve the problem and, if necessary, have the redesigned product retested before the labeling process is resumed.

301.4.2.1 Independent. The agency to be *approved* shall be objective and competent. To confirm its objectivity, the agency shall disclose all possible conflicts of interest.

❖ As a part of the basis for a code official's approval of a particular labeling agency, the agency must demonstrate both its independence from the manufacturer of the product and its competence to perform the required tests. The judgment of objectivity is linked to the financial and fiduciary independence of the agency. The competence of the agency is judged by its experience, organization and the experience of its personnel. As a hypothetical example, the Acme Inspection Agency is performing testing for gas-fired furnaces for the Real Hot Furnace Company. After some investigation, both Acme and Real Hot are found to be the subsidiaries of the same parent company. The inspection agency and the manufacturer clearly have a relationship that presents the potential for conflict of interest, and the objectivity of the inspection agency is sufficiently questionable for the code official to justify not approving Acme as a testing and labeling agency for equipment produced by the Real Hot Furnace Company.

301.4.2.2 Equipment. An *approved* agency shall have adequate *equipment* to perform all required tests. The *equipment* shall be periodically calibrated.

❖ Referring to the example in the commentary for Section 301.4.2.1, if the Acme Inspection Agency had only the facilities to test and label fire doors, the agency would not be qualified to test and label a gas-fired furnace. Although this example is oversimplified, the point is that the inspection agency must have all of the necessary equipment to perform the testing required by the applicable standard.

In addition to having the proper equipment, the agency must maintain records of the maintenance and calibration of their equipment to demonstrate that the equipment can be relied on to produce accurate,

consistent and reproducible results. Testing apparatus, instruments and equipment must often be capable of measurements using very small units of measure within a specified tolerance. To produce accurate, dependable readings and reliable test results, testing apparatus, equipment and instruments must be routinely calibrated to a fixed reference. Having the proper testing equipment can be just as important as the competence of the testing personnel.

301.4.2.3 Personnel. An *approved* agency shall employ experienced personnel educated in conducting, supervising and evaluating tests.

❖ The competence of an inspection agency is based on the agency having the proper equipment to perform the test, as stated in Section 301.4.2.2, and also on the experience and abilities of its personnel. The best calibrated equipment can produce accurate results only when operated by experienced personnel who are trained to conduct, supervise and evaluate tests. For example, consider a newly formed agency that has employed individuals who do not have experience related to the testing to be conducted and have not been adequately trained. The capabilities and experience of supervisory personnel overseeing their work is also important.

301.5 Label information. A permanent factory-applied nameplate(s) shall be affixed to appliances on which shall appear in legible lettering, the manufacturer's name or trademark, the model number, serial number and, for *listed* appliances, the seal or mark of the testing agency. A label shall also include the hourly rating in British thermal units per hour (Btu/h) (W); the type of fuel *approved* for use with the *appliance*; and the minimum *clearance* requirements.

❖ This section requires that the label be a metal plate, tag or other permanent label. In general, label materials other than metal tags or plates usually consist of material that is similar in appearance to a decal, and the label, its adhesive and the printed information must be durable and water resistant. Because of the important information given by a label, the label is intended to be permanent, not susceptible to damage and legible for the life of the appliance to which it is attached. The standards that appliances are tested to usually specify the required label performance criteria, the method of attachment and the required label information. The code requires that the label be affixed permanently and prominently on the appliance or equipment and specifies the information that must appear on the label. The manufacturer may be required by the relevant standard or may voluntarily provide additional information on the label. Commentary Figures 301.5(1) and 301.5(2) show typical appliance labels.

301.6 Plumbing connections. Potable water supply and building drainage system connections to appliances regulated by this code shall be in accordance with the *International Plumbing Code*.

❖ Plumbing connections to appliances and equipment regulated by the code must be in accordance with the *International Plumbing Code*® (IPC®).

Section 624.2 of the code requires that combination domestic water heating and hydronic supply water heating units be listed and installed according to their listing and manufacturer's installation instructions.

Hydronic systems normally require a means of supplying fill and makeup water to replace any water lost to evaporation, leakage or intentional draining. Where direct connections are made to the potable water supply, the connections must be isolated from the potable water source. This requirement is intended to protect the potable water system from contamination by backflow when a direct connection is made to a hydronic system.

Hydronic systems are normally pressurized, contain nonpotable water and fluids and can contain conditioning chemicals or antifreeze solutions. Low-temperature hydronic fluids and cooling towers have also been associated with disease-causing organisms such as the Legionnaires disease bacterium. The potable water system must be protected from potential contamination resulting from connection to hydronic systems, water-wash filter systems, cooling towers, solar systems, water-cooled heat exchangers, cooking appliances, ice makers, humidifiers, evaporative coolers, etc.

In addition, water heaters are part of the potable water distribution system and, therefore, must comply with both this code and the IPC. A water heater installation is complex in that it has a fuel or power supply; a chimney or vent connection, if fuel-fired; a combustion air supply, if fuel-fired; connections to the plumbing potable water distribution system and controls and devices to prevent a multitude of potential hazards from conditions such as excessively high temperatures, pressures and ignition failure.

It is not uncommon for jurisdictions to issue both plumbing and mechanical permits for water heater installations or to require that the installer be licensed in both the plumbing and mechanical trades when performing such installations (see commentary, Section 624). Water heaters are clearly under the purview of both plumbing and fuel gas codes. This section also refers to the IPC for the drainage associated with mechanical appliances and equipment, such as those addressed in Section 307.

301.7 Fuel types. Appliances shall be designed for use with the type of fuel gas that will be supplied to them.

❖ Appliances are usually designed by the manufacturer to operate on one specifically designated type of fuel. An element of information used for the approval of appliances is the label, which ensures that the appli-