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Supporting Documentation for ICC Code Change Requests

IFGC 409.5

IFGC 202

IRC G2420.5 (409.5)

3.3.5.1 Purpose: *The proponent shall clearly state the purpose of the proposed code change (e.g. clarify the Code; revise outdated material; substitute new or revised material for current provisions of the Code; add new requirements to the Code; delete current requirements, etc.)*

The purposes of the proposed code changes are to revise the codes: IFGC 409.5, IFGC 202, and IRC G2420.5 in order to improve the safety of gas appliances and fire safety and life safety at minimal additional expense.

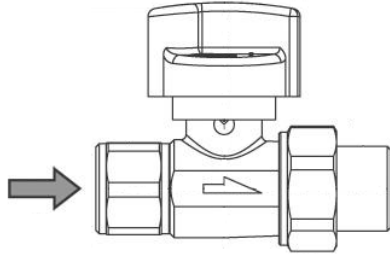
3.3.5.2 Reasons: *The proponent shall justify changing the current Code provisions, stating why the proposal is superior an improvement to the current provisions of the Code. Proposals which add or delete requirements shall be supported by a logical explanation which clearly shows why the current Code provisions are inadequate or overly restrictive, specifies the shortcomings of the current Code provisions and explains how such proposals will improve the Code.*

The current provisions of the codes require manual shut-off valves for all gas appliances for appliance maintenance or replacements. However, the current codes fail to address any life safety or property features such as a thermal activated shut-offs. Thermally activated gas shutoffs improve both personal safety and property at minimal cost. The benefits of improved safety at minimal cost come from the characteristics of thermal activated gas shutoffs:

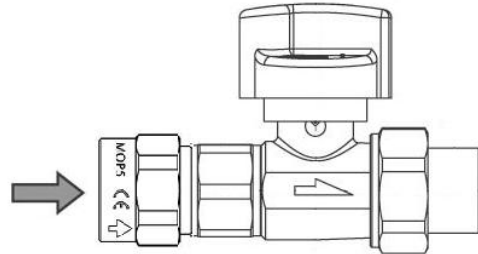
1. They prevent fire escalation, protecting life and property
2. They are not proprietary and are available from multiple manufacturers
3. They do not incur any additional labor costs when installed
4. When activated it will isolate the flexible gas connection – which in many cases is **only** rated to 150°F.

As can be seen in the diagram below the installation of manual gas shutoff valves, which are currently required, and the installation of manual gas shutoff valves with thermal activated shutoffs, is the same.

Typical Manual Gas Shutoff Valve

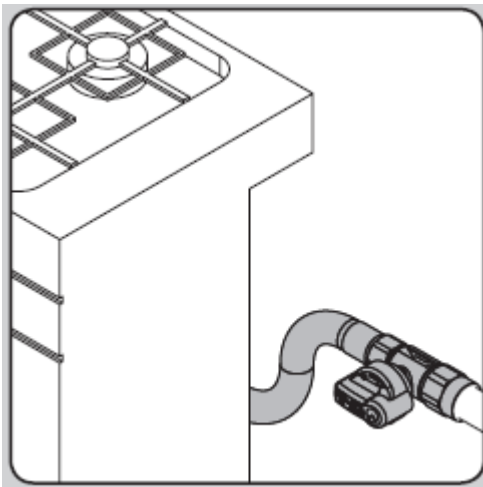


Manual Gas Shutoff Valve + Automatic Thermal Gas Shutoff

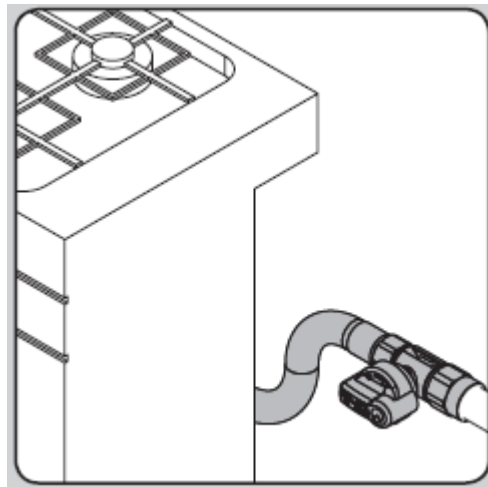


NO additional labor is required when installing Automatic Thermal Gas Shutoff with Manual Gas Shutoff

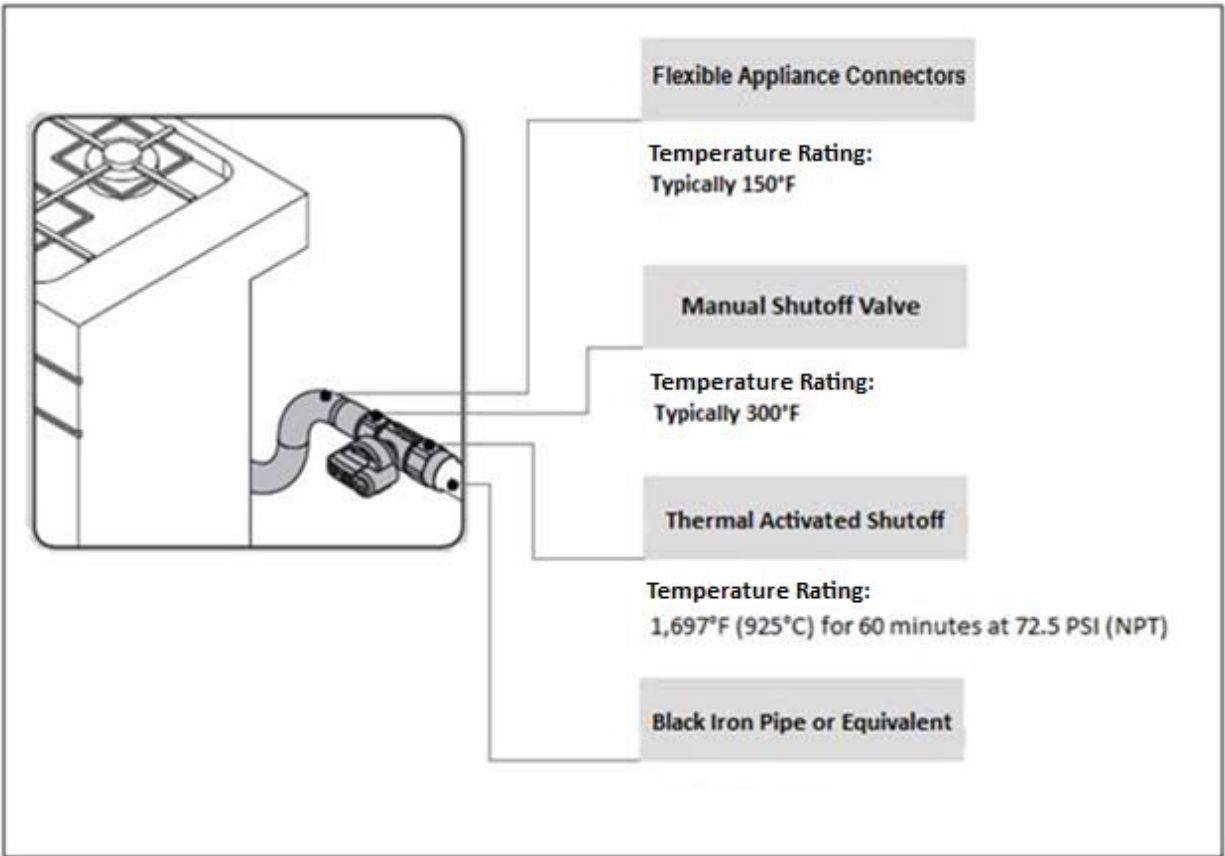
Installation of a Manual Shutoff Valve



Installation of Manual Shutoff Valve + Automatic Thermal Gas Shutoff



Gas Flow and Heat Resistance of Flow Components

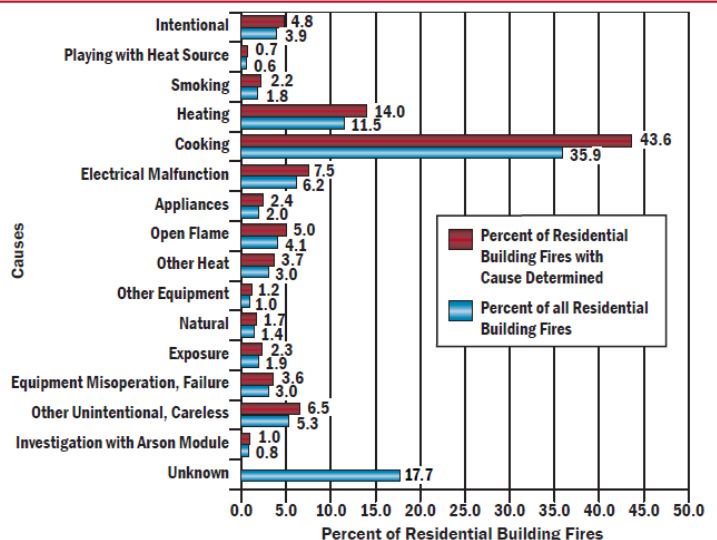


3.3.5.3 Substantiation: *The proponent shall substantiate the proposed code change based on technical information and substantiation. Substantiation provided which is reviewed in accordance with Section 4.2 and determined as not germane to the technical issues addressed in the proposed code change shall be identified as such. The proponent shall be notified that the proposal is considered an incomplete proposal in accordance with Section 4.3 and the proposal shall be held until the deficiencies are corrected. The proponent shall have the right to appeal this action in accordance with the policy of the ICC Board. The burden of providing substantiating material lies with the proponent of the code change proposal.*

The Case for Better Gas Appliance Safety

When the temperature reaches 212°F the thermal activated shutoff prevents the free flow of gas during fires, which substantially reduces the risk to life and property. The proposed code change would require that the manual valves now required for all gas

Causes of Residential Building Fires (2007–2009)



appliances also include a thermal activated shut-off device.

Building occupants have a false sense of security regarding gas appliances. Occupants assume they have the protection of thermal activated gas shut-offs, when in reality the manual valves have to be physically shut off to prevent gas release. A thermal activated shut-off provides passive gas and fire safety, and does not depend on a homeowner or facility manager to locate and manipulate a manual valve. Thermal activated gas shut-offs stop the flow of gas to the appliance prior to connection failure due to fire.

Cooking is the leading cause of residential building fires (44 percent), as reported by the U.S. Department of Homeland Security U.S. Fire Administration National Fire Data Center September 2011 Topical Fire Report.³

Additional statistics detailed in this report include:

- An estimated 374,900 residential building fires are reported to U.S. fire departments each year and cause an estimated 2,630 deaths, 13,075 injuries, and \$7.6 billion in property loss.
- Nonconfined residential building fires most often start in cooking areas and kitchens (21 percent).
- Cooking fires are the predominant type of confined fires in residential buildings
- 10.7 Fatalities/1,000 Nonconfined Residential Building Fires
- 47.6 Injuries / 1,000 Nonconfined Residential Building Fires
- \$32,780 Dollar loss / Nonconfined Residential Building Fires
- 81 percent of all fire deaths and 76 percent of all fire injuries occurred in residential buildings.
- Residential building fires accounted for over half (53 percent) of the total dollar loss from all fires.³

According to the National Fire Protection Association (NFPA), U.S. fire departments face 2,110 home fires each year where natural gas is the first material ignited, and 1,170 home fires a year where LP-gas is involved with the start of a fire. Most home gas fires originate in the kitchen at the stove or gas range.

Thermal activated gas shutoffs stop the flow of gas regardless whether the fire fighter's or emergency responders experience delays in getting to fires or if they cannot stop the gas service at the meter. Note that delays to reach fires occurred 43,222 times during the five-year period from 2005-2009 in the U.S.

When manual gas shut-off valves are combined with passive, thermal activated shut-offs, occupants and first responders greatly reduce risk to their lives. And they are much better protected from personal harm and property damage. Automatic thermal gas shutoffs greatly reduce the amount of gas released to the atmosphere when fire occurs. Uncontrolled gas leaks pose a significant hazard to firefighters, emergency responders, and the public.

When fire fighters reach a fire, the gas shut-off valve may not be easily found, preventing gas from being turned off to the entire dwelling or building. Also, a gas shut-off valve inside the dwelling or building

may be inaccessible to the fire fighters. Automatic gas shut-offs stop gas flow from exacerbating structure fires even in these circumstances.

In the five year period between 2005 and 2009, the National Fire Data Center of the United States Fire Administration (USFA) has documented 36,577 fires in 49 states and the District of Columbia where gas was the first material ignited and resulted in an uncontrolled or self-perpetuating fire. These fires have been documented and can be found in the National Fire Incident Reporting System (NFIRS) database.

Additional related gas fire statistics from the NFPA include:

- Gas ranges were involved in an estimated 1.1 million fires (2004-2005), resulting in a rate of 2.6 fires per 100 user households.¹
- Average U.S. Households Using a Gas Range: 43.8 million
Annual Average of 2004-2008 U.S. Home Structure Fires Involving Gas Range or Stove
Fires: 15,400
Civilian Deaths: 120
Civilian Injuries: 530
Direct Property Damage \$79 Million²
- Average U.S. Households Using Gas-Fueled Ovens or Rotisseries
Annual Average of 2004-2008 Structure Fires Reported to U.S. Fire Departments
Fires: 74,900
Civilian Deaths: 290
Civilian Injuries 3,210
Direct Property Damage: \$436 million²
- Home Gas Grill Fires, Annual Average of 2004-2008 Fires Reported to U.S. Fire Departments
Outside and Unclassified Grill Fires
Fires: 3,800
Civilian Injuries: 20
Direct Property Damage: \$1 million²

Automatic thermal gas shutoffs mitigate consequences of fires:

- Thermal gas shutoffs stop the flow of gas instantaneously when the fire temperature reaches 212°F
- When the curb valve is too close to a burning building to be safely operated, or it is non-existent or inoperable
- Thermal gas shutoffs are intended to shutoff the flow of gas when fire occurs near the gas line
- Automatic thermal gas shutoffs assist in the prevention of risk to fire personnel and first responders when gas is released and acts as an accelerant

The primary incident consequences that would be reduced are deaths, injuries, and property damage. Additional benefits would be an expected reduction in the severity of fires, explosions, and evacuation occurring at incidents, and the quantity of gas lost during incidents.

Current Usage and Experience

Thermal activated gas shutoffs are used throughout the world to protect lives and property :

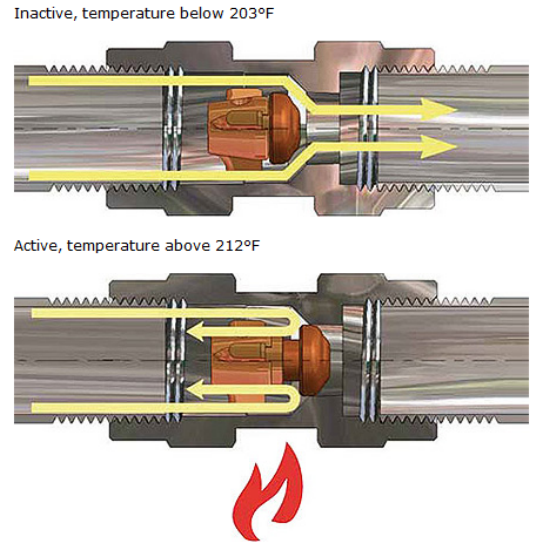
- More than 50,000,000 thermal activated gas shutoffs are installed worldwide
- Since 1996 Thermal activated gas shutoffs have been required for all gas appliances in Germany, Switzerland and Austria (DIN 3586)

Thermal Activated Gas Shutoff Features

Thermal activated gas shutoffs prevent gas from feeding fires – even when power is disconnected. A typical thermal activated gas shutoff is triggered when the ambient temperature reaches 212°F, blocking the flow of gas for at least 60 minutes at the temperature of 1,697°F.

The thermal activated gas shutoff is a self-contained device that can be combined with the required manual gas shut-off valve. The thermal activated shutoff automatically triggers, and:

- Does not require an actuator
- Does not require electrical power
- Does not require heat detectors
- Does not require fire detectors
- Shuts off natural gas, propane and butane gases
- Compliant with ICC IRC Code, Chapter 24 – Fuel Gas, Section G2420 (409) Gas Shutoff Valves - Table G2420.1.1 Manual Gas Valve Standards: ANSI Z21.15, ASME B16.44, ASME B16.33



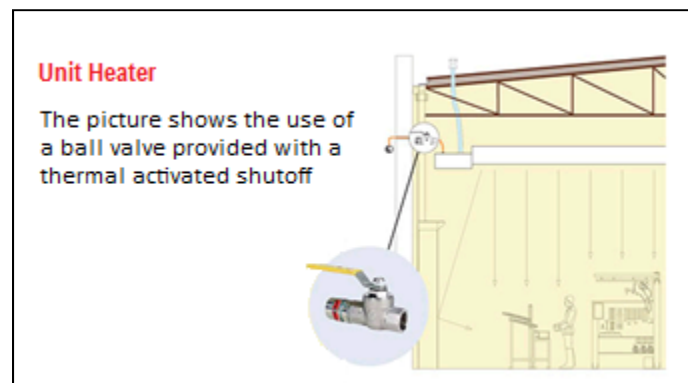
Availability and Cost Considerations

Thermal activated gas shutoffs are easily available and manufactured by several manufacturers, including Elster, Highfield and TECO.

Currently all gas appliances are required to have a manual shutoff valve. The product cost of an additional thermal activated gas shutoff is negligible when compared to building construction costs. When the thermal activated gas shut-off is installed as a combined manual gas shutoff valve, additional labor costs are eliminated.

Unit Heater Application Demonstration

Section 409.5.1 (IFGC) requires a gas shut-off valve within 6 feet of a Unit Heater appliance. Unit heaters are very common in storage and manufacturing occupancies and are typically installed at the corners of the building at the ceiling level. In Section 409.1.3 – Access to shut-off, there is no requirement for a ladder or



platform to be installed to provide access to these manual valves. Nor is a secondary “manual” gas shut-off valve required in the gas piping at the floor level in case of emergency.

There are thousands, if not hundreds of thousands of scenarios across the U.S. where Unit Heaters are installed with required “manual” shut-off valves that cannot be accessed if there is a fire event. In the event of a fire at the appliance or in the building there would be no way to get to the shut-off valve to terminate the flow of gas thus allowing the gas to release and potentiate prior to the fire department arrival.

Clearly, a passive, automatic thermal activated gas shutoff should be required to shut the gas down in the event of fire.

We have also included news coverage of recent fires where unrestricted gas contributed to the intensity of the fire, fire damage, and personal harm in the Bibliography below.

3.3.5.4 Bibliography: *The proponent shall submit a bibliography of any substantiating material submitted with the code change proposal. The bibliography shall be published with the code change and the proponent shall make the substantiating materials available for review at the appropriate ICC office and during the public hearing.*

1. Michael A. Greene and Craig Andres. 2004-2005 National Sample Survey of Unreported Residential Fires, U.S. Consumer Product Safety Commission, July 2009, pp. 127-128.
<http://www.cpsc.gov/library/foia/foia09/os/UnreportedResidentialFires.pdf>
2. NFPA Report: “Home Fires Involving Cooking Equipment,” Marty Ahrens, November 2010, 210 pages <http://www.nfpa.org/assets/files//PDF/OS.Cooking.pdf>
(Accessed 10/12/2011)
3. “Residential Building Fires (2007-2009),” U.S. Department of Homeland Security, U.S. Fire Administration, National Fire Data Center Topical Fire Report Series, Vol. 12, Issue 10, September 2011.
4. Article: “Can We Learn Something About Residential Gas Safety from Europeans?”
5. Residential Gas Safety schematic
6. *Fire Engineering; Fire Apparatus* articles: “Automatic Thermal Shut-off Devices for Natural Gas Minimize Property Damage and Protect Lives”
7. Article: “Massachusetts Automatic Thermal Shutoff Gas Codes”
8. "Gas explosion suspected in Beverly area restaurant fire," Chicago Tribune, 9/5/2011
Downloaded on 10/12/2011 from
http://articles.chicagotribune.com/2011-09-05/news/chi-gas-explosion-suspected-in-south-side-restaurant-fire-20110904_1_gas-explosion-heavy-fire-fire-officials
9. “2-Alarm Concord Fire Damages 3 Homes, 2 Gas Meters,” CBS San Francisco, 9/5/2011
Downloaded on 10/12/2011 from
<http://sanfrancisco.cbslocal.com/2011/09/05/2-alarm-concord-fire-damages-3-homes/>
10. "Massive Blaze Rips Through Homes," Doylestown-Buckingham-New Britain Patch, 9/30,2011,
Downloaded on 10/12/2011 from
<http://warminster.patch.com/articles/massive-blaze-rips-through-homes#photo-7958420>

11. Animation:

http://www.thefirebag.com/firebag_animation.php

12. Demo:

http://www.thefirebag.com/firebag_demo.php

13. Datasheet:

http://www.thefirebag.com/literature/FireBag_unbranded_datasheet.pdf

14. Certified Drawings:

http://www.thefirebag.com/literature/FireBag_Certified_Drawings.pdf

15. Cross Section of automatic thermal gas shutoff

http://www.thefirebag.com/firebag_cross_section.php

3.3.5.5 Copyright Release: *The proponent of code change proposals, floor modifications and public comments shall sign a copyright release reading: "I hereby grant and assign to ICC all rights in copyright I may have in any authorship contributions I make to ICC in connection with any proposal and public comment, in its original form submitted or revised form, including written and verbal modifications submitted in accordance Section 5.5.2. I understand that I will have no rights in any ICC publications that use such contributions in the form submitted by me or another similar form and certify that such contributions are not protected by the copyright of any other person or entity."*

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Jean Steckler



December 12, 2011

3.3.5.6 Cost Impact: *The proponent shall indicate one of the following regarding the cost impact of the code change proposal: 1) the code change proposal will increase the cost of construction; or 2) the code change proposal will not increase the cost of construction. This information will be included in the published code change proposal.*

The code change proposal will minimally increase the cost of construction. The cost of the thermal activated shutoff device and the currently required manual shutoff valve costs slightly more than the manual shutoff valve, and provides fire safety that the manual valve alone cannot do.

Gas Pipe Size	Average Cost of manual gas shutoff valve	Combined Cost of manual gas shutoff + automatic thermal activated shutoff
1/2"	\$ 6	\$ 17
3/4"	\$ 8	\$ 21