



RESEARCH

Fires in Structures Under Construction, Undergoing Major Renovation, or Being Demolished

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Abstract

U.S fire departments responded to an estimated average 3,750 fires in structures under construction each year, 2,560 fires in structures undergoing major renovation, and another 2,130 in structures being demolished. Fires in structures under construction were associated with 5 civilian deaths, 51 civilian injuries, and \$172 million in direct property damage per year, while fires in structures undergoing major renovation were associated with annual averages of 4 civilian deaths, 65 civilian injuries, and \$108 million in direct property damage, and fires in structures being demolished were associated with 4 civilian deaths 16 civilian injuries, and \$30 million in direct property damage annually

In structures *under construction*, cooking equipment was responsible for the largest share of fires (27%), followed by heating equipment and intentionally-set fires, each with 13% of the total. Heating equipment (15%), intentionally-set fires (13%), torch, burner, or soldering iron (10%) and cooking equipment (9%) were the leading causes of fires in structures *undergoing major renovation*. The leading causes of fires in structures being demolished were intentionally-set fires (42% of total and torch, burner, or soldering iron (12% of fires).

Keywords: structure fires, under construction, major renovation, being demolished, fire statistics.

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We are also grateful to the U.S. Fire Administration for its work in developing, coordinating, and maintaining NFIRS.

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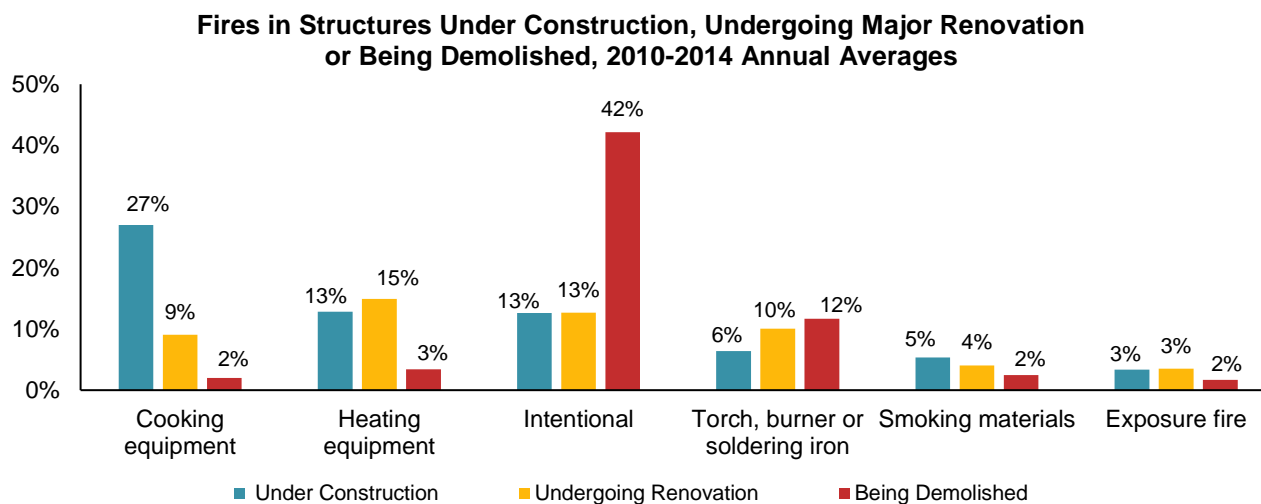
FIRES IN STRUCTURES UNDER CONSTRUCTION, UNDERGOING MAJOR RENOVATION OR BEING DEMOLISHED FACT SHEET

Between 2010 and 2014, municipal fire departments in the U.S. each year responded to an estimated average of 3,750 fires in structures under construction, 2,560 fires in structures undergoing major renovation, and 2,130 fires in structures being demolished.

Fires in Structures Under Construction, Undergoing Major Renovation, or Being Demolished 2010-2014 Annual Averages				
Structure Status	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Millions)
Under construction	3,750	5	51	\$172
Undergoing major renovation	2,560	4	65	\$108
Being demolished	2,130	4	16	\$30

These fires resulted in annual losses of:

- *Structures under construction:* 5 civilian deaths, 51 civilian injuries, and \$172 million in direct property damage.
- *Structures undergoing major renovation:* 4 civilian deaths, 65 civilian injuries, and \$108 in direct property damage.
- *Structures being demolished:* 4 civilian deaths, 16 civilian injuries, and \$30 million in direct property damage.



- Cooking equipment was the leading cause in structures under construction (27%).
- Heating equipment was the leading cause of fires in structures undergoing major renovation (15%).
- Fires in structures being demolished were most often intentionally set (42%).

Source: NFPA Research, Data & Analytics- REV

Fires in Structures under Construction, Undergoing Major Renovation, or Being Demolished

Between 2010 - 2014, U.S fire departments responded to an estimated average of 485,700 structure fires each year, resulting in estimated annual averages of 2,716 civilian deaths, 14,651 civilian injuries, and \$9.7 billion in direct property damage. Of these structure fires, 3,750 were estimated to occur in structures under construction each year, while 2,560 occurred annually in structures undergoing major renovation and another 2,130 in structures being demolished. Table A below provides summary information for the estimated number of annual structure fires and associated losses by structure status for the 2010 -2014 period.

**Table A. Structure Fires by Structure Status,
2010-2014 Annual Averages**

Structure Status	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Occupied and operating	433,180	(89.2%)	2,614	(96.3%)	14,209	(97.0%)	\$8,439	(86.9%)
Vacant and unsecured	17,290	(3.6%)	35	(1.3%)	83	(0.6%)	\$284	(2.9%)
Vacant and secured	13,470	(2.8%)	26	(0.9%)	87	(0.6%)	\$449	(4.6%)
Idle, not routinely used	6,280	(1.3%)	14	(0.5%)	51	(0.4%)	\$162	(1.7%)
Under construction	3,750	(0.8%)	5	(0.2%)	51	(0.3%)	\$172	(1.8%)
Undergoing major renovation	2,560	(0.5%)	4	(0.2%)	65	(0.4%)	\$108	(1.1%)
Being demolished	2,130	(0.4%)	4	(0.2%)	16	(0.1%)	\$30	(0.3%)
Other	7,010	(1.4%)	13	(0.5%)	89	(0.6%)	\$68	(0.7%)
Total	485,700	(100%)	2,716	(100%)	14,651	(100%)	\$9,711	(100%)

Source: NFIRS and NFPA Fire Experience Survey.

Note: Sums may not equal totals due to rounding errors.

As [Table A](#) indicates, the vast majority of structure fires (89%) occurred in structures that were classified as occupied and operating. These fires accounted for even larger shares of associated civilian deaths (96%) and injuries (97%), as well as 87% of direct property damage. Fires in structures that were under construction, undergoing major renovation, or being demolished, taken collectively, accounted for just 2% of fires, less than 1% of civilian fatalities, 1% of civilian injuries, and 3% of direct property damage.

The National Fire Incident Reporting System (NFIRS), a data collection system operated by the U.S. Fire Administration, distinguishes between “non-confined” and “confined” fires. Confined fires include confined cooking fires, confined chimney or flue fires, confined trash fires, confined fuel burner or boiler fires, confined commercial compactor fires, and confined incinerator fires. Losses are generally minimal in the confined fires which, by definition, are limited to the object of fire origin. NFIRS does not require causal data, including structure

status, to be reported for these fires, but it is present in some reports. Because non-confined and confined fires may substantially differ on a range of causal factors, they are separately analyzed in most tables. Fires are rounded to the nearest 10, deaths and injuries to the nearest one, and direct property damage to the nearest million dollars.

Table B shows the estimated annual average of fires and associated losses between 2010-2014 in structures under construction, undergoing major renovation, or being demolished, with totals shown for each category and the separate non-confined and confined fire components. The data illustrate the limited losses associated with confined fires. While 61% of fires in structures under construction were non-confined, they accounted for all of the civilian deaths, 96% of civilian injuries, and all of the direct property damage in this category. In structures undergoing renovation, 81% of fires were non-confined, with all of the civilian deaths and direct property damages and 96% of civilian injuries associated with these fires. Eighty-nine percent of the fires in structures being demolished were non-confined fires, which again accounted for all of the deaths and direct property damage, as well as 87% of civilian injuries.

Table B. Fires in Structures Under Construction, Undergoing Major Renovation, or Being Demolished, 2010-2014 Annual Averages

Structure Status	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Under construction	3,750	(100%)	5	(100%)	51	(100%)	\$172	(100%)
Non-confined	2,310	(61%)	5	(100%)	49	(96%)	\$172	(100%)
Confined	1,450	(39%)	0	(0%)	2	(4%)	\$0	(0%)
Undergoing major renovation	2,560	(100%)	4	(100%)	65	(100%)	\$108	(100%)
Non-confined	2,080	(81%)	4	(100%)	62	(96%)	\$108	(100%)
Confined	490	(19%)	0	(0%)	3	(4%)	\$0	(0%)
Being demolished	2,130	(100%)	4	(100%)	16	(100%)	\$30	(100%)
Non-confined	1,900	(89%)	4	(100%)	14	(87%)	\$30	(100%)
Confined	230	(11%)	0	(0%)	2	(13%)	\$0	(0%)

Source: NFIRS and NFPA Fire Experience Survey.

Note: Sums may not equal totals due to rounding errors.

The data in Table B also illustrate that while fires and losses in structures under construction, undergoing renovation, or being demolished represent a very small share of all structure fires, they are not insubstantial. Each year in the five-year period from 2010 through 2014, fires in structures under construction were associated with an average of 5 civilian deaths, 51 civilian injuries, and \$172 million in direct property damage each year, while fires in structures undergoing major renovation were associated with annual averages of 4 civilian deaths, 65 civilian injuries, and \$108 million in direct property damage. Fires in structures being demolished were associated with 4 civilian deaths 16 civilian injuries, and \$30 million in direct property damage annually.

Leading causes of fires

Tables C, D, and E show the leading causes of fires in structures under construction, undergoing major renovation, and being demolished. Note that the figures in the leading cause tables are based on 2010-2014 annual averages and are drawn from multiple NFIRS data fields, which means that the same fire may be listed under multiple causes.

Table C shows the leading causes of fires in structures under construction. Cooking equipment was responsible for the largest share of fires (27%), followed by heating equipment and intentionally-set fires, each with 13% of the total. The other leading causes included torch, burner, or soldering iron (6% of fires), smoking materials (5%), exposure fires (3%) and playing with heat source (2%). Fires caused by cooking equipment accounted for the greatest share of civilian injuries (20%), while intentionally-set fires caused the greatest share of direct property damage (18%). Fires caused by smoking materials accounted for the greatest share of civilian deaths, but this should be interpreted cautiously due to the instability associated with small numbers.

Data Sources, Definitions and Conventions Used in this Report

Unless otherwise specified, the statistics in this analysis are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to federal or state agencies or industrial fire brigades. The 2010-2014 estimates are projections based on the detailed information collected in Version 5.0 of the U.S. Fire Administration's National Fire Incident Reporting System (NFIRS 5.0) and the National Fire Protection Association's (NFPA's) annual fire department experience survey. Fires with unknown or unreported data were allocated proportionally in calculations of national estimates. In general, any fire that occurs in or on a structure is considered a structure fire, even if the fire was limited to contents and the building itself was not damaged.

What are “confined” and “non-confined” fires?

NFIRS 5.0 includes a category of structure fires collectively referred to as “confined fires,” identified by incident type. These include confined cooking fires, confined chimney or flue fires, confined trash fires, confined fuel burner or boiler fires, confined commercial compactor fires, and confined incinerator fires (incident type 113-118). Losses are generally minimal in these fires, which by definition, are assumed to have been limited to the object of origin. Although causal data is not required for these fires, it is sometimes present. Confined and non-confined fires were analyzed separately and then summed for most data elements.

Additional information

Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Property damage has not been adjusted for inflation. On most tables, fires are rounded to the nearest ten, civilian deaths and injuries are generally rounded to the nearest one, and direct property damage is rounded to the nearest million dollars. Additional details on the methodology may be found in Appendix A and B.

**Table C. Leading Causes of Fires in Structures Under Construction,
2010-2014 Annual Averages**

Cause	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Cooking equipment	1,010	(27%)	0	(0%)	10	(20%)	\$7	(4%)
Heating equipment	480	(13%)	0	(0%)	5	(10%)	\$24	(14%)
Intentional	470	(13%)	0	(0%)	3	(6%)	\$31	(18%)
Torch, burner or soldering iron	240	(6%)	0	(0%)	4	(8%)	\$16	(10%)
Smoking materials	200	(5%)	3	(58%)	4	(8%)	\$6	(3%)
Exposure fire	130	(3%)	0	(0%)	0	(0%)	\$5	(3%)
Playing with heat source	80	(2%)	0	(0%)	1	(2%)	\$1	(0%)

Source: NFIRS and NFPA Fire Experience Survey.

Heating equipment (15%), intentionally-set fires (13%), torch, burner, or soldering iron (10%) and cooking equipment (9%) were the leading causes of fires in structures undergoing major renovation, as shown in Table D. Another 4% of these fires were caused by smoking materials and 3% were exposure fires. Of these causes, heating equipment fires accounted for the greatest share of civilian injuries, and fires caused by a torch, burner, or soldering iron had the largest share of direct property damage (22% of the total).

**Table D. Leading Causes of Fires in Structures Undergoing Major Renovation,
2010-2014 Annual Averages**

Cause	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heating equipment	380	(15%)	2	(36%)	12	(18%)	\$11	(10%)
Intentional	320	(13%)	1	(23%)	4	(6%)	\$11	(10%)
Torch, burner or soldering iron	260	(10%)	0	(0%)	7	(10%)	\$24	(22%)
Cooking equipment	230	(9%)	1	(32%)	3	(4%)	\$4	(3%)
Smoking materials	100	(4%)	2	(39%)	8	(12%)	\$2	(2%)
Exposure fire	90	(3%)	0	(0%)	1	(1%)	\$2	(2%)

Source: NFIRS and NFPA Fire Experience Survey.

The leading causes of fires in structures being demolished are shown in Table E.

Intentionally-set fires were by far the leading cause of fires in these structures, accounting for almost two of every five of the fires (42%). However, these fires accounted for a lower share of

civilian injuries (28%) and direct property damage (15%). Other leading causes included torch, burner, or soldering iron (12% of fires), heating equipment (3%), cooking equipment (2%), and smoking materials (2%), and exposure fires (2%). The numbers for civilian deaths, civilian injuries, and direct property damage are comparatively small and should be viewed cautiously, but they indicate that heating equipment and cooking equipment fires accounted for disproportionately higher shares of civilian injuries and direct property damage.

**Table E. Leading Causes of Fires in Structures Being Demolished,
2010-2014 Annual Averages**

Cause	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Intentional	900	(42%)	0	(0%)	4	(28%)	\$5	(15%)
Torch, burner or soldering iron	250	(12%)	0	(0%)	0	(0%)	\$9	(29%)
Heating equipment	70	(3%)	0	(0%)	4	(28%)	\$2	(8%)
Cooking equipment	40	(2%)	0	(0%)	4	(23%)	\$2	(7%)
Smoking materials	50	(2%)	2	(46%)	1	(4%)	\$1	(2%)
Exposure fire	40	(2%)	0	(0%)	0	(0%)	\$1	(3%)

Source: NFIRS and NFPA Fire Experience Survey.

Fires in Structures Under Construction, By Cause of Ignition, Equipment Involved in Ignition and Heat Source

Tables 1-4 provide data for fires in structures under construction by equipment involved in ignition, cause of ignition, factor contributing to ignition, and heat source, which are the data fields from which the leading cause data are drawn.

Table 1 provides a more detailed breakdown on the specific types of cooking equipment and heating equipment identified as among the leading causes of fires in structures under construction. Cooking equipment was involved in 27% of these fires. Specific types of cooking equipment included ranges (13%), microwave ovens (3%), ovens and rotisseries (3%), and portable cooking or warming equipment (2%). Fires involving heating equipment (13% of fires) most often involved fixed or portable space heaters (5%) or were confined chimney or flue fires (5%). Other leading types of equipment involved in fires in structures under construction included electrical distribution and lighting equipment (13% of total), confined commercial compactors (10%), torches, burners, or soldering irons (6%), confined incinerators (2%) and fans (2%).

Table 2 shows that the vast majority of fires in structures under construction had an unintentional cause (70%), and that these fires accounted for all of the civilian deaths, 85% of civilian injuries, and 71% of direct property damage. In addition to the intentional fires already noted, other causes of ignition included failure of equipment or heat source (10% of fires), unspecified cause (5%), and act of nature (2%).

Factor Contributing to Ignition. As shown in Table 3, leading factors contributing to the ignition of fires in structures under construction included heat source too close to combustibles (14%), electrical failure or malfunction (12%), abandoned or discarded materials or products (11%), unattended equipment (8%), unclassified use of material or product (8%), an unclassified factor (7%), cutting or welding too close to combustibles (6%), failure to clean (6%) and mechanical failure or malfunction (5%).

The leading heat sources for fires in structures under construction included radiated or conducted heat from operating equipment (14%), unclassified heat from powered equipment (12%), and spark ember or flame from operating equipment (11%). Other heat sources included arcing (9%), unclassified heat source (8%), unclassified hot or smoldering object (7%), hot ember or ash (7%), spontaneous combustion or chemical reaction (5%), flame or torch used for lighting (3%), heat from direct flame or convection current (2%), match (2%), lighter (2%), and molten or hot material (2%). See Table 4 for details.

Approximately one-half (51%) of fires in structures under construction were confined to the object of origin, as shown in Table F, while another one-fifth (19%) of fires were confined to the room of origin. Three in 10 of the fires (31%) extended beyond the room of origin: 6% of these were confined to the floor of origin, 21% to the building or origin, and 4% extended beyond the building of origin.

**Table F. Fires in Structures Under Construction, by Extent of Flame Spread,
2010-2014 Annual Averages**

Extent of Flame Spread	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Confined fire identified by incident type	1,450	(39%)	0	(0%)	2	(4%)	\$0	(0%)
Confined to object of origin	440	(12%)	0	(0%)	7	(14%)	\$3	(2%)
Confined to room of origin	710	(19%)	1	(20%)	18	(36%)	\$11	(7%)
Confined to floor of origin	210	(6%)	0	(0%)	6	(11%)	\$8	(4%)
Confined to building of origin	790	(21%)	3	(72%)	15	(29%)	\$86	(50%)
Extended beyond building of origin	160	(4%)	0	(8%)	3	(5%)	\$65	(38%)
Total	3,750	(100%)	5	(100%)	51	(100%)	\$172	(100%)

Note: Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA Fire Experience Survey.

Fires in Structures Undergoing Major Renovation By Cause of Ignition, Equipment Involved in Ignition and Heat Source

Tables 5-8 provide data for fires in structures undergoing major renovation, by equipment involved in ignition, cause of ignition, factor contributing to ignition, and heat source.

Table 5 shows that electrical distribution and lighting equipment was involved in 20% of the fires in structures undergoing major renovation, including 14% involving wiring and related equipment and 4% involving lamp, bulb, or lighting equipment. Heating equipment involved in 15% of fires, was already identified as a leading cause. Of these fires, a fixed or portable space heater was involved in 4% of fires, 3% of fires were confined chimney or flue fires, and 2% were confined fuel burner or boiler fires. Other heating equipment included water heaters (2%) and fireplaces or chimneys (2%). Torches, burners, or soldering irons were involved in 10% of fires. Cooking equipment was involved in 9% of fires, including 6% involving ranges. Eight percent of fires were contained trash or rubbish fires and 2% involved fans. It is worth noting that the 10% of fires involving torches, burners, or soldering irons caused 22% of direct property damage.

Seven of ten fires (69%) in structures undergoing major renovation had an unintentional cause, and these fires accounted for even higher shares of civilian injuries (77%), and direct property damage (75%). See Table 6. Fires caused by a failure of equipment or heat source or having an intentional cause each accounted for 13% of fires. Unclassified causes were responsible for 4% of fires and acts of nature for 2% of fires.

An electrical failure or malfunction (18%) and heat sources too close to combustibles (17%) were the leading factors contributing to the ignition of fires in structures undergoing major renovation. See Table 7. Other leading factors included cutting or welding too close to combustibles (10%), abandoned or discarded materials or products (9%), unclassified factors (7%), unclassified misuse of material (7%), and mechanical failure or malfunction (6%). Exposure fires, rekindled fires, improper containers or storage, and unattended equipment each accounted for 3% of fires. Failure to clean, construction deficiency, and outside or open fire for debris or waste disposal account each accounted for 2% of fires. The 10% of fires involving cutting or welding too close to combustibles accounted for 18% of direct property damage.

Heat sources most frequently involved in the fires in structures undergoing major renovation included arcing (14% of fires) and a spark, ember or flame from operating equipment (12%). Other heat sources included radiated or conducted heat from operating equipment (10%), an unclassified hot or smoldering object (9%), unclassified heat from powered equipment (8%), hot embers or ashes (6%), spontaneous combustion or chemical reactions (6%), unclassified heat sources (5%), flame or torch used for lighting (4%), smoking materials (4%), matches (4%), heat from direct flame or convection currents (3%), molten or hot material (3%), lighters (2%), and radiated heat from another fire (2%). The 12% of fires in which spark, ember, or flame from operating equipment was the heat source accounted for 23% of civilian injuries, as well as 17% of direct property damage. See Table 8 for details.

Extent of Flame Spread. Table G. shows that 30% of fires in structures undergoing major renovation were confined to the object of origin, while one-fifth (21%) were confined to the room of origin and 9% to the floor of origin. Just over one-third (35%) of fires extended beyond the origin but were confined to the building of origin and 5% extended beyond the building of origin.

Table G. Fires in Structures Undergoing Major Renovation, by Extent of Flame Spread, 2010-2014 Annual Averages

Extent of Flame Spread	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Confined fire identified by incident type	490	(19%)	0	(0%)	3	(4%)	\$0	(0%)
Confined to object of origin	290	(11%)	0	(0%)	5	(7%)	\$3	(3%)
Confined to room of origin	540	(21%)	1	(17%)	20	(31%)	\$7	(6%)
Confined to floor of origin	230	(9%)	0	(0%)	11	(17%)	\$11	(10%)
Confined to building of origin	890	(35%)	3	(67%)	23	(35%)	\$69	(64%)
Extended beyond building of origin	120	(5%)	1	(16%)	3	(5%)	\$18	(17%)
Total	2,560	(100%)	4	(100%)	65	(100%)	\$108	(100%)

Note: Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA Fire Experience Survey.

Fires in Structures Being Demolished By Cause of Ignition, Equipment Involved in Ignition and Heat Source

Tables 9-12 provide data for fires in structures being demolished, by equipment involved in ignition, cause of ignition, factor contributing to ignition, and heat source.

No equipment was involved in two-thirds of fires in structures being demolished (60%), as shown in Table 9. A torch, burner, or soldering iron was involved in 12% of fires, while 11% of the fires were confined commercial compactor fires and 10% were confined incinerator overload or malfunction fires. Electrical distribution or lighting equipment was involved in another 4% of fires (3% of which involved wiring or related equipment), and heating equipment was involved in 3% of fires (2% of which involved fixed or portable space heaters). As indicated earlier in the leading cause discussion, 2% of these fires involved cooking equipment.

One-half of fires in structures being demolished had an unintentional cause, with 42% having an intentional cause, as previously noted. Failure of equipment or heat source caused 3% of fires, acts of nature caused 2%, and another 2% of the fires had an unclassified cause. Details are available in Table 10.

Leading factors contributing to the ignition of fires in structures being demolished included rekindling (17%), outside or open fires for debris or waste disposal (14%), cutting or welding too close to combustibles (12%), and abandoned or discarded materials or products (12%). Heat sources too close to combustibles contributed to 8% of fires, electrical failure or malfunctions to 5%, unclassified misuse of material or product to 4%, and high wind to 4%. Other factors included spilled flammable liquid or gas (2%), exposure fires (2%), and mechanical failure or malfunction (2%). The 12% of fires in which cutting or welding too close to combustibles was a factor accounted for 22% of direct property damage, while 13% of direct property damage was associated with the 5% of fires involving electrical failure or malfunction. One-third (33%) of civilian injuries were associated with the 8% of fires in which heat sources too close to combustibles were a factor. See Table 11.

The leading known heat sources for fires in structures being demolished included hot embers or ashes (17%), unclassified heat sources (9%), matches (9%), hot or smoldering objects (9%), sparks, embers, or flames from operating equipment (8%), flames or torches used for lighting (8%), and lighters (8%). Other sources included flying brands, embers, or sparks (5%), unclassified heat spread from another fire (4%), heat from direct flame or convection currents (4%), smoking materials (2%), arcing (2%), multiple heat sources (2%), molten or hot material (2%), unclassified heat from powered equipment (2%), radiated or conducted heat from powered equipment (2%), and heat or spark from friction (2%). See Table 12.

Extent of Flame Spread. Table H shows that one-quarter (24%) of fires in structures being demolished were confined to the object of origin, while 5% were confined to the building of origin and 3% to the floor of origin. Over one-half (53%) of the fires extended beyond the floor of origin, but were confined to the building of origin, and 15% extended beyond the building of origin.

**Table H. Fires in Structures Being Demolished, by Extent of Flame Spread,
2010-2014 Annual Averages**

Extent of Flame Spread	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Confined fire identified by incident type	230	(11%)	0	(0%)	2	(13%)	\$0	(0%)
Confined to object of origin	280	(13%)	0	(0%)	2	(13%)	\$2	(6%)
Confined to room of origin	110	(5%)	0	(8%)	0	(2%)	\$0	(1%)
Confined to floor of origin	60	(3%)	0	(0%)	0	(0%)	\$0	(1%)
Confined to building of origin	1,140	(53%)	2	(41%)	7	(42%)	\$19	(64%)
Extended beyond building of origin	310	(15%)	2	(51%)	5	(30%)	\$8	(28%)
Total	2,130	(100%)	4	(100%)	16	(100%)	\$30	(100%)

Note: Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 1. Fires in Structures Under Construction, by Equipment Involved in Ignition,
2010-2014 Annual Averages**

Equipment Involved	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Cooking equipment	1,010	(27%)	0	(0%)	10	(20%)	\$7	(4%)
Range with or without oven or cooking surface	500	(13%)	0	(0%)	8	(16%)	\$5	(3%)
<i>Non-confined</i>	140	(4%)	0	(0%)	8	(16%)	\$5	(3%)
<i>Confined</i>	360	(10%)	0	(0%)	0	(0%)	\$0	(0%)
Microwave oven	120	(3%)	0	(0%)	1	(2%)	\$1	(0%)
<i>Non-confined</i>	10	(0%)	0	(0%)	1	(2%)	\$1	(0%)
<i>Confined</i>	110	(3%)	0	(0%)	0	(0%)	\$0	(0%)
Oven, rotisserie	100	(3%)	0	(0%)	0	(0%)	\$0	(0%)
<i>Non-confined</i>	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
<i>Confined</i>	90	(3%)	0	(0%)	0	(0%)	\$0	(0%)
Portable cooking or warming equipment	60	(2%)	0	(0%)	0	(0%)	\$0	(0%)
<i>Non-confined</i>	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
<i>Confined</i>	50	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Other known cooking equipment	220	(6%)	0	(0%)	1	(2%)	\$1	(0%)
<i>Non-confined</i>	30	(1%)	0	(0%)	1	(2%)	\$1	(0%)
<i>Confined</i>	190	(5%)	0	(0%)	0	(0%)	\$0	(0%)
No equipment involved in ignition	680	(18%)	1	(19%)	7	(13%)	\$51	(30%)
Heating equipment	480	(13%)	0	(0%)	5	(10%)	\$24	(14%)
Fixed or portable space heater	170	(5%)	0	(0%)	3	(7%)	\$12	(7%)
Confined chimney or flue fire	170	(5%)	0	(0%)	0	(0%)	\$0	(0%)
Fireplace or chimney	50	(1%)	0	(0%)	0	(0%)	\$7	(4%)
Water heater	30	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Central heat	30	(1%)	0	(0%)	0	(0%)	\$2	(1%)
Other known heating equipment	20	(1%)	0	(0%)	2	(3%)	\$2	(1%)
Electrical distribution and lighting equipment	470	(13%)	1	(16%)	4	(8%)	\$28	(16%)
Wiring and related equipment	320	(9%)	0	(0%)	1	(2%)	\$18	(10%)
Lamp, bulb or lighting	80	(2%)	0	(0%)	1	(2%)	\$7	(4%)
Transformers and power supplies	30	(1%)	1	(16%)	1	(3%)	\$2	(1%)
Cord or plug	30	(1%)	0	(0%)	1	(2%)	\$1	(1%)
Confined commercial compactor fire	370	(10%)	0	(0%)	2	(4%)	\$0	(0%)
Torch, burner or soldering iron	240	(6%)	0	(0%)	2	(4%)	\$16	(10%)
Confined incinerator overload or malfunction fire	90	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Fan	60	(2%)	0	(0%)	2	(3%)	\$6	(4%)

**Table 1. Fires in Structures Under Construction, by Equipment Involved in Ignition,
2010-2014 Annual Averages (Continued)**

Equipment Involved	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified equipment involved in ignition	60	(1%)	3	(65%)	2	(4%)	\$21	(12%)
Clothes dryer	50	(1%)	0	(0%)	3	(5%)	\$2	(1%)
Air conditioner	20	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Power cutting tool	20	(1%)	0	(0%)	3	(5%)	\$1	(0%)
Power sander, grinder, buffer, or polisher	20	(1%)	0	(0%)	0	(0%)	\$1	(0%)
Power saw	20	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Other known equipment involved in ignition	160	(4%)	0	(0%)	11	(23%)	\$14	(8%)
Total	3,750	(100%)	5	(100%)	51	(100%)	\$172	(100%)

Source: NFIRS and NFPA Fire Experience Survey.

Note: Non-confined fires in which the equipment involved in ignition was unknown or not reported have been allocated proportionally among fires with known equipment involved. The same approach was used with confined cooking fires. Fires in which the equipment involved in ignition was entered as none but the heat source indicated equipment involvement or the heat source was unknown were also treated as unknown and allocated proportionally among fires with known equipment involved. Non-confined fires in which the equipment was partially unclassified (i.e., unclassified kitchen or cooking equipment, unclassified heating, cooling or air condition equipment, etc.) were allocated proportionally among fires in that grouping (kitchen or cooking equipment; heating, cooling or air conditioning equipment, etc.). The same approach was used with confined cooking fires. The estimates of fires involving fireplace or chimney include all fires with the confined chimney or flue incident type regardless of what may have been coded as equipment involved. Likewise, the estimates of fires involving furnaces, central heat or boilers include all fires with confined fuel burner or boiler incident type. The estimates shown should be considered upper bounds. Non-cooking confined fires were not analyzed separately. Estimates of other types of equipment exclude confined fires. Sums may not equal totals due to rounding errors.

**Table 2. Fires in Structures Under Construction, by Cause of Ignition,
2010-2014 Annual Averages**

Cause of Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unintentional	2,640	(70%)	5	(100%)	43	(85%)	\$122	(71%)
Non-confined	1,560	(41%)	5	(100%)	41	(81%)	\$122	(71%)
Confined	1,080	(29%)	0	(0%)	2	(4%)	\$0	(0%)
Intentional	470	(13%)	0	(0%)	3	(6%)	\$31	(18%)
Non-confined	290	(8%)	0	(0%)	3	(6%)	\$31	(18%)
Confined	190	(5%)	0	(0%)	0	(0%)	\$0	(0%)
Failure of equipment or heat source	390	(10%)	0	(0%)	4	(8%)	\$12	(7%)
Non-confined	300	(8%)	0	(0%)	4	(8%)	\$11	(7%)
Confined	100	(3%)	0	(0%)	0	(0%)	\$0	(0%)
Unspecified cause	190	(5%)	0	(0%)	0	(0%)	\$4	(2%)
Non-confined	110	(3%)	0	(0%)	0	(0%)	\$4	(2%)
Confined	80	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Act of nature	60	(2%)	0	(0%)	0	(0%)	\$4	(2%)
Non-confined	50	(1%)	0	(0%)	0	(0%)	\$4	(2%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Total	3,750	(100%)	5	(100%)	51	(100%)	\$172	(100%)
Non-confined	2,310	(61%)	5	(100%)	49	(96%)	\$172	(100%)
Confined	1,450	(39%)	0	(0%)	2	(4%)	\$0	(0%)

Note: Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 3. Fires in Structures Under Construction, by Factor Contributing to Ignition,
2010-2014 Annual Averages**

Factor Contributing to Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat source too close to combustibles	510	(14%)	0	(0%)	10	(20%)	\$33	(19%)
Non-confined	370	(10%)	0	(0%)	10	(20%)	\$33	(19%)
Confined	150	(4%)	0	(0%)	0	(0%)	\$0	(0%)
Electrical failure or malfunction	450	(12%)	0	(0%)	5	(9%)	\$21	(12%)
Non-confined	410	(11%)	0	(0%)	5	(9%)	\$21	(12%)
Confined	40	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Abandoned or discarded material or product	410	(11%)	1	(33%)	6	(12%)	\$10	(6%)
Non-confined	210	(5%)	1	(33%)	6	(12%)	\$10	(6%)
Confined	200	(5%)	0	(0%)	0	(0%)	\$0	(0%)
Equipment unattended	300	(8%)	0	(0%)	2	(4%)	\$3	(2%)
Non-confined	70	(2%)	0	(0%)	2	(4%)	\$3	(2%)
Confined	240	(6%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified misuse of material or product	300	(8%)	1	(19%)	2	(4%)	\$11	(6%)
Non-confined	170	(5%)	1	(19%)	2	(4%)	\$11	(6%)
Confined	130	(3%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified factor contributed to ignition	260	(7%)	0	(0%)	5	(9%)	\$15	(8%)
Non-confined	150	(4%)	0	(0%)	5	(9%)	\$15	(8%)
Confined	100	(3%)	0	(0%)	0	(0%)	\$0	(0%)
Cutting or welding too close to combustibles	240	(6%)	0	(9%)	4	(9%)	\$29	(17%)
Non-confined	200	(5%)	0	(9%)	2	(5%)	\$29	(17%)
Confined	40	(1%)	0	(0%)	2	(4%)	\$0	(0%)
Failure to clean	230	(6%)	0	(0%)	0	(0%)	\$1	(1%)
Non-confined	30	(1%)	0	(0%)	0	(0%)	\$1	(1%)
Confined	190	(5%)	0	(0%)	0	(0%)	\$0	(0%)
Mechanical failure or malfunction	200	(5%)	1	(32%)	3	(7%)	\$13	(8%)
Non-confined	140	(4%)	1	(32%)	3	(7%)	\$13	(8%)
Confined	60	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Exposure fire	130	(3%)	0	(0%)	0	(0%)	\$5	(3%)
Non-confined	130	(3%)	0	(0%)	0	(0%)	\$5	(3%)
Confined	0	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Accidentally turned on or not turned off	100	(3%)	0	(0%)	2	(4%)	\$8	(5%)
Non-confined	20	(1%)	0	(0%)	2	(4%)	\$8	(5%)
Confined	80	(2%)	0	(0%)	0	(0%)	\$0	(0%)

**Table 3. Fires in Structures Under Construction, by Factor Contributing to Ignition,
2010-2014 Annual Averages (Continued)**

Factor Contributing to Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Playing with heat source	80	(2%)	0	(0%)	1	(2%)	\$1	(0%)
Non-confined	40	(1%)	0	(0%)	1	(2%)	\$1	(0%)
Confined	50	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Improper container or storage	70	(2%)	0	(0%)	1	(1%)	\$3	(2%)
Non-confined	60	(2%)	0	(0%)	1	(1%)	\$3	(2%)
Confined	20	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Other known factor contributing to ignition	560	(15%)	0	(8%)	10	(20%)	\$22	(13%)
Non-confined	390	(10%)	0	(8%)	10	(20%)	\$22	(13%)
Confined	170	(4%)	0	(0%)	0	(0%)	\$0	(0%)
Total fires	3,750	(100%)	5	(100%)	51	100%	\$172	100%
Non-confined	2,310	(61%)	5	(100%)	49	96%	\$172	100%
Confined	1,450	(39%)	0	(0%)	2	4%	\$0	0%
Total factors	3,830	(102%)	5	(100%)	51	(101%)	\$175	(101%)
Non-confined	2,370	(63%)	5	(100%)	49	(97%)	\$174	(101%)
Confined	1,460	(39%)	0	(0%)	2	(4%)	\$0.4	(0%)

Note: Sums may not equal totals due to rounding errors. Multiple entries are allowed, which can result in sums higher than totals. Fires in which the factor contributing was coded as "none," "unknown," or was not reported have been allocated proportionally among fires with known contributing factors.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 4. Fires in Structures Under Construction, by Heat Source,
2010-2014 Annual Averages**

Heat Source	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Radiated or conducted heat from operating equipment	540	(14%)	0	(0%)	6	(11%)	\$9	(5%)
Non-confined	220	(6%)	0	(0%)	6	(11%)	\$9	(5%)
Confined	320	(9%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified heat from powered equipment	450	(12%)	0	(0%)	5	(10%)	\$18	(10%)
Non-confined	220	(6%)	0	(0%)	5	(10%)	\$18	(10%)
Confined	230	(6%)	0	(0%)	0	(0%)	\$0	(0%)
Spark, ember or flame from operating equipment	410	(11%)	0	(34%)	7	(14%)	\$13	(7%)
Non-confined	220	(6%)	0	(34%)	5	(10%)	\$13	(7%)
Confined	190	(5%)	0	(0%)	2	(4%)	\$0	(0%)
Arcing	340	(9%)	0	(0%)	8	(16%)	\$12	(7%)
Non-confined	310	(8%)	0	(0%)	8	(16%)	\$12	(7%)
Confined	30	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified heat source	290	(8%)	0	(0%)	1	(2%)	\$7	(4%)
Non-confined	150	(4%)	0	(0%)	1	(2%)	\$7	(4%)
Confined	130	(4%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified hot or smoldering object	270	(7%)	0	(0%)	2	(3%)	\$49	(29%)
Non-confined	190	(5%)	0	(0%)	2	(3%)	\$49	(29%)
Confined	80	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Hot ember or ash	250	(7%)	0	(0%)	2	(3%)	\$4	(3%)
Non-confined	120	(3%)	0	(0%)	2	(3%)	\$4	(3%)
Confined	130	(3%)	0	(0%)	0	(0%)	\$0	(0%)
Smoking materials	200	(5%)	3	(58%)	4	(8%)	\$6	(3%)
Non-confined	100	(3%)	3	(58%)	4	(8%)	\$6	(3%)
Confined	100	(3%)	0	(0%)	0	(0%)	\$0	(0%)
Spontaneous combustion or chemical reaction	190	(5%)	0	(0%)	1	(1%)	\$8	(5%)
Non-confined	100	(3%)	0	(0%)	1	(1%)	\$8	(5%)
Confined	90	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Flame or torch used for lighting	120	(3%)	0	(0%)	3	(6%)	\$4	(2%)
Non-confined	110	(3%)	0	(0%)	3	(6%)	\$4	(2%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)

**Table 4. Fires in Structures Under Construction, by Heat Source,
2010-2014 Annual Averages (Continued)**

Heat Source	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat from direct flame or convection currents	80	(2%)	0	(0%)	3	(6%)	\$4	(2%)
Non-confined	80	(2%)	0	(0%)	3	(6%)	\$4	(2%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Match	80	(2%)	0	(0%)	1	(3%)	\$1	(1%)
Non-confined	30	(1%)	0	(0%)	1	(3%)	\$1	(1%)
Confined	50	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Lighter	80	(2%)	0	(0%)	3	(7%)	\$3	(2%)
Non-confined	80	(2%)	0	(0%)	3	(7%)	\$3	(2%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Molten or hot material	80	(2%)	0	(0%)	2	(3%)	\$17	(10%)
Non-confined	70	(2%)	0	(0%)	2	(3%)	\$17	(10%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Other known heat source	370	(10%)	0	(8%)	0	(6%)	\$16	(9%)
Non-confined	300	(8%)	0	(8%)	0	(6%)	\$16	(9%)
Confined	70	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Total	3,750	(100%)	5	(100%)	51	(100%)	\$172	(100%)
Non-confined	2,310	(61%)	5	(100%)	49	(96%)	\$172	(100%)
Confined	1,450	(39%)	0	(0%)	2	(4%)	\$0	(0%)

Note: Sums may not equal totals due to rounding errors. The calculations for matches, lighters, smoking materials, and candles include a proportional share of fires in which the heat source was heat from an unclassified open flame or smoking material.

Source: NFIRS and NFPA Fire Experience Survey

**Table 5. Fires in Structures Undergoing Major Renovation, by Equipment Involved in Ignition,
2010-2014 Annual Averages**

Equipment Involved	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
No equipment involved in ignition	610	(24%)	1	(32%)	16	(25%)	\$38	(35%)
Electrical distribution and lighting equipment	510	(20%)	0	(0%)	12	(18%)	\$20	(18%)
Wiring and related equipment	350	(14%)	0	(0%)	3	(5%)	\$14	(12%)
Lamp, bulb or lighting	110	(4%)	0	(0%)	6	(10%)	\$4	(4%)
Cord or plug	30	(1%)	0	(0%)	1	(1%)	\$1	(1%)
Transformers and power supplies	20	(1%)	0	(0%)	1	(2%)	\$1	(1%)
Heating equipment	380	(15%)	2	(36%)	12	(18%)	\$11	(10%)
Fixed or portable space heater	110	(4%)	2	(36%)	6	(10%)	\$5	(5%)
Confined chimney or flue fire	80	(3%)	0	(0%)	0	(0%)	\$0	(0%)
Confined fuel burner or boiler fire	60	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Water heater	50	(2%)	0	(0%)	4	(6%)	\$2	(2%)
Fireplace or chimney	40	(2%)	0	(0%)	0	(0%)	\$3	(3%)
Central heat	30	(1%)	0	(0%)	2	(3%)	\$1	(1%)
Other known heating equipment	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Torch, burner or soldering iron	260	(10%)	0	(0%)	7	(10%)	\$24	(22%)
Cooking equipment	230	(9%)	1	(32%)	3	(4%)	\$4	(3%)
Range with or without oven or cooking surface	140	(6%)	0	(0%)	1	(2%)	\$1	(1%)
<i>Non-confined</i>	70	(3%)	0	(0%)	1	(2%)	\$1	(1%)
<i>Confined</i>	70	(3%)	0	(0%)	0	(0%)	\$0	(0%)
Other known cooking equipment	80	(3%)	1	(25%)	1	(2%)	\$2	(2%)
<i>Non-confined</i>	30	(1%)	1	(25%)	1	(2%)	\$2	(2%)
<i>Confined</i>	60	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Contained trash or rubbish fire	200	(8%)	0	(0%)	3	(4%)	\$0	(0%)
Unclassified equipment involved in ignition	50	(2%)	0	(0%)	1	(1%)	\$1	(1%)
Fan	40	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Power sander, grinder, buffer, or polisher	30	(1%)	0	(0%)	0	(0%)	\$1	(1%)
Clothes dryer	20	(1%)	0	(0%)	1	(2%)	\$0	(0%)
Power saw	20	(1%)	0	(0%)	1	(1%)	\$1	(1%)
Air conditioner	20	(1%)	0	(0%)	1	(1%)	\$1	(1%)
Power cutting tool	20	(1%)	0	(0%)	0	(0%)	\$1	(1%)
Heat treating equipment	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified portable appliance designed to produce heat	10	(1%)	0	(0%)	0	(0%)	\$2	(2%)

**Table 5. Fires in Structures Undergoing Major Renovation, by Equipment Involved in Ignition,
2010-2014 Annual Averages (Continued)**

Equipment Involved	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Other known equipment involved in ignition	130	(5%)	0	(0%)	8	(12%)	\$6	(5%)
Total	2,560	(100%)	4	(100%)	65	(98%)	\$108	(100%)

Note: Non-confined fires in which the equipment involved in ignition was unknown or not reported have been allocated proportionally among fires with known equipment involved. The same approach was used with confined cooking equipment fires. Fires in which the equipment involved in ignition was entered as none but the heat source indicated equipment involvement or the heat source was unknown were also treated as unknown and allocated proportionally among fires with known equipment involved. Non-confined fires in which the equipment was partially unclassified (i.e., unclassified kitchen or cooking equipment, unclassified heating, cooling or air condition equipment, etc.) were allocated proportionally among fires in that grouping (kitchen or cooking equipment; heating, cooling or air conditioning equipment, etc.). The same approach was used with confined cooking fires. The estimates of fires involving fireplace or chimney include all fires with the confined chimney or flue incident type regardless of what may have been coded as equipment involved. Likewise, the estimates of fires involving furnaces, central heat or boilers include all fires with confined fuel burner or boiler incident type. The estimates shown should be considered upper bounds. Non-cooking confined fires were not analyzed separately. Estimates of other types of equipment exclude confined fires. Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA Fire Experience Survey

**Table 6. Fires in Structures Undergoing Major Renovation, by Cause of Ignition,
2010-2014 Annual Averages**

Cause of Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unintentional	1,760	(69%)	3	(77%)	50	(77%)	\$81	(75%)
Non-confined	1,420	(55%)	3	(77%)	50	(77%)	\$81	(74%)
Confined	340	(13%)	0	(0%)	0	(0%)	\$0	(0%)
Failure of equipment or heat source	340	(13%)	0	(0%)	10	(15%)	\$13	(12%)
Non-confined	300	(12%)	0	(0%)	10	(15%)	\$13	(12%)
Confined	40	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Intentional	320	(13%)	1	(23%)	4	(6%)	\$11	(10%)
Non-confined	240	(10%)	1	(23%)	1	(2%)	\$11	(10%)
Confined	80	(3%)	0	(0%)	3	(4%)	\$0	(0%)
Unclassified cause	90	(4%)	0	(0%)	1	(1%)	\$2	(2%)
Non-confined	80	(3%)	0	(0%)	1	(1%)	\$2	(2%)
Confined	20	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Act of nature	40	(2%)	0	(0%)	1	(1%)	\$1	(1%)
Non-confined	30	(1%)	0	(0%)	1	(1%)	\$1	(1%)
Confined	0	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Total	2,560	(100%)	4	(100%)	65	(100%)	\$108	(100%)
Non-confined	2,080	(81%)	4	(100%)	62	(96%)	\$108	(100%)
Confined	490	(19%)	0	(0%)	3	(4%)	\$0	(0%)

Note: Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA Fire Experience Survey

**Table 7. Fires in Structures Undergoing Major Renovation, by Factor Contributing to Ignition,
2010-2014 Annual Averages**

Factor Contributing to Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Electrical failure or malfunction	460	(18%)	0	(0%)	7	(11%)	\$21	(20%)
Non-confined	460	(18%)	0	(0%)	7	(11%)	\$21	(20%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Heat source too close to combustibles	450	(17%)	0	(0%)	17	(25%)	\$23	(21%)
Non-confined	360	(14%)	0	(0%)	17	(25%)	\$23	(21%)
Confined	90	(3%)	0	(0%)	0	(0%)	\$0	(0%)
Cutting or welding too close to combustibles	270	(10%)	0	(0%)	3	(5%)	\$20	(18%)
Non-confined	230	(9%)	0	(0%)	3	(5%)	\$20	(18%)
Confined	40	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Abandoned or discarded material or product	240	(9%)	2	(49%)	6	(9%)	\$8	(7%)
Non-confined	170	(7%)	2	(49%)	6	(9%)	\$8	(7%)
Confined	60	(3%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified factor contributed to ignition	170	(7%)	0	(0%)	6	(10%)	\$7	(6%)
Non-confined	150	(6%)	0	(0%)	6	(10%)	\$7	(6%)
Confined	20	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified misuse of material or product	170	(7%)	0	(0%)	8	(13%)	\$6	(5%)
Non-confined	120	(5%)	0	(0%)	6	(9%)	\$6	(5%)
Confined	50	(2%)	0	(0%)	3	(4%)	\$0	(0%)
Mechanical failure or malfunction	150	(6%)	0	(0%)	7	(11%)	\$4	(4%)
Non-confined	100	(4%)	0	(0%)	7	(11%)	\$4	(4%)
Confined	50	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Exposure fire	90	(3%)	0	(0%)	1	(1%)	\$2	(2%)
Non-confined	80	(3%)	0	(0%)	1	(1%)	\$2	(2%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Rekindle	80	(3%)	0	(0%)	0	(0%)	\$1	(1%)
Non-confined	70	(3%)	0	(0%)	0	(0%)	\$1	(1%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Improper container or storage	80	(3%)	0	(0%)	1	(2%)	\$3	(3%)
Non-confined	50	(2%)	0	(0%)	1	(2%)	\$3	(3%)
Confined	30	(1%)	0	(0%)	0	(0%)	\$0	(0%)

**Table 7. Fires in Structures Undergoing Major Renovation, by Factor Contributing to Ignition,
2010-2014 Annual Averages (Continued)**

Factor Contributing to Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Equipment unattended	70	(3%)	0	(0%)	2	(3%)	\$1	(1%)
Non-confined	40	(2%)	0	(0%)	2	(3%)	\$1	(1%)
Confined	30	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Failure to clean	50	(2%)	0	(0%)	0	(0%)	\$3	(3%)
Non-confined	20	(1%)	0	(0%)	0	(0%)	\$3	(3%)
Confined	30	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Construction deficiency	40	(2%)	0	(0%)	2	(3%)	\$1	(1%)
Non-confined	30	(1%)	0	(0%)	2	(3%)	\$1	(1%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Outside/open fire for debris or waste disposal	40	(2%)	0	(0%)	1	(2%)	\$0	(0%)
Non-confined	20	(1%)	0	(0%)	1	(2%)	\$0	(0%)
Confined	20	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Other known factor contributing to ignition	360	(14%)	2	(50%)	10	(20%)	\$15	(14%)
Non-confined	290	(11%)	2	(50%)	10	(20%)	\$15	(14%)
Confined	60	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Total fires	2,560	(100%)	4	(100%)	65	(100%)	\$108	(100%)
Non-confined	2,080	(81%)	4	(100%)	62	(96%)	\$108	(100%)
Confined	490	(19%)	0	(0%)	3	(4%)	\$0	(0%)
Total factors	2,710	(106%)	4	(99%)	74	(114%)	\$115	(107%)
Non-confined	2,200	(86%)	4	(99%)	71	(110%)	\$115	(106%)
Confined	510	(20%)	0	(0%)	3	(4%)	\$0	(0%)

Note: Sums may not equal totals due to rounding errors. Multiple entries are allowed, which can result in sums higher than totals. Fires in which the factor contributing was coded as "none," "unknown," or was not reported have been allocated proportionally among fires with known contributing factors.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 8. Fires in Structures Undergoing Major Renovation, by Heat Source,
2010-2014 Annual Averages**

Heat Source	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Arcing	350	(14%)	0	(0%)	9	(14%)	\$15	(14%)
Non-confined	350	(14%)	0	(0%)	9	(14%)	\$15	(14%)
Confined	0	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Spark, ember or flame from operating equipment	320	(12%)	0	(0%)	15	(23%)	\$18	(17%)
Non-confined	230	(9%)	0	(0%)	15	(23%)	\$18	(17%)
Confined	90	(3%)	0	(0%)	0	(0%)	\$0	(0%)
Radiated or conducted heat from operating equipment	250	(10%)	1	(22%)	5	(8%)	\$7	(6%)
Non-confined	190	(7%)	1	(22%)	5	(8%)	\$7	(6%)
Confined	60	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified hot or smoldering object	220	(9%)	0	(0%)	3	(5%)	\$9	(9%)
Non-confined	160	(6%)	0	(0%)	0	(1%)	\$9	(9%)
Confined	60	(2%)	0	(0%)	3	(4%)	\$0	(0%)
Unclassified heat from powered equipment	210	(8%)	1	(19%)	1	(2%)	\$11	(10%)
Non-confined	160	(6%)	1	(19%)	1	(2%)	\$11	(10%)
Confined	50	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Hot ember or ash	160	(6%)	0	(0%)	0	(1%)	\$4	(4%)
Non-confined	130	(5%)	0	(0%)	0	(1%)	\$4	(4%)
Confined	30	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Spontaneous combustion or chemical reaction	140	(6%)	0	(0%)	3	(4%)	\$4	(4%)
Non-confined	100	(4%)	0	(0%)	3	(4%)	\$4	(4%)
Confined	40	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified heat source	120	(5%)	0	(0%)	3	(4%)	\$4	(4%)
Non-confined	110	(4%)	0	(0%)	3	(4%)	\$4	(4%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Flame or torch used for lighting	100	(4%)	0	(0%)	1	(1%)	\$14	(13%)
Non-confined	100	(4%)	0	(0%)	1	(1%)	\$14	(13%)
Confined	0	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Smoking materials	100	(4%)	2	(39%)	8	(12%)	\$2	(2%)
Non-confined	90	(3%)	2	(39%)	8	(12%)	\$2	(2%)
Confined	20	(1%)	0	(0%)	0	(0%)	\$0	(0%)

**Table 8. Fires in Structures Undergoing Major Renovation, by Heat Source,
2010-2014 Annual Averages (Continued)**

Heat Source	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Match	90	(4%)	0	(0%)	1	(1%)	\$2	(1%)
Non-confined	30	(1%)	0	(0%)	1	(1%)	\$2	(1%)
Confined	60	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Heat from direct flame or convection currents	90	(3%)	0	(0%)	5	(8%)	\$2	(2%)
Non-confined	70	(3%)	0	(0%)	5	(8%)	\$2	(2%)
Confined	20	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Molten or hot material	60	(3%)	0	(0%)	0	(0%)	\$3	(3%)
Non-confined	50	(2%)	0	(0%)	0	(0%)	\$3	(3%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Lighter	60	(2%)	0	(0%)	1	(2%)	\$2	(1%)
Non-confined	50	(2%)	0	(0%)	1	(2%)	\$2	(1%)
Confined	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Radiated heat from another fire	50	(2%)	0	(0%)	0	(1%)	\$1	(1%)
Non-confined	40	(1%)	0	(0%)	0	(1%)	\$1	(1%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Other known heat source	230	(9%)	1	(20%)	10	(14%)	\$9	(8%)
Non-confined	220	(8%)	1	(20%)	10	(14%)	\$9	(8%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Total	2,560	(100%)	4	(100%)	65	(100%)	\$108	(100%)
Non-confined	2,080	(81%)	4	(100%)	62	(96%)	\$108	(100%)
Confined	490	(19%)	0	(0%)	3	(4%)	\$0	(0%)

Note: Sums may not equal totals due to rounding errors. The calculations for matches, lighters, smoking materials, and candles include a proportional share of fires in which the heat source was heat from an unclassified open flame or smoking material.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 9. Fires in Structures Being Demolished, by Equipment Involved in Ignition,
2010-2014 Annual Averages**

Equipment Involved	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
No equipment involved in ignition	1,270	(60%)	4	(100%)	6	(36%)	\$13	(45%)
Torch, burner or soldering iron	250	(12%)	0	(0%)	0	(0%)	\$9	(29%)
Confined commercial compactor fire	230	(11%)	0	(0%)	2	(13%)	\$0	(0%)
Confined incinerator overload or malfunction fire	210	(10%)	0	(0%)	0	(0%)	\$0	(0%)
Electrical distribution and lighting equipment	90	(4%)	0	(0%)	0	(0%)	\$2	(6%)
Wiring and related equipment	60	(3%)	0	(0%)	0	(0%)	\$1	(3%)
Lamp, bulb or lighting	10	(1%)	0	(0%)	0	(0%)	\$0	(1%)
Other known electrical distribution or lighting equipment	20	(1%)	0	(0%)	0	(0%)	\$1	(2%)
Heating equipment	70	(3%)	0	(0%)	4	(28%)	\$2	(8%)
Fixed or portable space heater	30	(2%)	0	(0%)	4	(28%)	\$1	(5%)
Fireplace or chimney	10	(1%)	0	(0%)	0	(0%)	\$1	(3%)
Other known heating equipment	30	(1%)	0	(0%)	0	(0%)	\$0	(1%)
Power saw	50	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Cooking equipment	40	(2%)	0	(0%)	4	(23%)	\$2	(7%)
Range with or without oven, cooking surface	20	(1%)	0	(0%)	0	(0%)	\$1	(3%)
<i>Non-confined</i>	20	(1%)	0	(0%)	0	(0%)	\$1	(3%)
<i>Confined</i>	0	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Other known cooking equipment	20	(1%)	0	(0%)	4	(26%)	\$1	(4%)
<i>Non-confined</i>	10	(0%)	0	(0%)	2	(13%)	\$1	(4%)
<i>Confined</i>	10	(0%)	0	(0%)	2	(13%)	\$0	(0%)
Unclassified equipment involved in ignition	30	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Power cutting tool	30	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Chain saw	20	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified power tools	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Power sander, grinder, buffer, or polisher	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)

**Table 9. Fires in Structures Being Demolished, by Equipment Involved in Ignition,
2010-2014 Annual Averages (Continued)**

Equipment Involved	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Other known equipment involved in ignition	50	(2%)	0	(0%)	0	(0%)	\$1	(4%)
Total	2,130	(100%)	4	(100%)	16	(100%)	\$30	(100%)

Note: Non-confined fires in which the equipment involved in ignition was unknown or not reported have been allocated proportionally among fires with known equipment involved. The same approach was used with confined cooking equipment fires. Fires in which the equipment involved in ignition was entered as none but the heat source indicated equipment involvement or the heat source was unknown were also treated as unknown and allocated proportionally among fires with known equipment involved. Non-confined fires in which the equipment was partially unclassified (i.e., unclassified kitchen or cooking equipment, unclassified heating, cooling or air condition equipment, etc.) were allocated proportionally among fires in that grouping (kitchen or cooking equipment; heating, cooling or air conditioning equipment, etc.). The same approach was used with confined cooking fires. The estimates of fires involving fireplace or chimney include all fires with the confined chimney or flue incident type regardless of what may have been coded as equipment involved. Likewise, the estimates of fires involving furnaces, central heat or boilers include all fires with confined fuel burner or boiler incident type. The estimates shown should be considered upper bounds. Non-cooking confined fires were not analyzed separately. Estimates of other types of equipment exclude confined fires. Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA Fire Experience Survey

**Table 10. Fires in Structures Being Demolished, by Cause of Ignition,
2010-2014 Annual Averages**

Cause of Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unintentional	1,070	(50%)	4	(100%)	11	(72%)	\$22	(73%)
Non-confined	1,000	(47%)	4	(100%)	9	(59%)	\$22	(73%)
Confined	70	(3%)	0	(0%)	2	(13%)	\$0	(0%)
Intentional	900	(42%)	0	(0%)	4	(28%)	\$5	(15%)
Non-confined	770	(36%)	0	(0%)	4	(28%)	\$5	(15%)
Confined	130	(6%)	0	(0%)	0	(0%)	\$0	(0%)
Failure of equipment or heat source	60	(3%)	0	(0%)	0	(0%)	\$2	(7%)
Non-confined	50	(3%)	0	(0%)	0	(0%)	\$2	(7%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Act of nature	50	(2%)	0	(0%)	0	(0%)	\$1	(3%)
Non-confined	40	(2%)	0	(0%)	0	(0%)	\$1	(3%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified cause	50	(2%)	0	(0%)	0	(0%)	\$1	(2%)
Non-confined	40	(2%)	0	(0%)	0	(0%)	\$1	(2%)
Confined	0	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Total	2,130	(100%)	4	(100%)	16	(100%)	\$30	(100%)
Non-confined	1,900	(89%)	4	(100%)	14	(87%)	\$30	(100%)
Confined	230	(11%)	0	(0%)	2	(13%)	\$0	(0%)

Note: Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 11. Fires in Structures Being Demolished, by Factor Contributing to Ignition,
2010-2014 Annual Averages**

Factor Contributing to Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Rekindle	370	(17%)	0	(0%)	0	(0%)	\$3	(10%)
Non-confined	340	(16%)	0	(0%)	0	(0%)	\$3	(10%)
Confined	20	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Outside/open fire for debris or waste disposal	310	(14%)	0	(0%)	1	(5%)	\$1	(2%)
Non-confined	260	(12%)	0	(0%)	1	(5%)	\$1	(2%)
Confined	40	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Cutting or welding too close to combustibles	260	(12%)	0	(0%)	1	(7%)	\$7	(22%)
Non-confined	240	(11%)	0	(0%)	1	(7%)	\$7	(22%)
Confined	20	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Abandoned or discarded material or product	250	(12%)	0	(0%)	2	(16%)	\$4	(13%)
Non-confined	200	(9%)	0	(0%)	2	(16%)	\$4	(13%)
Confined	60	(3%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified factor contributed to ignition	210	(10%)	0	(0%)	2	(11%)	\$4	(13%)
Non-confined	210	(10%)	0	(0%)	2	(11%)	\$4	(13%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Heat source too close to combustibles	160	(8%)	2	(52%)	5	(33%)	\$2	(8%)
Non-confined	160	(7%)	2	(52%)	5	(33%)	\$2	(8%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified fire spread or control	100	(5%)	0	(0%)	0	(0%)	\$0	(2%)
Non-confined	100	(5%)	0	(0%)	0	(0%)	\$0	(2%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Electrical failure or malfunction	100	(5%)	0	(0%)	0	(0%)	\$4	(13%)
Non-confined	90	(4%)	0	(0%)	0	(0%)	\$4	(13%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified misuse of material or product	80	(4%)	2	(47%)	0	(0%)	\$2	(7%)
Non-confined	80	(4%)	2	(47%)	0	(0%)	\$2	(7%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
High wind	80	(4%)	0	(0%)	0	(0%)	\$0	(1%)
Non-confined	70	(3%)	0	(0%)	0	(0%)	\$0	(1%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)

**Table 11. Fires in Structures Being Demolished, by Factor Contributing to Ignition,
2010-2014 Annual Averages (Continued)**

Factor Contributing to Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Flammable liquid or gas spilled	50	(2%)	0	(0%)	2	(15%)	\$0	(0%)
Non-confined	30	(2%)	0	(0%)	2	(15%)	\$0	(0%)
Confined	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Exposure fire	40	(2%)	0	(0%)	0	(0%)	\$1	(3%)
Non-confined	40	(2%)	0	(0%)	0	(0%)	\$1	(3%)
Confined	0	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Mechanical failure or malfunction	40	(2%)	0	(0%)	1	(5%)	\$0	(1%)
Non-confined	30	(1%)	0	(0%)	1	(5%)	\$0	(1%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Other known factor contributing to ignition	180	(8%)	0	(0%)	0	(13%)	\$3	(11%)
Non-confined	140	(7%)	0	(0%)	0	(0%)	\$3	(11%)
Confined	40	(2%)	0	(0%)	0	(13%)	\$0	(0%)
Total fires	2,130	(100%)	4	(100%)	16	(100%)	\$30	(100%)
Non-confined	1,900	(89%)	4	(100%)	14	(87%)	\$30	(100%)
Confined	230	(11%)	0	(0%)	2	(13%)	\$0	(0%)
Total factors	2,230	(105%)	4	(112%)	17	(105%)	\$31	(106%)
Non-confined	1,990	(93%)	4	(112%)	15	(92%)	\$31	(106%)
Confined	240	(11%)	0	(0%)	2	(13%)	\$0	(0%)

Note: Sums may not equal totals due to rounding errors. Multiple entries are allowed, which can result in sums higher than totals. Fires in which the factor contributing was coded as "none," "unknown," or was not reported have been allocated proportionally among fires with known contributing factors.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 12. Fires in Structures Being Demolished, by Heat Source,
2010-2014 Annual Averages**

Heat Source	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Hot ember or ash	350	(17%)	0	(19%)	1	(4%)	\$5	(16%)
Non-confined	320	(15%)	0	(19%)	1	(4%)	\$5	(16%)
Confined	30	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified heat source	200	(9%)	0	(0%)	1	(3%)	\$3	(10%)
Non-confined	180	(9%)	0	(0%)	1	(3%)	\$3	(10%)
Confined	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Match	190	(9%)	0	(0%)	0	(0%)	\$0	(1%)
Non-confined	160	(8%)	0	(0%)	0	(0%)	\$0	(1%)
Confined	30	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified hot or smoldering object	190	(9%)	0	(0%)	1	(4%)	\$2	(7%)
Non-confined	170	(8%)	0	(0%)	1	(4%)	\$2	(7%)
Confined	20	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Spark, ember or flame from operating equipment	170	(8%)	0	(0%)	1	(9%)	\$4	(14%)
Non-confined	150	(7%)	0	(0%)	1	(9%)	\$4	(14%)
Confined	20	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Flame or torch used for lighting	170	(8%)	0	(0%)	0	(0%)	\$1	(2%)
Non-confined	150	(7%)	0	(0%)	0	(0%)	\$1	(2%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Lighter	160	(8%)	0	(0%)	2	(13%)	\$1	(2%)
Non-confined	140	(6%)	0	(0%)	2	(13%)	\$1	(2%)
Confined	30	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Flying brand, ember or spark	100	(5%)	0	(0%)	1	(4%)	\$1	(3%)
Non-confined	80	(4%)	0	(0%)	1	(4%)	\$1	(3%)
Confined	20	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified heat spread from another fire	90	(4%)	0	(35%)	0	(0%)	\$1	(3%)
Non-confined	90	(4%)	0	(35%)	0	(0%)	\$1	(3%)
Confined	0	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Heat from direct flame or convection currents	80	(4%)	0	(0%)	0	(0%)	\$0	(1%)
Non-confined	70	(3%)	0	(0%)	0	(0%)	\$0	(1%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)

**Table 12. Fires in Structures Being Demolished, by Heat Source,
2010-2014 Annual Averages (Continued)**

Heat Source	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Smoking materials	50	(2%)	2	(46%)	1	(4%)	\$1	(2%)
Non-confined	50	(2%)	2	(46%)	1	(4%)	\$1	(2%)
Confined	0	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Arcing	50	(2%)	0	(0%)	0	(0%)	\$2	(7%)
Non-confined	50	(2%)	0	(0%)	0	(0%)	\$2	(7%)
Confined	0	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Multiple heat sources including multiple ignitions	50	(2%)	0	(0%)	0	(0%)	\$5	(16%)
Non-confined	50	(2%)	0	(0%)	0	(0%)	\$5	(16%)
Confined	0	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Molten or hot material	50	(2%)	0	(0%)	0	(0%)	\$1	(3%)
Non-confined	40	(2%)	0	(0%)	0	(0%)	\$1	(3%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified heat from powered equipment	40	(2%)	0	(0%)	2	(11%)	\$1	(3%)
Non-confined	30	(2%)	0	(0%)	2	(11%)	\$1	(3%)
Confined	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Radiated or conducted heat from operating equipment	40	(2%)	0	(0%)	5	(33%)	\$1	(4%)
Non-confined	30	(1%)	0	(0%)	3	(20%)	\$1	(4%)
Confined	10	(1%)	0	(0%)	2	(13%)	\$0	(0%)
Heat or spark from friction	40	(2%)	0	(0%)	2	(10%)	\$0	(0%)
Non-confined	30	(2%)	0	(0%)	2	(10%)	\$0	(0%)
Confined	0	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Other known heat source	110	(5%)	0	(0%)	1	(4%)	\$2	(6%)
Non-confined	100	(5%)	0	(0%)	1	(4%)	\$2	(6%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Total	2,130	(100%)	4	(100%)	16	(100%)	\$30	(100%)
Non-confined	1,900	(89%)	4	(100%)	14	(87%)	\$30	(100%)
Confined	230	(11%)	0	(0%)	2	(13%)	\$0	(0%)

Note: Sums may not equal totals due to rounding errors. The calculations for matches, lighters, smoking materials, and candles include a proportional share of fires in which the heat source was heat from an unclassified open flame or smoking material.

Source: NFIRS and NFPA Fire Experience Survey.

Appendix A.

How National Estimates Statistics Are Calculated

The statistics in this analysis are estimates derived from the U.S. Fire Administration's (USFA's) National Fire Incident Reporting System (NFIRS) and the National Fire Protection Association's (NFPA's) annual survey of U.S. fire departments. NFIRS is a voluntary system by which participating fire departments report detailed factors about the fires to which they respond. Roughly two-thirds of U.S. fire departments participate, although not all of these departments provide data every year. Fires reported to federal or state fire departments or industrial fire brigades are not included in these estimates.

NFIRS provides the most detailed incident information of any national database not limited to large fires. NFIRS is the only database capable of addressing national patterns for fires of all sizes by specific property use and specific fire cause. NFIRS also captures information on the extent of flame spread, and automatic detection and suppression equipment. For more information about NFIRS visit <http://www.nfirs.fema.gov/>. Copies of the paper forms may be downloaded from http://www.nfirs.fema.gov/documentation/design/NFIRS_Paper_Forms_2008.pdf.

NFIRS has a wide variety of data elements and code choices. The NFIRS database contains coded information. Many code choices describe several conditions. These cannot be broken down further. For example, area of origin code 83 captures fires starting in vehicle engine areas, running gear areas or wheel areas. It is impossible to tell the portion of each from the coded data.

Methodology may change slightly from year to year.

NFPA is continually examining its methodology to provide the best possible answers to specific questions, methodological and definitional changes can occur. *Earlier editions of the same report may have used different methodologies to produce the same analysis, meaning that the estimates are not directly comparable from year to year.*

NFPA's fire department experience survey provides estimates of the big picture.

Each year, NFPA conducts an annual survey of fire departments which enables us to capture a summary of fire department experience on a larger scale. Surveys are sent to all municipal departments protecting populations of 50,000 or more and a random sample, stratified by community size, of the smaller departments. Typically, a total of roughly 3,000 surveys are returned, representing about one of every ten U.S. municipal fire departments and about one third of the U.S. population.

The survey is stratified by size of population protected to reduce the uncertainty of the final estimate. Small rural communities have fewer people protected per department and are less likely to respond to the survey. A larger number must be surveyed to obtain an adequate sample of those departments. (NFPA also makes follow-up calls to a sample of the smaller fire departments that do not respond, to confirm that those that did respond are truly representative of fire departments their size.) On the other hand, large city departments are so few in number and protect such a large proportion of the total U.S. population that it makes sense to survey all of them. Most respond, resulting in excellent precision for their part of the final estimate.

The survey includes the following information: (1) the total number of fire incidents, civilian deaths, and civilian injuries, and the total estimated property damage (in dollars), for each of the major property use classes defined in NFIRS; (2) the number of on-duty firefighter injuries, by type of duty and nature of illness; (3) the number and nature of non-fire incidents; and (4) information on the type of community protected (e.g., county versus township versus city) and the size of the population protected, which is used in the statistical formula for projecting national totals from sample results. The results of the survey are published in the annual report *Fire Loss in the United States*. To download a free copy of the report, visit <http://www.nfpa.org/assets/files/PDF/OS.fireloss.pdf>.

Projecting NFIRS to National Estimates

As noted, NFIRS is a voluntary system. Different states and jurisdictions have different reporting requirements and practices. Participation rates in NFIRS are not necessarily uniform across regions and community sizes, both factors correlated with frequency and severity of fires. This means NFIRS may be susceptible to systematic biases. No one at present can quantify the size of these deviations from the ideal, representative sample, so no one can say with confidence that they are or are not serious problems. But there is enough reason for concern so that a second database -- the NFPA survey -- is needed to project NFIRS to national estimates and to project different parts of NFIRS separately. This multiple calibration approach makes use of the annual NFPA survey where its statistical design advantages are strongest.

Scaling ratios are obtained by comparing NFPA's projected totals of residential structure fires, non-residential structure fires, vehicle fires, and outside and other fires, and associated civilian deaths, civilian injuries, and direct property damage with comparable totals in NFIRS. Estimates of specific fire problems and circumstances are obtained by multiplying the NFIRS data by the scaling ratios. Reports for incidents in which mutual aid was given are excluded from NFPA's analyses.

Analysts at the NFPA, the USFA and the Consumer Product Safety Commission developed the specific basic analytical rules used for this procedure. "The National Estimates Approach to U.S. Fire Statistics," by John R. Hall, Jr. and Beatrice Harwood, provides a more detailed explanation of national estimates. A copy of the article is available online at <http://www.nfpa.org/osds> or through NFPA's One-Stop Data Shop.

Version 5.0 of NFIRS, first introduced in 1999, used a different coding structure for many data elements, added some property use codes, and dropped others. The essentials of the approach described by Hall and Harwood are still used, but some modifications have been necessary to accommodate the changes in NFIRS 5.0.

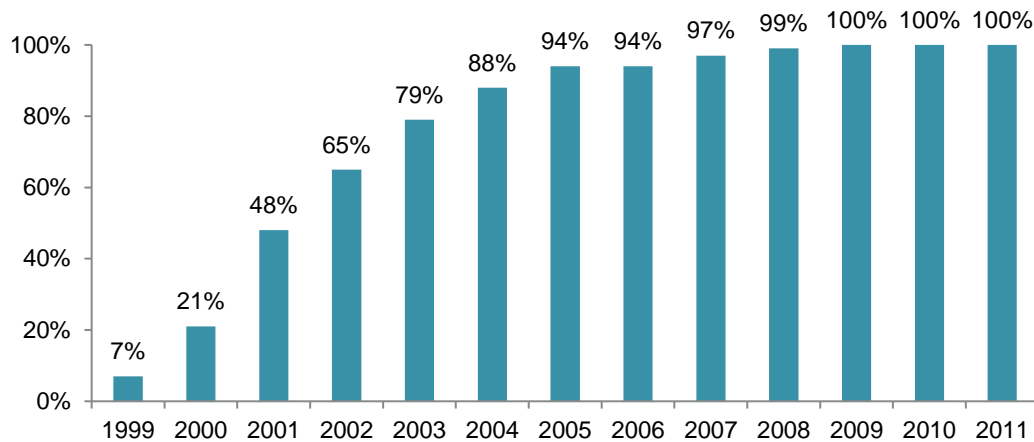
Figure A.1 shows the percentage of fires originally collected in the NFIRS 5.0 system. Each year's release version of NFIRS data also includes data collected in older versions of NFIRS that were converted to NFIRS 5.0 codes.

From 1999 data on, analyses are based on scaling ratios using only data originally collected in NFIRS 5.0:

$$\frac{\text{NFPA survey projections}}{\text{NFIRS totals (Version 5.0)}}$$

For 1999 to 2001, the same rules may be applied, but estimates for these years in this form will be less reliable due to the smaller amount of data originally collected in NFIRS 5.0; they should be viewed with extreme caution.

Figure A.1. Fires Originally Collected in NFIRS 5.0 by Year



NFIRS 5.0 introduced six categories of confined structure fires, including:

- cooking fires confined to the cooking vessel,
- confined chimney or flue fires,
- confined incinerator fire,
- confined fuel burner or boiler fire or delayed ignition,
- confined commercial compactor fire, and
- trash or rubbish fires in a structure with no flame damage to the structure or its contents.

Because this analysis focused on fatalities only, no distinction was made between confined and non-confined fires.

For most fields other than Property Use and Incident Type, NFPA allocates unknown data proportionally among known data. This approach assumes that if the missing data were known, it would be distributed in the same manner as the known data. NFPA makes additional adjustments to several fields. *Casualty and loss projections can be heavily influenced by the inclusion or exclusion of unusually serious fire.*

In the formulas that follow, the term “all fires” refers to all fires in NFIRS on the dimension studied. The percentages of fires with known or unknown data are provided for non-confined fires and associated losses, and for confined fires only.

Rounding and percentages. The data shown are estimates and generally rounded. An entry of zero may be a true zero or it may mean that the value rounds to zero. Percentages are calculated from unrounded values. It is quite possible to have a percentage entry of up to 100% even if the rounded number entry is zero. The same rounded value may account for a slightly different percentage share. Because percentages are expressed in integers and not carried out to several decimal places, percentages that appear identical may be associated with slightly different values.

In the formulas that follow, the term “all fires” refers to all fires in NFIRS on the dimension studied. The percentages of fires with known or unknown data are provided for non-confined fires and associated losses, and for confined fires only.

Cause of Ignition: This field is used chiefly to identify intentional fires. “Unintentional” in this field is a specific entry and does not include other fires that were not intentionally set:

failure of equipment or heat source, act of nature, or “other” (unclassified).” The last should be used for exposures but has been used for other situations as well. Fires that were coded as under investigation and those that were coded as undetermined after investigation were treated as unknown.

Factor Contributing to Ignition: In this field, the code “none” is treated as an unknown and allocated proportionally. For Human Factor Contributing to Ignition, NFPA enters a code for “not reported” when no factors are recorded. “Not reported” is treated as an unknown, but the code “none” is treated as a known code and not allocated. Multiple entries are allowed in both of these fields. Percentages are calculated on the total number of fires, not entries, resulting in sums greater than 100%. Although Factor Contributing to Ignition is only required when the cause of ignition was coded as: 2) unintentional, 3) failure of equipment or heat source; or 4) act of nature, data is often present when not required. Consequently, any fire in which no factor contributing to ignition was entered was treated as unknown.

In some analyses, all entries in the category of mechanical failure, malfunction (factor contributing to ignition 20-29) are combined and shown as one entry, “mechanical failure or malfunction.” This category includes:

- 21. Automatic control failure;
- 22. Manual control failure;
- 23. Leak or break. Includes leaks or breaks from containers or pipes. Excludes operational deficiencies and spill mishaps;
- 25. Worn out;
- 26. Backfire. Excludes fires originating as a result of hot catalytic converters;
- 27. Improper fuel used; Includes the use of gasoline in a kerosene heater and the like; and
- 20. Mechanical failure or malfunction, other.

Entries in “electrical failure, malfunction” (factor contributing to ignition 30-39) may also be combined into one entry, “electrical failure or malfunction.” This category includes:

- 31. Water-caused short circuit arc;
- 32. Short-circuit arc from mechanical damage;
- 33. Short-circuit arc from defective or worn insulation;
- 34. Unspecified short circuit arc;
- 35. Arc from faulty contact or broken connector, including broken power lines and loose connections;
- 36. Arc or spark from operating equipment, switch, or electric fence;
- 37. Fluorescent light ballast; and
- 30. Electrical failure or malfunction, other.

Heat Source. In NFIRS 5.0, one grouping of codes encompasses various types of open flames and smoking materials. In the past, these had been two separate groupings. A new code was added to NFIRS 5.0, which is code 60: “Heat from open flame or smoking material, other.” NFPA treats this code as a partial unknown and allocates it proportionally across the codes in the

61-69 range, shown below.

- 61. Cigarette;
- 62. Pipe or cigar;
- 63. Heat from undetermined smoking material;
- 64. Match;
- 65. Lighter: cigarette lighter, cigar lighter;
- 66. Candle;
- 67. Warning or road flare, fuse;
- 68. Backfire from internal combustion engine. Excludes flames and sparks from an exhaust system, (11); and
- 69. Flame/torch used for lighting. Includes gas light and gas-/liquid-fueled lantern.

In addition to the conventional allocation of missing and undetermined fires, NFPA multiplies fires with codes in the 61-69 range by

$$\frac{\text{All fires in range 60-69}}{\text{All fires in range 61-69}}$$

The downside of this approach is that heat sources that are truly a different type of open flame or smoking material are erroneously assigned to other categories. The grouping “smoking materials” includes codes 61-63 (cigarettes, pipes or cigars, and heat from undetermined smoking material, with a proportional share of the code 60s and true unknown data.

Equipment Involved in Ignition (EII). NFIRS 5.0 originally defined EII as the piece of equipment that provided the principal heat source to cause ignition if the equipment malfunctioned or was used improperly. In 2006, the definition was modified to “the piece of equipment that provided the principal heat source to cause ignition.” However, much of the data predates the change. Individuals who have already been trained with the older definition may not change their practices. To compensate, NFPA treats fires in which EII = NNN and heat source is not in the range of 40-99 as an additional unknown.

To allocate unknown data for EII, the known data is multiplied by

$$\frac{\text{All fires}}{(\text{All fires} - \text{blank} - \text{undetermined} - [\text{fires in which EII} = \text{NNN and heat source} \neq 40-99])}$$

In addition, the partially unclassified codes for broad equipment groupings (i.e., code 100 - heating, ventilation, and air conditioning, other; code 200 - electrical distribution, lighting and power transfer, other; etc.) were allocated proportionally across the individual code choices in their respective broad groupings (heating, ventilation, and air conditioning; electrical distribution, lighting and power transfer, other; etc.). Equipment that is totally unclassified is not allocated further. This approach has the same downside as the allocation of heat source 60 described above. Equipment that is truly different is erroneously assigned to other categories.

In some analyses, various types of equipment are grouped together.

Code Grouping	EII Code	NFIRS definitions
Central heat	132	Furnace or central heating unit
	133	Boiler (power, process or heating)
Fixed or portable space heater	131	Furnace, local heating unit, built-in
	123	Fireplace with insert or stove
	124	Heating stove
	141	Heater, excluding catalytic and oil-filled
	142	Catalytic heater
	143	Oil-filled heater
Fireplace or chimney	120	Fireplace or chimney
	121	Fireplace, masonry
	122	Fireplace, factory-built
	125	Chimney connector or vent connector
	126	Chimney – brick, stone or masonry
	127	Chimney-metal, including stovepipe or flue
Fixed wiring and related equipment	210	Unclassified electrical wiring
	211	Electrical power or utility line
	212	Electrical service supply wires from utility
	213	Electric meter or meter box
	214	Wiring from meter box to circuit breaker
	215	Panel board, switch board or circuit breaker board
	216	Electrical branch circuit
	217	Outlet or receptacle
	218	Wall switch
	219	Ground fault interrupter
Transformers and power supplies	221	Distribution-type transformer
	222	Overcurrent, disconnect equipment
	223	Low-voltage transformer
	224	Generator
	225	Inverter
	226	Uninterrupted power supply (UPS)
	227	Surge protector
	228	Battery charger or rectifier
	229	Battery (all types)

Code Grouping	EII Code	NFIRS definitions
Lamp, bulb or lighting	230	Unclassified lamp or lighting
	231	Lamp-tabletop, floor or desk
	232	Lantern or flashlight
	233	Incandescent lighting fixture
	234	Fluorescent light fixture or ballast
	235	Halogen light fixture or lamp
	236	Sodium or mercury vapor light fixture or lamp
	237	Work or trouble light
	238	Light bulb
	241	Nightlight
	242	Decorative lights – line voltage
	243	Decorative or landscape lighting – low voltage
	244	Sign
Cord or plug	260	Unclassified cord or plug
	261	Power cord or plug, detachable from appliance
	262	Power cord or plug- permanently attached
	263	Extension cord
Torch, burner or soldering iron	331	Welding torch
	332	Cutting torch
	333	Burner, including Bunsen burners
	334	Soldering equipment
Portable cooking or warming equipment	631	Coffee maker or teapot
	632	Food warmer or hot plate
	633	Kettle
	634	Popcorn popper
	635	Pressure cooker or canner
	636	Slow cooker
	637	Toaster, toaster oven, counter-top broiler
	638	Waffle iron, griddle
	639	Wok, frying pan, skillet
	641	Breadmaking machine

Equipment was not analyzed separately for confined fires. Instead, each confined fire incident type was listed with the equipment or as other known equipment.

Item First Ignited. In most analyses, mattress and pillows (item first ignited 31) and bedding, blankets, sheets, and comforters (item first ignited 32) are combined and shown as “mattresses and bedding.” In many analyses, wearing apparel not on a person (code 34) and wearing apparel on a person (code 35) are combined and shown as “clothing.” In some analyses, flammable and combustible liquids and gases, piping and filters (item first ignited 60-69) are combined and shown together.

Area of Origin. Two areas of origin: bedroom for more than five people (code 21) and bedroom for less than five people (code 22) are combined and shown as simply “bedroom.” Chimney is no longer a valid area of origin code for non-confined fires.

Rounding and percentages. The data shown are estimates and generally rounded. An entry of zero may be a true zero or it may mean that the value rounds to zero. Percentages are calculated from unrounded values. It is quite possible to have a percentage entry of up to 100% even if the rounded number entry is zero. The same rounded value may account for a slightly different percentage share. Because percentages are expressed in integers and not carried out to several decimal places, percentages that appear identical may be associated with slightly different values.

Appendix B.

Methodology and Definitions Used in “Leading Cause” Tables

The cause table reflects relevant causal factors that accounted for at least 2% of the fires in a given occupancy. Only those causes that seemed to describe a scenario are included. Because the causal factors are taken from different fields, some double counting is possible. Percentages are calculated against the total number of structure fires, including both confined and non-confined fires. Bear in mind that every fire has at least three “causes” in the sense that it could have been prevented by changing behavior, heat source, or ignitability of first fuel, the last an aspect not reflected in any of the major cause categories. For example, several of the cause categories in this system refer to types of equipment (cooking, heating, electrical distribution and lighting, clothes dryers and washers, torches). However, the problem may be not with the equipment but with the way it is used. The details in national estimates are derived from the U.S. Fire Administration’s National Fire Incident Reporting System (NFIRS). This methodology is based on the coding system used in Version 5.0 of NFIRS. The *NFIRS 5.0 Reference Guide*, containing all of the codes, can be downloaded from <http://www.nfirs.fema.gov/documentation/reference/>.

Cooking equipment and heating equipment are calculated by summing fires identified by equipment involved in ignition and relevant confined fires. Confined fires will be shown if they account for at least 2% of the incidents. **Confined cooking fires** (cooking fires involving the contents of a cooking vessel without fire extension beyond the vessel) are identified by NFIRS incident type 113.

Confined heating equipment fires include **confined chimney or flue fires** (incident type 114) and **confined fuel burner or boiler** fires (incident type 116). The latter includes delayed ignitions and incidents where flames caused no damage outside the fire box. The two types of confined heating fires may be combined or listed separately, depending on the numbers involved.

Intentional fires are identified by fires with a “1” (intentional) in the field “cause.” The estimate includes a proportional share of fires in which the cause was undetermined after investigation, under investigation, or not reported. All fires with intentional causes are included in this category regardless of the age of the person involved. Earlier versions of NFIRS included codes for incendiary and suspicious. Intentional fires were deliberately set; they may or may not be incendiary in a legal sense. No age restriction is applied.

Fires caused by **playing with heat source** (typically matches or lighters) are identified by code 19 in the field “factor contributing to ignition.” Fires in which the factor contribution to ignition was undetermined (UU), entered as none (NN) or left blank are considered unknown and allocated proportionally. Because factor contributing to ignition is not required for intentional fires, the share unknown, by these definitions, is somewhat larger than it should be.

The heat source field is used to identify fires started by: **smoking materials** (cigarette, code 61; pipe or cigar, code 62; and heat from undetermined smoking material, code 63); **candles** (code 66), **lightning** (code 73); and **spontaneous combustion or chemical reaction** (code 72). Fires started by heat from unclassified open flame or smoking materials (code 60) are allocated proportionally among the “other open flame or smoking material” codes (codes 61-69) in an allocation of partial unknown data. This includes smoking materials and candles. This approach results in any true unclassified smoking or open flame heat sources such as incense being inappropriately allocated. However, in many fires, this code was used as an unknown.

The equipment involved in ignition field is used to find several cause categories. This category includes equipment that functioned properly and equipment that malfunctioned.

Cooking equipment Non-confined fire refers to equipment used to cook, heat or warm food (codes 620-649 and 654). Fire in which ranges, ovens or microwave ovens, food warming appliances, fixed or portable cooking appliances, deep fat fryers, open fired charcoal or gas grills, grease hoods or ducts, or other cooking appliances) were involved in the ignition are said to be caused by cooking equipment. Food preparation devices that do not involve heating, such as can openers or food processors, are not included here. As noted in Appendix A, a proportional share of unclassified kitchen and cooking equipment (code 600) is included here.

Heating equipment Non-confined fire (codes 120-199) includes central heat, portable and fixed heaters (including wood stoves), fireplaces, chimneys, hot water heaters, and heat transfer equipment such as hot air ducts or hot water pipes. Heat pumps are not included. As noted in Appendix A, a proportional share of unclassified heating, ventilation and air condition equipment (code 100) is included here.

Confined fires are excluded from the tallies of the remaining categories of fires involving equipment.

Electrical distribution and lighting equipment (codes 200-299) include: fixed wiring; transformers; associated overcurrent or disconnect equipment such as fuses or circuit breakers; meters; meter boxes; power switch gear; switches, receptacles and outlets; light fixtures, lamps, bulbs or lighting; signs; cords and plugs; generators, transformers, inverters, batteries and battery charges.

Torch, burner or soldering iron (codes 331-334) includes welding torches, cutting torches, Bunsen burners, plumber furnaces, blowtorches, and soldering equipment. As noted in Appendix A, a proportional share of shop tools and industrial equipment (code 300) is included here.

Clothes dryer or washer (codes 811, 813 and 814) includes clothes dryers alone, washer and dryer combinations within one frame, and washing machines for clothes. As noted in Appendix A, a proportional share of unclassified personal and household equipment (code 800) is included here.

Electronic, office or entertainment equipment (codes 700-799) includes: computers and related equipment; calculators and adding machines; telephones or answering machines; copiers; fax machines; paper shredders; typewriters; postage meters; other office equipment; musical instruments; stereo systems and/or components; televisions and cable TV converter boxes,, cameras, excluding professional television studio cameras, video equipment and other electronic equipment. Older versions of NFIRS had a code for electronic equipment that included radar, X-rays, computers, telephones, and transmitter equipment.

Shop tools and industrial equipment excluding torches, burners or soldering irons (codes 300-330, 335-399) includes power tools; painting equipment; compressors; atomizing equipment; pumps; wet/dry vacuums; hoists, lifts or cranes; powered jacking equipment; water or gas drilling equipment; unclassified hydraulic equipment; heat-treating equipment; incinerators, industrial furnaces, ovens or kilns; pumps; compressors; internal combustion engines; conveyors; printing presses; casting, molding; or forging equipment; heat treating equipment; tar kettles; working or shaping machines; coating machines; chemical process equipment; waste recovery equipment; power transfer equipment; power takeoff; powered valves; bearings or brakes; picking, carding or weaving machines; testing equipment; gas regulators; separate motors; non-vehicular internal combustion engines; and unclassified shop tools and industrial equipment. . As noted in Appendix A, a proportional share of shop tools and industrial equipment (code 300) is included here.

Medical equipment (codes 410-419) includes: dental, medical or other powered bed, chair or wheelchair; dental equipment; dialysis equipment; medical monitoring and imaging equipment; oxygen administration equipment; radiological equipment; medical sterilizers, therapeutic equipment and unclassified medical equipment. As noted in Appendix A, a proportional share of commercial and medical equipment (code 400) is included here.

Exposures are fires that are caused by the spread of or from another fire. These were identified by factor contributing to ignition code 71. This code is automatically applied when the exposure number is greater than zero.