HOME STRUCTURE FIRES INVOLVING KITCHEN EQUIPMENT OTHER THAN COOKING EQUIPMENT

John R. Hall, Jr. November 2012



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Abstract

In 2006-2010, an estimated 2,920 reported U.S. home structure fires per year involving equipment normally used in the kitchen for food preparation, storage or disposal but excluding cooking equipment resulted in annual averages of six reported civilian deaths, 82 civilian injuries, and \$75 million in direct property damage.

Nearly all home fires involving kitchen equipment excluding cooking equipment specifically involve refrigerators, freezers and ice makers (59%) or dishwashers (39%). Other equipment in this group include garbage disposers, blenders, juicers, food processors, can openers, coffee grinders, and knife sharpeners.

These estimates are based on data 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 fire department experience survey. This report complements *Home Fires Involving Cooking Equipment* by Marty Ahrens, published in November 2012.

Keywords: Refrigerator, freezer, dishwasher, kitchen, cooking, scald, fire statistics, home fires, residential fires

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In 2006-2010, an estimated 2,920 reported U.S. home structure fires involving kitchen equipment excluding cooking equipment resulted in annual averages of six civilian deaths, 82 civilian injuries, and \$75 million in direct property damage.¹

Nearly all home fires involving kitchen equipment excluding cooking equipment specifically involve refrigerators and freezers or dishwashers.

Refrigerators, separate freezers, and separate ice makers together were involved in 1,710 home structure fires reported to U.S. fire departments per year in 2006-2010. These fires resulted in two civilian deaths, 56 civilian injuries, and \$50 million in direct property damage per year.

Dishwashers were involved in 1,130 home structure fires reported to U.S. fire departments per year in 2006-2010. These fires resulted in two civilian deaths, 19 civilian injuries, and \$23 million in direct property damage per year.

The other equipment types in this group – garbage disposer, blender, juicer, food processor, can opener, coffee grinder, and knife sharpener – collectively were involved in 90 home structure fires reported to U.S. fire departments per year in 2006-2010.

Roughly three out of five 2006-2010 home structure fires involving refrigerators, separate freezers, or separate ice makers began with ignition of appliance housing or casing (31%) or wire or cable insulation (30%).

Roughly three-fourths of 2006-2010 home nonconfined structure fires involving dishwashers also began with ignition of appliance housing or casing (47%) or wire or cable insulation (26%).

One-third (34%) of 2006-2010 home nonconfined structure fires involving refrigerators, separate freezers, or separate ice makers began in a room other than the kitchen, starting with the garage (12%). Only 5% of 2006-2010 home non-confined structure fires involving dishwashers began in an area other than the kitchen.

The fire statistics in this report are estimates derived from the U.S. Fire Administration's National Fire Incident Reporting System (NFIRS) and NFPA's annual fire experience survey.

Refrigerators, separate freezers, and separate ice makers were involved in an estimated 49,660 injuries reported to hospital emergency rooms in 2011. Most of these injuries did not involve burns or fire but instead involved sprains or strains, contusions or abrasions, lacerations, or fractures. Dishwashers were involved in 9,790 injuries reported to hospital emergency rooms in 2011.

This report complements *Home Fires Involving Cooking Equipment* by Marty Ahrens, published in November 2012.

¹ All statistics exclude 234 fires per year reported as confined to cooking vessel, fuel burner or boiler, chimney or flue, compactor or incinerator, or trash.

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Section 1. Kitchen Equipment Excluding Cooking Equipment

In 2010, an estimated 2,910 reported U.S. home structure fires involving kitchen equipment excluding cooking equipment resulted in 38 civilian injuries and \$100 million in direct property damage.

This report complements *Home Fires Involving Cooking Equipment* by Marty Ahrens, published in November 2012.

Table 1.A. Home Fires Involving Kitchen Equipment Other Than Cooking Equipment, by Year

Most of these types of equipment were not separately identified in national fire incident data prior to the advent of NFIRS Version 5.0. No clear trend is apparent. (See Table 1.A.)

		Structure Fires Reported to U.S. Fire Departments (Excluding Fires Coded as Confined Fires)									
Year	Fires	Civilian Injuries	Direct Property As Reported	Damage (in Millions) In 2010 Dollars							
2002	3,160	87	\$53	\$64							
2003	2,680	117	\$87	\$103							
2004	2,660	96	\$55	\$64							
2005	2,830	108	\$91	\$102							
2006	2,650	71	\$63	\$68							
2007	3,380	129	\$57	\$60							
2008	3,050	35	\$84	\$85							
2009	2,600	127	\$81	\$82							
2010	2.910	38	\$100	\$100							

Note: These 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. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian injuries are expressed to the nearest one and property damage is rounded to the nearest million dollars. Civilian deaths are too variable for meaningful year-by-year estimates. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or reported as cooking or other kitchen equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Inflation adjustment to 2010 dollars is done using the consumer price index.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Nearly all home fires involving kitchen equipment excluding cooking equipment² specifically involve refrigerators, freezers and ice makers (59%) or dishwashers (39%).

 $^{^2}$ Beginning in 1999, limited reported is permitted for fires coded as confined fires in the U.S. Fire Administration's National Fire Incident Reporting System (NFIRS). There are six types – confined to cooking vessel, chimney or flue, burner or boiler, trash, incincerator, or commercial compactor. In 2006-2010, there were an estimated 234 confined fires per year involving kitchen equipment other than cooking equipment – 135 confined to cooking vessel, 52 confined to trash, 20 confined to incinerator, 10 confined to fuel burner or boiler, and 7 confined to chimney or flue. None of these fires are included in the analysis in this report.

These fires and losses represent 1% of total home fires, civilian injuries, and damages, and represent only one-quarter of 1% of civilian deaths. See Table 1.B.

Table 1.B. Home Fires Involving Kitchen Equipment Other Than Cooking Equipment,
by Type or Group of EquipmentAnnual Average of 2006-2010 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Type or Group of Equipment	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Millions)
Refrigerator, freezer, or icemaker	1,710	2	56	\$50
Refrigerator	1.530	2	47	\$41
Separate freezer	170	0	8	\$9
Separate ice maker	10	0	1	\$0
Dishwasher	1,130	2	19	\$23
Blender, juicer, or food processor	30	0	1	\$1
Garbage disposer ³	30	0	1	\$0
Can opener	20	2	3	\$0
Coffee grinder	10	0	0	\$0
Knife sharpener	0	0	0	\$0
Knife	0	0	1	\$0
Total	2,920	6	82	\$75

Note: These 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. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and civilian injuries are expressed to the nearest one and property damage is rounded to the nearest million dollars. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or reported as cooking or other kitchen equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Sums may not equal totals because of rounding error. Does not include 234 fires per year coded as confined fires – 98 refrigerator, 96 dishwasher, 13 freezer, 13 ice maker, 7 knife sharpener, and 7 garbage disposer.

Source: Data from NFIRS Version 5.0 and NFPA survey.

In 2011, more than 320,000 injuries involving kitchen equipment and other products used in food preparation or presentation, excluding cooking equipment, were reported to hospital emergency rooms.⁴

Table 1.C provides numbers of injuries by type of equipment for all types of injuries and the six leading types of injuries.

³ "Garbage disposer" is the term used in NFIRS for what is more commonly called "garbage disposal."

⁴ Statistics from the National Electronic Injury Surveillance System (NEISS), queried at the U.S. Consumer Product Safety Commission website, <u>www.cpsc.gov</u>.

Type of Product	Any Type of Injury	Laceration	Contusion or Abrasion	Sprain or Strain	Scald Burn	Thermal Burn	Fracture
Tableware (excluding flatware)	90,760	64,330	4,200	3,510	6,660	960	1,870
Drinking glass	77,310	69,850	970	360	370	120	470
Refrigerator, freezer or icemaker	49,660	8,310	10,260	10,500	140	10	6,630
Cookware*	34,000	3,940	3,650	1,690	9,670	11,120	1,110
Slicers and chippers	21,700	15,300	300	160	0	0	60
Unclassified kitchen gadget	12,960	250	1,270	400	10	610	540
Dishwasher	9,790	850	1,270	1,040	20	30	520
Blender	7,260	6,160	230	0	140	20	320
Flatware	6,710	1,850	1,360	100	190	330	0
Food processor	5,280	4,820	20	80	0	0	0
Mixing bowl	2,130	460	220	20	60	70	130
Unknown-type can opener	1,600	1,600	0	0	0	0	0
Electric mixer	1,220	570	180	0	0	0	240
Food grinder	1,150	630	140	20	0	0	140
Garbage disposer	990	780	10	0	0	0	90
Juicer	340	310	20	0	0	0	0
Unpowered coffee maker**	330	100	0	0	160	0	0
Non-electric can opener	120	110	20	0	0	0	0
Ice cream maker	80	80	0	0	0	0	0
Ice crusher	70	0	0	0	0	0	0
Electric can opener	60	50	0	0	0	0	0
Total	323,530	190,340	24,100	17,860	17,390	13,270	12,130

Table 1.C. 2011 Injuries Involving Kitchen Products Excluding Cooking Equipment Reported to Hospital Emergency Rooms, by Type of Product

* Includes chafing dishes, fondue pots, and metal, non-metal, unclassified and unknown-type cookware.

** This does not include 2,480 injuries involving unknown-type coffee makers, which might be powered (and so cooking equipment) or unpowered.

Source: CPSC's NEISS.

In 2010, an estimated 1,680 reported U.S. home structure fires⁵ involving refrigerators, freezers, or ice makers resulted in 25 civilian injuries and \$67 million in direct property damage.

Refrigerator and freezer non-confined fires declined by more than half from 1980 to 1998. After some volatility during the transition years as NFIRS Version 5.0 was introduced, the estimates returned to the levels of the mid-1990's. (See Figure 2.1 and Table 2.1.)





Note: These 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. National estimates are projections. Fires are rounded to the nearest hundred. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or reported as cooking or other kitchen equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. *Because of low participation in NFIRS Version 5.0 during 1999-2001, estimates for those years are highly uncertain and must be used with caution.*

Source: Data from NFIRS Version 5.0 and NFPA survey.

Refrigerator fires outnumbered fires involving separate freezers by roughly 9-to-1 in 2006-2010.

See Table 2.A.

 $^{^{5}}$ Beginning in 1999, limited reported is permitted for fires coded as confined fires. There are six types – confined to cooking vessel, chimney or flue, burner or boiler, trash, incinerator, or commercial compactor. In 2006-2010, there were an estimated 124 confined fires per year involving refrigerators, separate freezers, or separate ice makers – 45 confined to trash, 42 confined to cooking vessel, 20 confined to incinerator, 10 confined to fuel burner or boiler, 7 confined to chimney or flue, and none confined to commercial compactor. None of these fires are included in the analysis in this report.

Table 2.A. Home Fires Involving Refrigerator or Freezer, by Type of EquipmentAnnual Average of 2006-2010 Structure Fires Reported to U.S. Fire Departments(Excluding Fires Reported as Confined Fires)

Equipment	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Millions)
Refrigerator	1,530	2	47	\$41
Separate freezer	170	0	8	\$9
Separate ice maker	10	0	1	\$0
Total	1,710	2	56	\$50

Note: These 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. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion or one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and civilian injuries are expressed to the nearest one and property damage is rounded to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or reported as cooking or other kitchen equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Does not include 124 fires per year coded as confined fires – 98 refrigerator and 13 each freezer and ice maker.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Most home structure fires involving refrigerators or freezers involved electrical or mechanical failures or malfunctions with few details, if any, on the nature of the failure or malfunction. The leading mechanical or electrical factors contributing to ignition with some details include short circuit arc from defective or worn insulation (5% of fires), short circuit arc from mechanical damage (3% of fires), and arc from faulty contact or broken conductor (2%). See Table 2.2.

Roughly three of five home structure fires involving refrigerators or freezers began with ignition of appliance housing or casing (31%) or wire or cable insulation (30%).

The coded data do not indicate whether the appliance housing or wire insulation ignited is part of the kitchen appliance involved in ignition or part of some other appliance or equipment in or next to the kitchen appliance that supplied the heat of ignition. See Table 2.3.

Two-thirds of home structure fires involving refrigerators or freezers began in the kitchen (66%).

The second leading area of origin for refrigerator or freezer fires was garage (12%). See Table 2.4.

In 2011, an estimated 49,660 injuries involving refrigerators, freezers or ice makers were reported to hospital emergency rooms.⁶

Refrigerators accounted for 41,790 injuries, freezers for 7,460 injuries, and ice makers for 480 injuries. Most injuries related to refrigerators, freezers or ice makers, were sprains or strains (10,500), contusions or abrasions (10,260), lacerations (8,310), or fractures (6,630). These are injuries that may occur when moving the refrigerator or freezer or when a person or an appliance falls onto the other.

⁶ Statistics from the National Electronic Injury Surveillance system (NEISS), queried at the U.S. Consumer Product Safety Commission website, <u>www.cpsc.gov</u>.

Safety Tips:

- To help prevent refrigerator and freezer fires, have a professional inspect the appliance to see that the wiring is safe and that the mechanical parts of the refrigerator are in good working order.
- Make sure the refrigerator is plugged directly into a wall outlet appropriate for that type of appliance.
- Do not install or place combustibles too close to the refrigerator or freezer. When installing, leave air space in the back between the refrigerator and wall for heat to vent from the refrigerator.
- Remove lint and dust from under and behind the unit periodically.
- Make sure the power cord is not pinched in back of or under the appliance.

Voor	Fires	Civilian Injurios	Direct Propert	y Damage (in Millions)
I Cal	11105	injuries	As Reported	III 2010 Donais
1980	3.040	30	\$17	\$44
1981	2,890	81	\$14	\$34
1982	2,570	41	\$17	\$38
1983	2,500	79	\$20	\$43
1984	2,380	51	\$20	\$42
1985	2,510	58	\$22	\$44
1986	2,320	60	\$17	\$33
1987	2,180	69	\$18	\$35
1988	2,080	60	\$21	\$38
1989	1,870	105	\$23	\$40
1990	1,860	77	\$21	\$35
1991	1,860	75	\$31	\$49
1992	1,730	54	\$25	\$39
1993	1,800	76	\$20	\$30
1994	1,540	69	\$17	\$25
1995	1,440	64	\$16	\$24
1996	1,320	33	\$18	\$24
1997	1,200	78	\$19	\$26
1998	1,250	46	\$20	\$27
1999	2,180	513	\$18	\$24
2000	2,180	106	\$58	\$74
2001	1,370	71	\$69	\$85
2002	1,890	37	\$39	\$48
2003	1,510	58	\$65	\$78
2004	1,480	86	\$34	\$40
2005	1,560	83	\$53	\$59
2006	1,460	50	\$44	\$47
2007	1,940	107	\$35	\$37
2008	1,820	14	\$57	\$57
2009	1,630	83	\$56	\$57
2010	1,680	25	\$67	\$67

Table 2.1. Home Fires Involving Refrigerator, Freezer, or Ice Maker, by YearStructure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Note: These 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. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian injuries to the nearest one and property damage to the nearest million dollars. Civilian deaths are too variable for meaningful year-by-year estimates. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or reported as cooking or kitchen equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Before 1999, statistics are for "local, fixed refrigerator units" and also include a proportional allocation of fires coded as air conditioning or refrigeration of unknown type but no allocation of fires involving portable or unclassified air conditioning or refrigerator devices. *Because of low participation in NFIRS Version 5.0 during 1999-2001, estimates for those years are highly uncertain and must be used with caution*. Inflation adjustment to 2010 dollars is done using the consumer price index.

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2010) and from NFPA survey.

Factor		Fires	Civ Dea	rilian aths	Civ Inj	vilian uries	Direct Damage	: Property (in Millions)
Unclassified electrical failure								
or malfunction	460	(27%)	0	(0%)	13	(23%)	\$17	(34%)
Unclassified mechanical								
failure or malfunction	430	(25%)	2	(100%)	18	(33%)	\$11	(22%)
Unspecified short circuit arc	260	(15%)	0	(0%)	10	(17%)	\$7	(15%)
Arc or spark from operating		. ,				, í		
equipment	110	(6%)	0	(0%)	0	(0%)	\$5	(11%)
Short circuit arc from						, í		
defective or worn								
insulation	90	(5%)	0	(0%)	2	(4%)	\$3	(5%)
Heat source too close to						· · · ·		
combustibles	70	(4%)	0	(0%)	2	(4%)	\$3	(6%)
Worn out	60	(3%)	0	(0%)	0	(0%)	\$1	(2%)
Failure to clean	50	(3%)	0	(0%)	0	(0%)	\$0	(1%)
Short circuit arc from						· · ·		~ /
mechanical damage	40	(3%)	0	(0%)	5	(8%)	\$1	(3%)
Arc from faulty contact or						· · ·		~ /
broken conductor	30	(2%)	0	(0%)	0	(0%)	\$1	(2%)
Unclassified factor				. ,		· · · ·		
contributed to ignition	30	(2%)	0	(0%)	0	(0%)	\$1	(2%)
Equipment overloaded	20	(1%)	0	(0%)	0	(0%)	\$1	(2%)
Unclassified misuse of						· · · ·		
material or product	20	(1%)	0	(0%)	0	(0%)	\$1	(1%)
Unclassified operational						· · · ·		
deficiency	20	(1%)	0	(0%)	0	(0%)	\$0	(1%)
Automatic control failure	20	(1%)	0	(0%)	0	(0%)	\$0	(1%)
Improper container or						· · · ·		
storage	10	(1%)	0	(0%)	2	(4%)	\$2	(4%)
Leak or break	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Equipment not being								
operated properly	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Water caused short circuit						· · · ·		
arc	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Storm	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Other known factor	50	(3%)	0	(0%)	8	(14%)	\$2	(4%)
Total fires	1,710	(100%)	2	(100%)	56	(100%)	\$50	(100%)
Total factor entries	1,820	(107%)	2	(100%)	61	(108%)	\$57	(115%)

Table 2.2. Home Structure Fires Involving Refrigerator, Freezer or Ice Maker, by Factor Contributing to Ignition Annual Average of 2006-2010 Structure Fires Reported to U.S. Fire Departments (Excluding Fires Reported as Confined Fires)

Note: Multiple entries are allowed, resulting in more factor entries than fires. These 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. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as cooking or kitchen equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home fires with this equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Table 2.3. Home Structure Fires Involving Refrigerator, Freezer or Ice Maker, by Item First Ignited Annual Average of 2006-2010 Structure Fires Reported to U.S. Fire Departments (Excluding Fires Reported as Confined Fires)

Item First Ignited]	Fires	C D	Civilian Deaths	Civ Inju	ilian 1ries	Direct F Damage (i	Property in Millions)
Appliance housing or casing	530	(31%)	0	(0%)	21	(38%)	\$13	(27%)
Wire or cable insulation	500	(30%)	2	(100%)	15	(26%)	\$11	(23%)
Interior wall covering	130	(8%)	0	(0%)	0	(0%)	\$5	(11%)
Unclassified item	70	(4%)	0	(0%)	2	(3%)	\$1	(3%)
Floor covering	50	(3%)	0	(0%)	2	(3%)	\$1	(3%)
Structural member or framing	40	(3%)	0	(0%)	3	(5%)	\$4	(9%)
Dust, fiber, or lint	40	(2%)	0	(0%)	0	(0%)	\$0	(1%)
Multiple items first ignited	30	(2%)	0	(0%)	2	(3%)	\$1	(1%)
Flammable or combustible								
gas or liquid	30	(2%)	0	(0%)	7	(13%)	\$2	(5%)
Unclassified structural								
component or finish	30	(2%)	0	(0%)	0	(0%)	\$2	(5%)
Cabinetry	20	(1%)	0	(0%)	0	(0%)	\$1	(2%)
Exterior wall covering or								
finish	20	(1%)	0	(0%)	1	(2%)	\$1	(2%)
Clothing	20	(1%)	0	(0%)	0	(0%)	\$1	(1%)
Cooking materials	20	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified furniture or								
utensil	20	(1%)	0	(0%)	0	(0%)	\$0	(1%)
Insulation within structural								
area	20	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Papers	10	(1%)	0	(0%)	0	(0%)	\$0	(1%)
Household utensil	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Box or bag	10	(1%)	0	(0%)	0	(0%)	\$1	(1%)
Unclassified soft goods or								
clothing	10	(1%)	0	(0%)	2	(3%)	\$1	(2%)
Interior ceiling covering	10	(1%)	0	(0%)	1	(2%)	\$0	(1%)
Trash or waste	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Other known item first								
ignited	60	(3%)	0	(0%)	1	(2%)	\$1	(3%)
Total fires	1,710	(100%)	2	(100%)	56	(100%)	\$50	(100%)

Note: These 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. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as cooking or kitchen equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding.

Table 2.4. Home Structure Fires Involving Refrigerator, Freezer or Ice Maker, by Area of Origin Annual Average of 2006-2010 Structure Fires Reported to U.S. Fire Departments (Excluding Fires Reported as Confined Fires)

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Kitchen	1,130	(66%)	2	(100%)	37	(66%)	\$24	(48%)
Garage*	200	(12%)	0	(0%)	4	(7%)	\$11	(23%)
Laundry room or area	50	(3%)	0	(0%)	0	(0%)	\$3	(5%)
Crawl space or substructure								
space	30	(2%)	0	(0%)	1	(2%)	\$0	(1%)
Unclassified function area	30	(2%)	0	(0%)	3	(5%)	\$1	(3%)
Living room, family room,								
or den	20	(1%)	0	(0%)	0	(0%)	\$1	(3%)
Unclassified storage area	20	(1%)	0	(0%)	1	(2%)	\$1	(1%)
Exterior balcony or								
unenclosed porch	20	(1%)	0	(0%)	0	(0%)	\$1	(2%)
Wall assembly or concealed								
space	20	(1%)	0	(0%)	0	(0%)	\$1	(1%)
Unclassified area of origin	20	(1%)	0	(0%)	0	(0%)	\$1	(2%)
Bedroom	20	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified structural area	20	(1%)	0	(0%)	0	(0%)	\$0	(1%)
Storage room or area	20	(1%)	0	(0%)	0	(0%)	\$0	(1%)
Exterior wall surface	10	(1%)	0	(0%)	0	(0%)	\$0	(1%)
Courtyard, terrace or patio	10	(1%)	0	(0%)	1	(2%)	\$0	(1%)
Unclassified equipment or								
service area	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Other known area of origin	70	(4%)	0	(0%)	8	(15%)	\$4	(7%)
Total fires	1,710	(100%)	2	(100%)	56	(100%)	\$50	(100%)

* Excludes residential garages coded as separate properties.

Note: These 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. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as cooking or kitchen equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home fires with this equipment and area of origin unknown have also been allocated proportionally. Totals may not equal sums because of rounding error.

Section 3. Dishwashers

In 2010, an estimated 1,170 reported U.S. home structure fires⁷ involving dishwashers resulted in six civilian injuries and \$30 million in direct property damage. See Table 3.A. There is no clear, steady trend.

Table 3.A. Home Fires Involving Dishwasher, by YearStructure Fires Reported to U.S. Fire Departments(Excluding Fires Reported as Confined Fires)

		Civilian	Direct Property Damage (in Millions)					
Year	Fires	Injuries	As Reported	In 2010 Dollars				
2002	1,140	37	\$10	\$12				
2003	1,070	49	\$20	\$24				
2004	1,070	10	\$21	\$24				
2005	1,220	25	\$38	\$42				
2006	1,130	21	\$18	\$20				
2007	1,350	14	\$19	\$20				
2008	1,100	21	\$25	\$25				
2009	900	32	\$24	\$24				
2010	1,170	6	\$30	\$30				

Note: These 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. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion or one unusually serious fire. Fires are rounded to the nearest hundred, civilian injuries are expressed to the nearest ten and property damage is rounded to the nearest million dollars. Civilian deaths are too variable for meaningful year-by year estimates. Figures reflect a proportional share of home fires with equipment involve in ignition unknown or reported as cooking or other kitchen equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Inflation adjustment to 2010 dollars is done using the consumer price index.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Most home structure fires involving dishwashers involved electrical or mechanical failures or malfunctions with few if any details on the nature of the failure or malfunction.

The leading mechanical or electrical factors contributing to ignition with some details include short circuit arc from defective or worn insulation (5%), short circuit arc from mechanical damage (2%), automatic control failure (2%), and arc from faulty contact or broken conductor (2%). See Table 3.1.

 $^{^{7}}$ Beginning in 1999, limited reported is permitted for fires coded as confined fires. There are six types – confined to cooking vessel, chimney or flue, burner or boiler, trash, incinerator, or commercial compactor. In 2006-2010, there were an estimated 96 confined fires per year involving dishwashers – 86 confined to cooking vessel, 10 confined to commercial compactor, and none confined to trash, chimney or flue, fuel burner or boiler, or incinerator. None of these fires are included in the analysis in this report.

Roughly three-fourths of home structure fires involving dishwashers began with ignition of appliance housing or casing (47%) or wire or cable insulation (26%).

The coded data do not indicate whether the cited appliance housing or casing or wire insulation is part of the dishwasher or part of some other appliance or equipment in or next to the dishwasher. See Table 3.2.

Nearly all (95%) home structure fires involving dishwashers began in the kitchen. See Table 3.3.

In 2011, an estimated 9,790 injuries involving dishwashers were reported to hospital emergency rooms.⁸

Half of these injuries (4,850) related to dishwashers involved lacerations.

Safety Tips

- For greatest assurance of safe installation, have a professional install any major appliance.
- Make sure power cords are not pinched or crimped.
- Make sure appliances are connected to circuits with enough capacity.
- Make sure any equipment has adequate clearance from nearby fixed and portable combustibles.

⁸ Statistics from the National Electronic Injury Surveillance System (NEISS), queried at the U.S. Consumer Product Safety Commission website, <u>www.cpsc.gov</u>.

Fastar		F ina	C	ivilian	Civ	vilian	Direct	Property
Factor		Fires	I	Deatns	Inj	uries	Damage	(in Millions)
Unclassified electrical failure								
or malfunction	310	(28%)	2	(100%)	10	(54%)	\$8	(36%)
Unclassified mechanical								
failure or malfunction	240	(21%)	0	(0%)	4	(19%)	\$6	(25%)
Unspecified short circuit arc	230	(20%)	0	(0%)	2	(8%)	\$5	(23%)
Short circuit arc from defective								
or worn insulation	60	(5%)	0	(0%)	2	(10%)	\$0	(1%)
Heat source too close to								
combustibles	40	(4%)	0	(0%)	0	(0%)	\$1	(2%)
Arc or spark from operating								
equipment	40	(3%)	0	(0%)	0	(0%)	\$2	(9%)
Equipment unattended	30	(3%)	0	(0%)	0	(0%)	\$2	(7%)
Unclassified operational								
deficiency	30	(3%)	0	(0%)	0	(0%)	\$0	(1%)
Unclassified factor contributed								
to ignition	30	(2%)	0	(0%)	0	(0%)	\$0	(2%)
Short circuit arc from				· /		, í		
mechanical damage	30	(2%)	0	(0%)	0	(0%)	\$0	(1%)
Automatic control failure	20	(2%)	0	(0%)	2	(9%)	\$0	(0%)
Arc from faulty contact or								
broken conductor	20	(2%)	0	(0%)	0	(0%)	\$0	(1%)
Design deficiency	20	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified design,				~ /				
manufacturing or								
installation deficiency	10	(1%)	0	(0%)	0	(0%)	\$2	(7%)
Installation deficiency	10	(1%)	0	(0%)	0	(0%)	\$0	(1%)
Water caused short circuit arc	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Abandoned or discarded								()
material or product	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Manufacturing deficiency	10	(1%)	0	(0%)	0	(0%)	\$1	(3%)
Animal	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Unintentionally turned on or								
not turned off	10	(1%)	0	(0%)	0	(0%)	\$0	(1%)
Equipment overloaded	10	(1%)	0	(0%)	0	(0%)	\$0	(1%)
Equipment not being operated				()		()		())
properly	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Other known factor	30	(2%)	0	(0%)	0	(0%)	\$0	(1%)
Total fires	1,130	(100%)	2	(100%)	19	(100%)	\$23	(100%)
Total factor entries	1,200	(106%)	2	(100%)	19	(100%)	\$27	(120%)

Table 3.1. Home Structure Fires Involving Dishwasher, by Factor Contributing to IgnitionAnnual Average of 2006-2010 Structure Fires Reported to U.S. Fire Departments(Excluding Fires Reported as Confined Fires)

Note: Multiple entries are allowed, resulting in more factor entries than fires. These 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. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as cooking or kitchen equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home fires with this equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Table 3.2. Home Structure Fires Involving Dishwasher, by Item First IgnitedAnnual Average of 2006-2010 Structure Fires Reported to U.S. Fire Departments(Excluding Fires Reported as Confined Fires)

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Appliance housing or casing	530	(47%)	2	(100%)	8	(42%)	\$10	(44%)
Wire or cable insulation	290	(26%)	0	(0%)	7	(34%)	\$4	(18%)
Household utensil	80	(7%)	0	(0%)	0	(0%)	\$1	(2%)
Cabinetry	60	(6%)	0	(0%)	0	(0%)	\$4	(16%)
Unclassified item	40	(4%)	0	(0%)	0	(0%)	\$1	(4%)
Structural member or framing	20	(1%)	0	(0%)	4	(24%)	\$1	(5%)
Unclassified furniture or								
utensil	10	(1%)	0	(0%)	0	(0%)	\$0	(2%)
Unclassified structural								
component or finish	10	(1%)	0	(0%)	0	(0%)	\$0	(2%)
Interior wall covering	10	(1%)	0	(0%)	0	(0%)	\$1	(3%)
Cooking materials	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Floor covering	10	(1%)	0	(0%)	0	(0%)	\$0	(1%)
Multiple items first ignited	10	(1%)	0	(0%)	0	(0%)	\$0	(2%)
Papers	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Other known item first ignited	30	(3%)	0	(0%)	0	(0%)	\$0	(1%)
Total fires	1,130	(100%)	2	(100%)	19	(100%)	\$23	(100%)

Note: These 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. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as cooking or kitchen equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home fires with this equipment and item first ignited unknown have also been allocated proportionally. Totals may not equal sums because of rounding.

Table 3.3. Home Structure Fires Involving Dishwasher, by Area of Origin Annual Average of 2006-2010 Structure Fires Reported to U.S. Fire Departments (Excluding Fires Reported as Confined Fires)

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Kitchen	1,070	(95%)	2	(100%)	14	(72%)	\$22	(96%)
Unclassified structural area	10	(1%)	0	(0%)	0	(0%)	\$0	(1%)
Unclassified function area	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Wall assembly or concealed space	10	(1%)	0	(0%)	4	(20%)	\$0	(2%)
Unclassified equipment or service area	10	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Laundry room or area	10	(1%)	0	(0%)	0	(0%)	\$0	(1%)
Other known area of origin	20	(1%)	0	(0%)	1	(7%)	\$0	(0%)
Total fires	1,130	(100%)	2	(100%)	19	(100%)	\$23	(100%)

Note: These 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. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation.. Figures reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as cooking or kitchen equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home fires with this equipment and area of origin unknown have also been allocated proportionally. Totals may not equal sums because of rounding error.

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 <u>http://www.nfirs.fema.gov/</u>. 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 <u>http://www.nfpa.org/assets/files/PDF/OS.fireloss.pdf</u>.

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 <u>http://www.nfpa.org/osds</u> 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:



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.

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.

Although causal and other detailed information is typically not required for these incidents, it is provided in some cases. Some analyses, particularly those that examine cooking equipment, heating equipment, fires caused by smoking materials, and fires started by playing with fire, may examine the confined fires in greater detail. Because the confined fire incident types describe certain scenarios, the distribution of unknown data differs from that of all fires. Consequently, allocation of unknowns must be done separately.

Some analyses of structure fires show only non-confined fires. In these tables, percentages shown are of non-confined structure fires rather than all structure fires. This approach has the advantage of showing the frequency of specific factors in fire causes, but the disadvantage of

possibly overstating the percentage of factors that are seldom seen in the confined fire incident types and of understating the factors specifically associated with the confined fire incident types.

Other analyses include entries for confined fire incident types in the causal tables and show percentages based on total structure fires. In these cases, the confined fire incident type is treated as a general causal factor.

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.

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

All fires in range 60-69 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

All fires
(All fires – blank – undetermined – [fires in which EII =NNN and heat source <>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
1	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)
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
· · I · · I	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.